PROCEEDING
INTERNATIONAL SEMINAR

January, 8-10th, 2020

"The Application of "CERDIK" Programs In The Management of Diabetes Mellitus"

LEMBAGA PENELITIAN DAN PENGABDIAN MASYARAKAT
STIKES WIJAYA HUSADA BOGOR

PRCEEDING
International Seminar

Thema:

"The Application of "CERDIK" Program In The Management of Diabetes Mellitus"

Bogor, 8-10 January 2020

Diselenggarakan oleh:

Lembaga Penelitian dan Pengabdian Masyarakat

Sekolah Tinggi Ilmu Kesehatan

Wijaya Husada Bogor

DEWAN REDAKSI

PROCEEDING INTERNATIONAL SEMINAR
"The Application of "CERDIK" Program In The Management of Diabetes Mellitus"

Bogor, 8-10 January 2020

Alamat Redaksi :
STIKES Wijaya Husada Bogor
Jl. Letjend Ibrahim Adjie No 180 Sindang Barang Bogor Barat
Phone :0251-8327396 / 0251-8327399
Mobile: 0852-1670-1658 / 0812-9581-9088
Email: wijayahusada@gmail.com
Website: www.wijayahusada.com

P R A K A T A

Assalamualaikum Wr. Wb

Puji syukur kehadirat Allah SWT yang senantiasa memberikan rahmatnya kepada kita sekalian, sehingga kita dapat menerbitkan *Proceeding International Seminar* sebagai upaya peningkatan Tri Dharma Perguruan Tinggi.

Prosiding ini merupakan prosiding yang diterbitkan oleh STIKes Wijaya Husada sebagai sarana untuk menyajikan perkembangan ilmu pengetahuan dan teknologi dalam pelayanan kesehatan. Dalam proses pengerjaannya, tentunya tidak sedikit halangan, namun dengan bantuan berbagai pihak yang tidak pernah berhenti dapat teratasi.

Prosiding ini dapat dimanfaatkan oleh Dosen, maupun Mahasiswa Kesehatan lainnya, yang tertarik dengan masalah kesehatan. Harapan kami terbitan prosiding ini dapat menjadi wadah – wadah berbagai ilmu bagi dosen dan mahasiswa. Serta dengan hadirnya prosiding ini semakin memicu tumbuh & suburnya budaya menulis ilmiah serta semangat berkarya diantara kita.

Selamat membaca & semoga bermanfaat

Wassalamualaikum Wr.Wb

DAFTAR ISI

PROCEEDING INTERNATIONAL SEMINAR

"The Application of "CERDIK" Program In The Management of Diabetes Mellitus"

Bogor, 8-10 January 2020

Proceeding International Seminar
The Application of "CERDIK" Programs In The Management of Diabetes Mellitus
Bogor, 8-10 January, 2020

THE EFFECT OF TRADITIONAL DRINK OF SIRSAK LEAVES ON BLOOD SUGAR LEVELS OF DIABETES MELLITUS PATIENTS IN ELDERLY

Widia Astuti, Ade Suryani, Retno Dwi Santi, Ayu Sri Rejeki
Wijaya Husada Health Science Institute

ABSTRACT

The results of a preliminary study in Puskesmas North Bogor on July 29, 2019 from interviewing 10 people suffering from DM data obtained that 4 people said they had heard the benefits of sour sop leaf decoction but had never used it, 3 respondents said that knowing sour sop leaf as a medicine but did not know the benefits of sour sop leaf as a blood sugar-lowering, 2 respondents did not know the benefits of sour sop leaf decoction as an anti-diabetic, and 1 respondent knows and uses a traditional sour sop leaf drink to reduce sugar levels. The purpose of this study is the effect of sour sop leaf traditional drinks on blood sugar levels in patients with diabetes mellitus in the elderly at the Health Center in North Bogor. The method used is a experimental study Pre-Test-Post-Test Design, using quantitative data analysis. The study was conducted at the North Bogor Health Center. The research sample was taken using a purposive sampling technique, with a total sample of 40 elderly people divided into 20 intervention groups and 20 control groups.
The results showed that the influences of the traditional drink sour sop leaves on blood sugar levels of patients with diabetes mellitus in the elderly in North Bogor health center, where the results of the calculation of Independent Sample T-Test unknown value$_t$ of 3.163 with 0.000 significance. The value of t_{table} from dk = 80-2 = 78 is 2,000. So it can be concluded that $t_{count} > t_{table}$ (3.163> 2,000)
So that it can be stated that there is an influence of sour sop leaf traditional drinks on blood sugar levels in patients with diabetes mellitus in the elderly at the North Bogor Health Center. For people with diabetes mellitus, especially the elderly, it is expected that the results of this study can be used as a means to reduce blood sugar levels by drinking a traditional sour sop leaf drink. The results of this study can be used as a support for further research and used as a source of reading material and references in the STIKes Wijaya Husada Bogor library.

Keywords : Traditional, Blood Sugar Levels, Elderly

INTRODUCTION

The number of DM sufferers will increase to 552 million people in 2030. DM sufferers are scattered from urban to rural areas. The total number of DM sufferers in Indonesia based on WHO data in 2017 is around 8 million and it is estimated that the number will exceed 21 million in 2030. This number makes Indonesia the fourth largest country with diabetes after China, India and America. Indonesia is facing a diabetes threat situation similar to that of the *International Diabetes Federation* (IDF) Atlas 2017 reports that the Diabetes epidemic in Indonesia is still showing an increasing trend. Indonesia is the sixth country in the world after

China, India, the United States, Brazil and Mexico with about 10.3 million people with diabetes aged 20-79 years.[1]

Currently, there are approximately 425 million people in the world who have diabetes. By 2030, it is estimated that the number will increase to 600 million people. In Indonesia, there are already more than 10 million people who have diabetes. Meanwhile, the incidence of diabetes in West Java in 2017 was 4.2% with the number of people with diabetes at 7.8%.[2]

The high prevalence of DM sufferers in Indonesia has led to various treatment efforts, both pharmacological and non-pharmacological. Pharmacological treatment is expensive and causes side effects. Meanwhile, traditional or alternative medicine is not expensive and has no side effects.[3]

In non-pharmacological therapy, there are many medicinal plants that are reported to be useful and used as antidiabetic agents empirically. The content of chemical compounds in plants is reported to be safe for people with diabetes mellitus. Research on the discovery of new anti-diabetic agents from plants is still ongoing, although it is known that more than 400 plants have hypoglycemic activity.[4]

One of the anti-diabetic medicinal plants that has not been widely researched scientifically is the sour sop plant. The part of the sour sop plant that has anti-diabetic properties is the leaves. Sour sop leaves are believed to be used as a diabetes mellitus drug. The content ofsour sop leaves among other *acetogeninsthings, annocatacin, annocatalin, annohexocin, annonacin, annomuricin, anomurine, anonol, caclourine, gentisic acid, gigantetronin, linoleic acid, muricapentocin, flavonoids,* alkaloids, fatty acids, *phytosterols, mirisil alcohol* and anonol.[5]

Research conducted by Arizona on the effectiveness of sour sop leaf boiled water in reducing blood sugar levels in mice concluded that consumption of sour sop leaf boiled water can help reduce blood glucose levels in mice.[6]

Sour sop (*Annona muricata* L.) is a plant that grows in Indonesia which

has many benefits and uses. Each part of this plant has many benefits, one of which is the leaves. Sour sop leaves have been used by some Indonesians as traditional medicine, including as a back pain medication, relieving pain, itching, rheumatism, ulcers and fever.[7]

Sour sop leaves contain flavonoids, alkaloids, fatty acids, phytosterols, myristil alcohol and anonols. The compounds in sour sop leaves that have antidiabetic properties are alkaloids and flavonoids.[8] Flavonoids can stimulate the effect of insulin by influencing the *phosphokinase* protein. In addition, flavonoids also have hypoglycemic activity or decrease blood glucose levels by inhibiting important enzymes that play a role in breaking down carbohydrates into monosaccharides that can be absorbed by the intestine, namely alpha amylase and alpha glucosidase enzymes.[9]

Sour sop leaf extract can improve the function of pancreatic beta cells which produce insulin function. Sour sop leaves with a given dose have a hypoglycemic effect thought to be caused by flavonoids that stimulate insulin secretion, increase β-cell repair or proliferation and increase the effect of insulin.[10]

Non - pharmacological management was carried out for the first time for diabetes mellitus patients, in the form of meal planning and exercise /*exercise*. Then if these steps are not on target, the next step is drug / pharmacological management. In addition, blood sugar levels must be monitored regularly. Blood sugar checked before and after meals is useful in monitoring the results of diet, exercise, and other medications.[11]

Disorders of lipid metabolism in diabetes mellitus cause abnormalities in the hepatic cells. The pathogenesis of abnormalities in hepatic cells arises because of the insulin resistance produced by lipolysis. This lipolysis will increase the circulation of free fatty acids which are then taken up by the liver. These fatty acids in the liver will cause the formation of free radicals that cause lipid peroxidation.[12] Fatty liver in diabetes mellitus is also related to

ketosis which occurs due to the absence of insulin which causes the transport of glucose into cells, so that carbohydrates that should be metabolized and stored in the form of glycogen in the liver will be metabolized into fat. Liver damage due to exposure to reactive radicals in DM sufferers can be prevented by antioxidant compounds.[13]

The results of Ari Rahmat Aziz's research (2013) in his research entitled Effectiveness of Sour sop (Annona Muricata) Leaf Boiled Water on Blood Sugar Levels in Patients with Type II Diabetes Mellitus. The results showed that the test showed that the average blood glucose patient with diabetes after being given sour sop with boiled water. The blood glucose level before being given boiled sour sop leaf water was 236.60 mg / dl in the experimental group and 279.67 mg / dl in the control group. with p value = 0.006. The dependent sample t test in the experimental group showed that the average patient with blood glucose was 277.07 mg / dl, and after being given boiled sour sop leaf water was 236.60 mg / dl, that means a decrease in blood glucose levels was around 40.467 mg. / dl with p value = 0.000.[14]

The results of Afriani Rini's research (2015) found that there was an effect of giving sour sop leaf boiled water on blood sugar levels in people with diabetes mellitus (p value = 0.000). It was concluded that there was an effect of giving sour sop leaf boiled water on blood sugar levels in people with Diabetes Mellitus.[15]

The results of a preliminary study at the North Bogor Public Health Center on July 29, 2019, from interviews with 10 people suffering from diabetes, it was found that 4 people said they had heard of the benefits of sour sop leaf decoction but had never used it, 3 respondents said that they knew sour sop leaves as medicine but did not know the benefits of sour sop leaves as a blood sugar lowering, 2 respondents did not know the benefits of sour sop leaf decoction as an anti-diabetes, and 1 respondent knew and used traditional sour sop leaf drinks to reduce sugar levels.

Based on the description above, further research was carried out with the title "The Effect of Traditional Sour sop Leaf Drinks on Blood Sugar Levels for Elderly Diabetes Mellitus Patients at North Bogor Community Health Center in 2019".

From the background previously described, the problem formulation in this study is "Is there an effect of traditional sour sop leaf drinks on blood sugar levels on elderly diabetes mellitus patients at the North Bogor Puskesmas in 2019?"

The purpose of this study was to determine the effect of traditional sour sop leaf drinks on blood sugar levels in elderly patients with diabetes mellitus at the North Bogor Community Health Center in 2019.

RESEARCH METHOD

This research is an experimental study *Pre-Test-Post-Test Design*, using quantitative data analysis. The test was carried out twice, namely before and after the experiment. The test conducted before the experiment (O_1) is called the pretest and the observation after the experiment (O_2) is called the posttest. The difference between O_1 and $O_{2\ is}$ that O_1-O_2 is assumed to be the effect of thetreatment or experiment. *Pre-Test-Post-Test Design*.

The hypothesis is a temporary answer to the problem to be studied which is still presumptive because it still has to be proven.[18] The hypothesis proposed in this study is to find out the effect and difference of traditional sour sop leaf drinks on reducing blood sugar levels in elderly patients with diabetes mellitus, if the *p-value is* ≤ 0.05.

The population in this study were the elderly who suffered from diabetes mellitus at the North Bogor Public Health Center, as many as 207 people consisting of 101 men and 106 women.

The research sample was taken using *purposive sampling technique*, namely one of the *non-random sampling techniques* where the researcher determines the sampling by determining specific characteristics in accordance with the research objectives so that it is expected to be able to answer the research problem.[21] The specific characteristics referred to are the

elderly at Puskesmas Bogor Utara who suffer from diabetes.

To determine the sample, Federer's formula is used as follows:

$$(n-1) \times (t-1) \geq 15$$

Thus, each group has a minimum of 16 samples, the authors chose to use 20 samples per group with 2 groups so that the total number of subjects (sample) research as many as 40 people.

Hypothesis testing is basically a decision-making method based on data analysis. In this research, t test hypothesis will be tested. unpaired groups, meaning that the data sources come from different subjects.

In addition to using the *Independent T Test* , the *Mann Whitney U Test* is also used, which is a non-parametric test used to determine the difference in the median of 2 independent groups if the dependent variable data scale is ordinal or interval / ratio but not

RESEARCH RESULTS

A. Assessment of Sugar Levels

Table 1 Distribution of Sample Frequency Based on Group of Blood Sugar Levels of Diabetes Mellitus Patients in the Elderly

Blood Sugar Levels in	the Intervention				Group Control Group			
	Pre-Test		Post-Test		Pre-Test		Post-Test	
	F	%	F	%	F	%	F	%
Normal	0	0	0	0	0	0	7	35
Pre-Diabetes	0	0	8	40	3	15	5	25
Diabetes	20	100	12	60	17	85	8	40
Total	20	100	20	100	20	100	20	100

Source: Processed Primary Data

Based on table 1 shows that out of 20 respondents in the intervention group obtained data on the elderly who had diabetes blood sugar levels in the pre-test as many as 20 respondents (100%) greater than the post-test with diabetes blood sugar levels, namely 12 respondents (60%). The control group during the pre-test diabetes blood sugar levels were 17 respondents (85%) greater than the post-test, namely 8 respondents (40%). This shows that the blood sugar levels of diabetic patients in the elderly have decreased

after drinking the traditional sour sop leaf drink.

B. Control Group Normality Test

Based on the control group data, it can be seen the results of the normality test in the following.

Table 2. Results of Normality Test for Control Group Giving Traditional Drinks of Sour sop Leaves

Kel.	Shapiro-Wilk			sig	
	Sta	df	Sig.		
Pre-Test	0.924	20	0.120	0.05	Normal
Post-Test	0.960	20	0.544	0.05	Normal

Source: Primary Data Processed

Based on the table above, it is known that the significant value of the control group data in *the Shapiro-Wilk Test* is 0.120 in the *Pre-Test* and 0.544 in *Post-Test*. From these data we can conclude that the data of blood sugar levels in the control group giving traditional drink sour sop leaf isdistribution, **Normal,** this was due to the significant value that is greater than 0.05.

C. Normality Test Intervention Group C. Giving Traditional Drink Sour sop Leaf

Data sugar intervention group given traditional drink sour sop leaves can be seen at the normality test results below.

Table 3. Results of the Intervention Group Normality Test for Giving Traditional Drinks of Sour sop Leaves

Intervention of	**Shapiro-Wilk**			**Sig.**	
	Sta	**df**	**Sig.**		
Pre-Test	0.817	20	0.200	0.05	Norma
Post-Test	0.805	20	0.100	0.05	Normal

Source: Primary Data Processed

Based on the table above it is known that the significant value of the sugar content in the intervention group giving traditional sour sop leaves in *the Shapiro-Wilk test* is 0.200. on the *Pre-Test* and 0.100 on the *Post-Test*. From these data it can

be concluded that the sugar content data intervention group giving traditional drink sour sop leaf isdistribution, **Normal,** this was due to the significant value that is greater than 0.05.

D. Homogeneity

Test of the control group, giving traditional sour sop leaves drink.

Table4. Homogeneity Test Results of Control Group Giving Traditional Drinks of Sour sop Leaves

Sta.	df 1	df 2	Sig.	Sig.	
0.024	1	38	.878	0.05	Homogeneous

Source: Processed primary data

From the table above it can be seen that the *sig. The levene statistic* on the data about the control group is 0.878> 0.05, thus it can be concluded that the data variants of the control group both *Pre-Test* and *The Post-Test* is **homogeneous**.

E. Homogeneity Test of the Intervention Group for Giving Sour sop Leaf Traditional Drinks

Based on the results of the homogeneity test on the intervention group giving traditional sour sop leaf drinks, it can be seen in the following table.

Table 5. Results of Homogeneity Test for the Intervention Group of Traditional Drinking Sour sop Leaves

Sta.	df 1	df 2	Sig.	Sig.	
0.001	1	38	0.975	0.05	Homogeneous

Source: Processed primary data

From the table above it can be seen that the *sig. Levene Statistic* on the data about the group giving traditional sour sop leaves drink is 0.975> 0.05, so it can be concluded that the data variants of giving traditional sour sop leaf drink both *Pre-Test* and *Post-Test* are **homogeneous**.

F. T *-test for* the Intervention Group *Pre-Test andPre-Test* the Control Group

Analysis of the *Paired t-test* on the *Pre-Test for the* group giving the traditional sour sop leaf drink and the *pre-test for* the control group aims to determine whether there is a significant difference in thescores *Pre-Test* in the group. giving the traditional sour sop leaf drink and the control group. The research conclusion stated that there was a difference if the p-value <0.05. The summary of the *Paired t-test* between the *Pre-Test* group giving the traditional sour sop leaf drink and the control group is shown in the following table:

Table 6. Data Table *Paired Samples Statistics Pre-Test* Intervention Group with *Pre-Test* Control Group(n = 20)

	Mean	N	Std. Dev	Std. Error Mean	*P Value*
Control Intervention	263,75	20	62,972	14,081	0,000
	326,25	20	60,413	13,509	

Source: Primary Data Processed

From table 6, data on *paired samples statistics* shows that the mean (average) blood sugar levels of the control group when the *Pre-Test* was 263.75 and the mean (average) blood sugar level of the intervention group at the *Pre-Test* was 326.25. So it is known that the blood sugar levels in the intervention group were higher than those in the control group with an average difference of 62.5 mg / dl. The number of respondents in the study was 20 people. The results of statistical tests used the *Paired t-test Pre-Test* and *Post-Test*. The value of significance (2-tailed) shows the value of ρ-value = 0.006, which means that ρ-value <0.05. So in this case Ha is accepted, namely "There is a difference in blood sugar levels between the control group and the intervention group for diabetes mellitus patients at the Bogor Utara Health Center in 2019"

G. *Pre-Test* and *Post-Test for* the Intervention Group to Give Sour sop Leaf Traditional Drinks

The *Paired t-test* between the *pre-test* and *post-test* of the traditional sour sop leaf giving group aims to determine whether there is a difference. The research conclusion stated that there was a difference if the p-value <0.05. The summary of the *Paired t-test* between the *pre-test* and *post-test of* the experimental class is shown in the following table:

Table *7.Paired Samples Statisticsfor* the Intervention Group on Traditional Drinking Sour sop Leaves (n = 20)

	Mean	N	Std. Dev	Std. Error Mean	*P value*
Pre-Test	326,25	20	60,413	13,509	0,00
Post-Test	223,75	20	63,967	14,303	

Source: Primary Data Processed

From table 7, data on *paired samples statistics* shows that the mean (average) value of the *Pre-Test* blood sugar levels is 326.25 and the mean (average) the values *Post-Test* drops by 223.75. So that there is a mean change of 102.5, which means there is a decrease in blood sugar levels of 102.5 mg / dl after being given the traditional sour sop leaf drink. The number of respondents in the study was 20 people. The results of statistical tests used the *Paired t-test Pre-Test* and *Post-Test*. The value of significance (2-tailed) shows the value of ρ-value = 0,000, which means ρ-value <0.05. So in this case Ha is accepted, namely "There is a difference in blood sugar levels between the *Pre-Test* and *Post-Test* groups who were given traditional sour sop leaf drinks in diabetes mellitus patients at the North Bogor Public Health Center in 2019"

H. *Pre-test* and *post-test* control group was not given traditional sour sop leaves.

The *Paired t-test* between the *pre-test* and *post-test of* the control group aims to determine whether there is a difference. The research

conclusion stated that there was a difference if the p-value <0.05. The summary of the *Paired t-test* between the *pre-test* and *post-test of* the control group is shown in the following table:

Table 8. Data table for *Paired Samples Statistics for* the Control Group not given traditional sour sop leaves (n = 20)

	Mean	N	Std. Dev	Std. Error Mean	*P value*
Pre-Test	263.75	20	62.972	14.081	0.00
Post-Test	176.50	20	58.873		

Source: Primary Data Processed

From table 8, data on *paired samples statistics* shows

that the mean (average) value of the *Pre-Test* blood sugar levels is 263.75 and the mean (average) of the values has *Post-Test* decreased by 176.50. So that there is a mean change of 87.25, which means that there is a decrease in blood sugar levels of 87.25 mg / dl. The number of respondents in the study was 20 people. The results of statistical tests used the *Paired t-test Pre-Test* and *Post-Test*. The value of significance (2-tailed) shows the value of ρ-value = 0,000, which means ρ-value <0.05. So in this case Ha is accepted, namely "There is a difference in blood sugar levels between the *pretest* and *posttest groups* in the control group of diabetes mellitus patients at the North Bogor Puskesmas in 2019 "

I. Test t *Post--test for* the intervention group with traditional drinking sour sop leaves and *post-test for* the control

Table 9.Post-Test Paired Samples Statistics for the Intervention Group and *Post-Test for* the Control Group (n = 20)

	Mean	N	Std. Dev	Std. Error Mean	*P Value*

Control	176.50	20	58.873	13.164	0.021
Intervention	223.75	20	63.967	14,303	

Source: Primary Data Processed

From table 9, data on *paired samples statistics* shows that the mean (average) blood sugar levels of the control group at the *Post-Test it* was 176.50 and the mean (average) blood sugar level of the intervention group at the *Post-Test* was 223.75. So it is known that the blood sugar levels in the intervention group were higher than those in the control group with an average difference of 47.25 mg / dl. The number of respondents in the study was 20 people. The results of statistical tests used the *Paired t-test Pre-Test* and *Post-Test*. The value of significance (2-tailed) shows the value of ρ-value = 0.021, which means that ρ-value <0.05. So in this case Ha is accepted, namely "There is a difference in blood sugar levels between the *Post-Test* group in the control group and the intervention group for diabetes mellitus patients at the North Bogor Community Health Center in 2019"

J. Test *Independent Sample T-Test* Blood Sugar Among Intervention Group Sour sop Leaf Giving Traditional Drinks with Control Group Giving Traditional Drink Sour sop Leaf

Table 10. Test Results *Independent Sample T-Test* Blood Sugar Control Group Group Intervention with

Group	t	t_{table}	Conclusion
Control	3.163	2.000	There is a significant difference
Intervention			

Source: Primary Data Processed

Based on calculations *Independent Sample T-Test* unknown value$_t$ of 3.163 with 0.000 significance. The $t_{table\ value}$ of dk = 80-2 = 78 is 2,000.

Table 11. Mann-Whitney U

Test	Results of
Mann-Whitney U	504,000
test,Wilcoxon W	1324,000
Z	-2851.

Asymp Sig. (2-tailed)	.004

Source: Primary Data Processed

It is known the asymp value. Sig 0.004 <0.05 means that there is a difference.

DISCUSSION

A. Blood Sugar Levels Before Drinking Traditional Sour sop Leaves Drinks in the Intervention and Control Group

Based on the results of the study, it is known that the blood sugar levels before drinking traditional sour sop leaf drinks in the intervention group and the control group are known to be the average of the control group is 263.75 and an average the group giving the traditional sour sop leaf drink was 326.25, so it can be concluded that the average blood sugar level in the intervention group was higher than the sugar level in the control group with an average difference of 62.5 mg / dl.

The results of Afriani's research (2015) in his research entitled The Effect of Sour sop Leaf Boiled Water on Blood Sugar Levels in Patients with Diabetes Mellitus in the Internal Medicine Polyclinic of Dr. M Zein Painan Hospital in 2014. The results showed that the results showed that there was an effect of giving boiled leaf water. sour sop on blood sugar levels in people with diabetes mellitus with (p = 0.000). It is concluded that there is an effect of giving sour sop leaf boiled water on blood sugar levels in people with diabetes mellitus. [22]

From the results above, it can be said that the blood sugar levels of diabetes mellitus sufferers can be influenced by the provision of traditional sour sop leaves. Thus it can be assumed that drinking sour sop leaf traditional drinks can reduce blood sugar levels in people with diabetes mellitus.

B. Frequency of Decrease in Blood Sugar Levels in the Control Group.

Based on the results of the study, it is known that the frequency of the *Pre-Test* group giving the group of traditional sour sop leaves was 326.25 and the mean (average) of

thevalues *Post-Test* decreased by 223.75. So that there is a mean change of 102.5, which means there is a decrease in blood sugar levels of 102.5 mg / dl after being given the traditional sour sop leaf drink. Whereas in the control group it was 263.75 and the mean (average) *Post-Test score* decreased by 176.50. So that there is a mean change of 87.25, which means that there is a decrease in blood sugar levels of 87.25 mg / dl.

Research conducted by Arizona on the effectiveness of sour sop leaf boiled water in reducing blood sugar levels in mice concluded that consumption of sour sop leaf boiled water can help reduce blood glucose levels in mice.[23]

Thus, it can be said that the frequency of blood sugar levels is influenced by the traditional drink of sour sop leaves, where there is a decrease in blood sugar levels in people with diabetes mellitus. Thus it can be assumed that the blood sugar levels of diabetics do not decrease before consuming the traditional sour sop leaf drink.

C. Effect of Blood Sugar Levels After Drinking Traditional Sour sop Leaf Drinks in the Intervention and Control Group.

Based on the results of the study, it is known that the value of ρ-value = 0.021, which means ρ-value <0.05. So in this case Ha is accepted, namely "There is a difference in blood sugar levels between the *Post-Test* group in the control group and the intervention group for diabetes mellitus patients at the North Bogor Community Health Center in 2019"

Levi, Marlina and Syalfinaf, Manaf and Rochmah, Supriati. 2018. (2018) proved that the dose of sour sop leaf extract 150 mg / kg BW can affect and reduce blood glucose levels.

Based on the research results, it can be seen that the decrease in blood sugar levels in diabetes mellitus sufferers has decreased after drinking the traditional sour sop leaf drink, thus it can be assumed that diabetes mellitus sufferers have decreased their blood sugar levels after routinely for 3 days drinking the traditional sour sop leaf drink.

D. Effect of Traditional Drinks of Sour sop Leaves on Blood Sugar Levels on Elderly Diabetes Mellitus Patients at North Bogor Community Health Center in 2019

Based on the results of the research, the calculation of the *Independent Sample T-Test* the t-value is$_{count}$ shows that3.163 with a significance of 0.000. The $t_{table\ value}$ of dk = 80-2 = 78 is 2,000. So it can be concluded that $t_{count} > t_{table}$ (3.163> 2,000) and the asymp value is known. Sig 0.004 <0.05 means that there is a difference, so it can be stated that there is an effect of traditional sour sop leaf drinks on blood sugar levels in elderly diabetes mellitus patients at the North Bogor Community Health Center in 2019.

Research that supports the results of this study is the result of Diana's research. (2017) which showed that the ethanol extract of sour sop leaves caused a decrease in blood sugar levels (p <0.05) and an improvement in liver histology (p <0.05) at a dose of 150 mg / kg bw per day. It is concluded that there is an effect of giving sour sop leaf boiled water on blood sugar levels in diabetes mellitus sufferers, so it is advisable for DM sufferers to make boiled water of sour sop leaves as an alternative natural treatment in lowering blood sugar levels and should be able to comply with the procedures established during the process. use of boiled water for sour sop leaves in order to obtain far more maximum results.

It can be assumed that there are differences and effects of blood sugar levels of diabetes mellitus sufferers before and after consuming the traditional sour sop leaf drink, where after drinking the traditional sour sop leaf drink, the blood sugar levels have decreased.

The researcher realizes that this study has various limitations that can affect the research results. These limitations include:

1. This study was conducted on the elderly population with diabetes mellitus at the North Bogor Public Health Center in 2019. The conclusion of the research results is limited to generalization to diabetes mellitus sufferers who are in North Bogor Community Health Center, cannot be

generalized to other populations that are not have the same character as the study population.

2. The limitation of the research variables used, the researchers only analyzed the traditional sour sop leaf drink variables that could affect the decrease in blood sugar levels, while it was known that there were other variables that could affect blood sugar levels but were not examined in this study, namely age, family history, race. or background, and a history of diabetes.

For people with diabetes mellitus, especially the elderly, it is hoped that the results of this study can be used as a means to lower blood sugar levels by drinking the traditional sour sop leaf drink. The results of this study can be used as a support for further research and used as a source of reading material and reference in the library of STIKes Wijaya Husada Bogor.

CONCLUSION

1. The average blood sugar level of the intervention group was higher than the control group with an average difference of 62.5 mg / dl.
2. There is a decrease in blood sugar levels as much as 87.25 mg / dl.
3. There is a difference in blood sugar levels between the *Post-Test* group in the control group and the intervention group for diabetes mellitus patients at the North Bogor Public Health Center in 2019
4. There is an effect of traditional sour sop leaf drinks on blood sugar levels on elderly diabetes mellitus patients at the North Bogor Puskesmas, where the results of the calculation of *Independent Sample T-Test* unknown $value_t$ of 3.163 with 0.000 significance. The $t_{table\ value}$ of dk = 80-2 = 78 is 2,000, so it can be concluded that $t_{arithmetic} > t_{table}$ (3.163> 2,000) and the asymp value is known. Sig 0.004 <0.05

SUGGESTIONS

1. For Puskesmas

   It is hoped that in providing services to patients who have diabetes mellitus, treatment can be

given that can reduce blood sugar levels.

2. Nurses.

   Nurses are expected to play an active role in providing health education for both patients and families in reducing blood sugar levels for diabetes mellitus sufferers.

3. Educational Institutions

   This research is expected to be an input for nursing disciplines regarding the effect of traditional sour sop leaf drinks. in lowering blood sugar levels for people with diabetes mellitus.

4. For Diabetes Patients

   The results of this study are expected to be used as information that drinking sour sop leaves can reduce blood sugar levels.

5. For further

   researchers. The results of this study can be used as a basis for future research on other aspects that can reduce blood sugar levels in patients with diabetes mellitus.

REFERENCES

1. Guyton, A. C & Hall, JE 2012. *Textbook of* F*isiologiMedicine.* (Edition 11). Jakarta: EGC.
2. https://regional.kompas.com/read /2017/11/17/10100121/penderita-diabetes-di-bandung-men Increase-60-persen. Retrieved 6 August 2019.
3. Purwatresna, E. 2012. *Antidiabetic Activity of Water Extract and Ethanol Sour sop Leaves In Vitro Through Inhibition of α-Glucosidase Enzymes*. Retrieved from http: // repository. ipb.ac.id/handle/123 456789/58641. Retrieved 12 August 2019
4. Malviya, N., Jain, S., Malviya, S. 2010. *Antidiabetic Potential Of Medicinal Plants. Acta poloniae pharmaceutica-drug research* 67: 113-118
5. Joe, W. 2012. The *tremendous efficacy of sour sop for many deadly diseases*. Yogyakarta: Andi.
6. Arizona, D. 2010. The *Effectiveness of Sour sop Leaf Boiled Water on Decreasing Blood Sugar Levels in Mice.* Airlangga University. Surabaya.

7. Mardiana, L. 2012. *The magic leaves kill the disease.* Jakarta: Self-help spreader.
8. Purwatresna, E. 2012. *Antidiabetic Activity of Water Extract and Ethanol Sour sop Leaves In Vitro Through Inhibition of α-Glucosidase Enzymes*. Retrieved from http: // repository. ipb.ac.id/handle/123 456789/58641. Retrieved 12 August 2019
9. Putri, RNA, 2012. *Antioxidant Activity Test of Sour sop (Annona muricata L.) Leaf Extract Using the DPPH* (*1,1-Diphenyl-2-picrylhydrazylMethod*). [Essay]. Jakarta: Faculty of Medicine and Health Sciences, Syarif Hidayatullah State Islamic University, Undergraduate Program. (Thesis)
10. Gumelar, Bakti, RA Retno Ekowati, Annisa Rahmah Furqaani Potential of Ethanol Extract of Sour sop Leaves (Annona muricata) as Therapeutic Agent of Hyperglycemia in Alloxan-Induced Mice. Bandung Meeting on Global Medicine & Health (BaMGMH), Vol. 1 No. 1 of 2017 Faculty of Medicine, Bandung Islamic University.
11. Kariadi, Sri Hastuti. 2010. *Diabetes: A Complete Guide To Diabetes*. Jakarta: Mizan Media Utama.
12. Wijayanti, R. Abdur Rosyid and Iffa Kholishotul Izza, 2017.Bulk *Effect of GarlicSkin Extract (Allium sativum L.) on Total Blood Cholesterol Levels of Wistar Male Rats with Diabetes Mellitus. Pharmaciana*. Semarang: Faculty of Medicine, Sultan Agung Islamic University Semarang. 7 (1): 13.
13. Aziz, Ari Rahmat. 2013. Effectiveness of Sour sop (Leaf*Annona MuricataBoiled Water*)Against Blood Sugar Levels in Type II Diabetes Mellitus Patients. Jurnal program studi ilmu keperawatan universitas riau kampus binawidya pekanbaru, 28293, Indonesia.
14. Riri, Afriani. 2015. Pengaruh Air Rebusan Daun Sirsak Terhadap Kadar Gula Darah Pada Penderita Diabetes Melitus Di Ruangan Poliklinik Penyakit Dalam RSUD Dr.M Zein Painan Tahun 2014.

Diploma thesis, Universitas Andalas. (Skripsi)

15. Supranto, J. 2013. *Statistika Teori dan Aplikasi*. Jakarta: Penerbit Erlangga.
16. Sugiyono. 2015. *Metode Penelitian Administrasi*, Bandung: Alfabeta
17. Subekti, I. 2009. Neuropati Diabetik. In AW Sudoyo, B. Setiyohadi, I. Alwi, MS K & S. Setiati. Buku ajar ilmu penyakit dalam. Jakarta: Penerbit FK UI.
18. American Diabetes Association (ADA), 2015.*Standards of Medical Care in Diabetes-2015*. Diakses dari: *http://care. diabetesjournals. org/ content/36/Supplement_1/S11.full.pdf+html.* Diakses tanggal 19 Agustus 2019.
19. Wijayanti, R. Abdur Rosyid dan Iffa Kholishotul Izza, 2017. *Pengaruh Ekstrak Kulit Umbi Bawang Putih (Allium sativum L.) Terhadap Kadar Kolesterol Darah Total Tikus Jantan Galur Wistar Diabetes Mellitus. Pharmaciana*. Semarang: Fakultas Kedokteran, Universitas Islam Sultan Agung Semarang. 7 (1): 13.
20. Aziz, Ari Rahmat. 2013. Efektivitas Air Rebusan Daun Sirsak (*Annona Muricata*)Terhadap Kadar Gula Darah Pada Penderita Diabetes Melitus Tipe II. Jurnal program studi ilmu keperawatan universitas riau kampus binawidya pekanbaru, 28293, Indonesia.
21. Astuti, Putri Dhea. 2017. Pengaruh Ekstrak Daun Sirsak (*Annona muricata L*.) terhadap Penurunan Kadar Glukosa Darah. Fakultas Kedokteran, Universitas Lampung. Jurnal Majority Volume 6 Nomor 2 Maret 2017.
22. Joe, W. 2012. *Dahsyatnya Khasiat Sirsak Untuk Banyak Penyakit Mematikan*.Yogyakarta: Andi.
23. Arizona, D. 2010. *Efektivitas Air Rebusan Daun Sirsak Terhadap Penurunan Kadar Gula Darah Pada Mencit.* Universitas Airlangga. Surabaya.

PROLANIS GYMNASTICS CORRELATION WITH DECREASE BLOOD GLUCOSE IN ELDERLY PATIENTS DIABETES MELLITUS

Nining Fitrianingsih, Fajar Adhie Sulistyo, Al muhajirin, Aditia Putri

Wijaya Husada Health Science Institute

Abstract

In Indonesia diabetes mellitus has become a serious threat to global health, quoted from the WHO 2016 "70% of total deaths in the world and more than half the disease burden" International Diabetes Federation (IDF) Atlas 2017 reported the diabetic epidemic in Indonesia's tendency increases and has ranked to six worlds with the number of diabetics aged 20-79 years around 10.3 million people. Blood sugar levels of diabetics can decrease by means of physical activity, one of them is prolanis gymnastics.

This research aims to determine the correlation of gymnastics with the decrease in blood sugar while in elderly people with diabetes mellitus.

This type of research is quantitative analytic with cross sectional design and is in the implementation in the Puskesmas in Sukaraja on 29 August 2019 with a population of 35 using a total sampling technique. The instruments used are questionnaire sheets and observation sheets.

In the know the univariate analysis of the variable gymnastic gymnastics of 35 respondents following the provisions of gymnastics 21 (60.0%) And those who do not follow the provisions 14 (40.0%) Respondents. For the results of univariate analysis that occurs decrease with blood sugar levels when the 100-199 as much as 20 (57.1%) Respondents and the > 200 as many as 15 (42.9%) Respondents.

It is known that from 35 respondents following the provisions of 9 Resonden (25.7%) With blood sugar 100-199 in elderly people with diabetes mellitus. Based on statistical test table sufficient test analysis obtained P value 0.022 then p, value > α, so that Ha accepted and H0 rejected which means ststistic test shows there is a prolanical gymnastics relationship with blood sugar decline in elderly diabetics Melitus in the Puskesmas Sukaraja year 2019.

Diabetes mellitus is not curable, but blood sugar levels can be controlled by one of them by Prolanis Gymnastics. One of the benefits of Prolanis gymnastics is that it can lower blood sugar.

Keywords : gymnastics, blood sugar, Diabetes mellitus

INTRODUCTION

Diabetes is a high blood sugar level that causes damage to blood vessels, nerves and other internal structures. Poor blood circulation through large blood vessels can injure the brain, heart, and leg veins, while small blood vessels can injure the eyes, kidneys, nerves, and skin and slow wound healing. Hypertension in diabetes mellitus is not handled properly, so it has the potential to cause other illnesses. One of the most common is stroke, especially the type of thrombotic stroke. [1]

Currently there are 230 million people in the world who have diabetes, this figure is up 3% or an increase of 7 million people every year and by 2025 it is estimated that 350 million people will have

diabetes.[15] In Indonesia diabetes mellitus has become a serious threat to global health, quoted from the 2016 WHO "70% of the world's total deaths and more than half of the disease burden" The International Diabetes Federation (IDF) Atlas 2017 reports that the diabetes epidemic in Indonesia has an increasing trend and has occupied ranked sixth in the world with the number of people with diabetes aged 20-79 years around 10.3 million people. Based on data from the health profile of Bogor Regency, patients with diabetes mellitus who are undergoing outpatient treatment in the hospital are 11.52% or 11.83 cases with an age range of 45 to 75 years, which is the most cases after hypertension. At the Sukaraja Community Health Center in 2018, 391 people or 18.19% had diabetes mellitus, consisting of 125 men and 266 women.

There are 347 million people in the world with Diabetes. In 2004 an estimated 3.4 million died due to high fasting blood sugar levels. In low and middle income countries, the mortality rate is 80% due to DM. Diabetes is the 7th leading cause of death in 2030. [2]

Currently, Indonesia is experiencing an epidemiological transition, where there has been a decrease in the prevalence of infectious diseases but an increase in the prevalence of non-communicable diseases (PTM) or degenerative diseases. According to the results of Basic Health Research (Riskesdas) in 2007. Government programs in the health service system and a proactive approach implemented in an integrated manner that involve participants. Health Facilities and BPJS (Social Security Service Agency) for Health are PROLANIS (Chronic Disease Management Program). The aim of PROLANIS is to encourage participants with chronic diseases to achieve optimal quality of life on specific examinations for Diabetes Militus (DM) and Hypertension according to related clinical guidelines so as to prevent complications. [1] Public knowledge about PROLANIS needs to be improved to increase interest and motivation because PROLANIS was stopped for about a month ago (lastly implemented in mid-October)

because the BPJS budget did not go down. [1]

State of Northern California, the implementation of the PROLANIS DM program is carried out by trained pharmacists who are tasked with prescribing and adapting drugs for DM sufferers. Pharmacists also refer patients to carry out laboratory examinations, provide education and confirm glycemic levels.[The 3] countries with the highest cases of Diabetes Mellitus are China, which is estimated to reach 142.7 million in 2035 from 98.4 million today. However, the prevalence is highest in the West Pacific, with over a third of adults in Tokelau, Micronesia and the Marshall Islands suffering from the disease.[1]

Indonesia is one of the 10 largest countries with Diabetes Mellitus in the world. To be precise, Indonesia's position is at number seven with a total of 8.5 million sufferers. In the top position, there are China (98.4 million people), India (65.1 million people), and America (24.4 million people). The rate of Diabetes Mellitus in East Java is around 1.01%, the essence of the population, which is more than 222,430 sufferers from 3 million people.[1]

Gymnastics according to Muhajir is the main activity that is useful in developing physical and movement components.[6] Meanwhile, according to Imam Hidayat in Hendra Agusta Senam is a form of body training that has undergone a systematic arrangement, is constructed deliberately, is carried out consciously, planned, which aims to improve physical health, as well as develop skills and instill mental and spiritual values.[6]

Gymnastics is a form of physical movement that is systematic, orderly, planned, by doing physical movements in order to get benefits in the body.[6] Gymnastics is a physical movement that has rhythm. The movements are regular and rhythmic which aim to improve physical health.

Based on the general definition, a person is said to be elderly (elderly) when he is 65 years and over. Elderly is not a disease, but is an advanced stage of a life process marked by a decrease in the body's ability to adapt to environmental stress. Elderly is a condition

characterized by a person's failure to maintain balance against physiological stress conditions. This failure is related to a decrease in the ability to live and an increase in individual sensitivity. [9]

Gymnastics for the elderly is a light and easy exercise that is not burdensome for the elderly.[10] These sports activities help the body to stay in shape and stay fresh because it trains bones to stay strong, encourages the heart to work optimally and helps eliminate free radicals that roam the body.

PROLANIS is a health service system and a proactive approach that is implemented in an integrated manner that involves participants, health facilities and BPJS Kesehatan in the context of health care for BPJS Kesehatan participants who suffer from chronic diseases to achieve optimal quality of life with cost effective and efficient health services.[4] This PROLANIS activity is very beneficial for the health of BPJS users. PROLANIS is to encourage participants with chronic diseases to achieve optimal quality of life on specific examinations for DM and Hypertension according to related clinical combinations so as to prevent disease complications.[4] Patients with diabetes mellitus who do not participate in prolanis activities may experience complications, because PROLANIS will control blood pressure and sugar so that they are normal and avoid complications.[4]

In the success of the government program, it is necessary to socialize and motivate health workers about PROLANIS to the community and so that it will invite Diabetes Mellitus and Hypertension patients to participate in the success of the PROLANIS program is a health service system and a proactive approach implemented in an integrated manner that involves participants, health facilities and BPJS Kesehatan in the framework of health care for BPJS Kesehatan participants who suffer from chronic diseases to achieve an optimal quality of life with cost effective and efficient health services.[4]

Physical freshness is the ability of a person to carry out daily tasks without experiencing significant fatigue and still have

reserves of energy to enjoy his free time properly. Freshness / physical fitness for the elderly is fitness related to health, namely heart-lung fitness, blood circulation, muscle strength and joint flexibility.[19]

Sports training for the elderly aims to improve physical fitness. To obtain good physical fitness, you must train all the basic components of physical fitness which include heart endurance, blood circulation and respiration, muscle endurance, muscle strength and flexibility. With the aging process, it causes a decline in work performance and a decrease in one's physical capacity. To maintain physical fitness, exercise is needed. [10]

Physical activity or sports are open media that can be used by the elderly according to the abilities, pleasures, goals and opportunities of each person. Sports training in the elderly must be tailored to their individual abilities based on their physical abilities, needs and goals for carrying out these sports activities.[10]

level is Fitness evaluated by monitoring resting heart rate, i.e. resting pulse rate. So in order to be fitter, your resting heart rate must decrease.[19] Gymnastics for the elderly in addition to having a positive impact on improving the function of organs also has an effect on increasing immunity in the human body after regular exercise. [10]

Based on the results of a preliminary study conducted by researchers on August 29, 2019, at the Sukaraja Community Health Center there were 35 people who suffered from diabetes mellitus and participated in prolanic exercises. The data was obtained from the number of visits at the Sukaraja Community Health Center. Of these, 35 people participated in the Prolanis exercise at the Sukaraja Community Health Center.

By participating in elderly exercise, the minimal effect is that the elderly will feel happy, always have fun, can sleep better, and have a fresh mind.

RESEARCH RESULTS

This research was conducted at the Sukaraja Community Health Center in 2019. With primary data, questionnaires and blood sugar levels were measured in Prolanis gymnastics patients. This study was

conducted on August 29, 2019. This study aims to determine the relationship between prolanic exercise and decreased blood sugar levels in elderly people with diabetes mellitus. The variables studied were prolanic exercise (independent variable), and blood sugar levels (dependent variable). Respondents in this study were elderly prolanis participants. The measuring instruments used were questionnaires and checking blood sugar levels by collecting data from 35 respondents.

This study uses a method *quantitative analytical* with approach, *cross sectional* the sampling technique used is *technique total sampling.* After going through data collection, the next step is to find out the results of the research, the data processing is carried out, then the Univariate analysis and the Bivariate analysis are carried out.

Table 1
Frequency Distribution of Prolanic Exercise in Elderly Patients with Diabetes Mellitus

No	Prolanic Gymnastics	Frequency	Percentage (%)
1	Following Provisions	21	60.0
2	Not Following Provisions	14	40.0
	Total	35	100

Source: SPSS Version 22

Based on table 1 the frequency distribution of prolanic exercise in elderly people with diabetes mellitus at Sukaraja Community Health Center in 2019, 21 respondents (60.0%) performed prolanic exercise by following the provisions.

Table 2
Distribution of Frequency Blood Sugarin Elderly Patients with Diabetes Mellitus

No	Blood Sugar Levels	Frequency	Percentage (%)
1	Decreased	20	57.1
2	There was no decrease	15	42.9
	Total	35	100

Source: SPSS Version 22

Based on table 2 of the frequency distribution of blood sugar levels in diabetes mellitus patients at the Sukaraja Community Health Center in 2019, it is known that 20 respondents (57.1%) had decreased blood sugar levels.

Table 3 The relationship between prolanic exercise and a decrease in blood sugar during the elderly with diabetes mellitus

Parental Prolanis Gymnastics	Involvement				Total		*P Value*	*Odds Ratio*
	There is a decrease		There is no decrease in					
	F	%	F	%	F	%		
Follow the Conditions	9	25.7	12	34.3	21	60.0	0.022	0.205
Not following the provisions	11	31.4	3	8.6	14	40.0		
Total	20	57.1	15	42.9	35	100		

Source: SPSS Version 22

Based on table 3 Based on Table 4.3 above, it is known that the relationship between Prolanic Exercise and Blood Sugar Decrease in the Elderly with Diabetes Mellitus at Sukaraja Health Center in 2019, there were 12 (34.3%) respondents who followed the provisions of prolanic exercise and there was no decrease in blood sugar. With anvalue of *odd ratio* 0.205, it can be concluded that there is no risk factor for prolanic exercise with a decrease in blood sugar in the elderly with diabetes mellitus.

The significant relationship value using computerization obtained *p value* 0.022 ≤ 0.05 (*alpha*), meaning that Ha is accepted and H0 is rejected. From this value, the results of the analysis state that there is a relationship between Prolanic Gymnastics and a decrease in blood sugar in the elderly with diabetes mellitus.

DISCUSSION

a. Prolanis Gymnastics for elderly people with diabetes mellitus

Based on Table 1, the frequency distribution of prolanic exercise in elderly people with diabetes mellitus at the Sukaraja Community Health Center in 2019 from a total of 35 respondents, shows that 21 respondents (60.0%) followed the provisions, 14 respondents (40.00%) did not follow the provisions.

The results of this study are comparable to research conducted by Deiby 2016 which examined "the effect of Prolanis Exercise on blood sugar levels in diabetes mellitus patients" of 191 respondents, indicating that 128 (67.0%) good

respondents attended exercise, and 63 respondents (33.0%) respondents who are not good at following gymnastics.

According to Margono's opinion, gymnastics is a body movement exercise that was created systematically with the aim of forming harmonious movements in the physical development and ability of a person to move.[8]

In the opinion of H. Werner, gymnastics is one of the body exercises designed to increase flexibility and strength endurance by using tools in floor exercises.[8]

According to Imam Hidayat, the meaning of gymnastics is a form of body exercise that is carried out in a planned and structured manner to improve physical fitness and improve skills.[8]

Prolanis Gymnastics is an activity or physical activity (sports) for sufferers of chronic diseases such as Diabetes Mellitus and Hypertension, this activity is carried out in an integrated manner in the framework of maintaining health for sufferers of chronic diseases in order to achieve an optimal life. This sport is organized from the health service of the Social Security Administration (BPJS).

The provisions of gymnastics: Exercise dosage is done once a week exercise duration 30-40 minutes (including warm up and cool down). At the beginning of gymnastics warm up, stretch, then core exercises and at the end of the exercise do cool down and stretch again. Before exercising, you can drink it first to replace lost sweat. Always remember to drink water before and after exercise. Gymnastics is supervised by trainers to prevent injury.

Based on the theory and results of research that researchers have conducted at the Sukaraja Community Health Center with 35 respondents, most of the respondents who follow the provisions are 21 (60.0%) respondents, this is reinforced by the results of the questionnaire items that have been researchers give to respondents.

So the conclusion from the results of theory and research can be concluded that prolanis exercise can affect the decrease in blood sugar levels.

b. Decrease in Blood Sugar when Elderly with Diabetes Mellitus

Based on Table 2 above, it is known that the frequency distribution of blood sugar levels in elderly people with diabetes mellitus at Sukaraja Health Center in 2019, there were 20 respondents (57.1%) who experienced a decrease or had blood sugar levels of 100-199, and there were 15 respondents (42.9%) with blood sugar levels> 200 that did not decrease.

The results of this study are comparable to research conducted by Deiby 2016 which examined "the effect of Prolanis Exercise on blood sugar levels in diabetes mellitus patients" of 191 respondents, indicating that 128 (67.0%) good respondents attended exercise, and 63 respondents (33.0%) respondents who are not good at following gymnastics.

Blood sugar is a term that refers to the level of glucose in the blood. Blood sugar concentration, or serum glucose level, is tightly regulated in the body. Blood-borne glucose is the main source of energy for body cells. Generally, blood sugar levels are maintained within narrow limits throughout the day: 4-8 mmol / l (70-150 mg / dl). These levels increase after eating and are usually at their lowest level in the morning, before people eat.

A time blood sugar check is a blood sugar test that is done on the spot. Blood glucose test when done by taking a blood sample of the patient without fasting first to be able to find out the blood sugar level at that time. The unit used to express the value of blood sugar at any time is mg / dl (milligrams per deciliter). The results of blood sugar tests when comparing the amount of blood sugar in milligrams with the amount with the amount of blood in deciliter units.

Factors that affect blood sugar are stress, obesity, food intake, exercise, treatment either with tablets or insulin, education, knowledge, availability and exposure to information sources.

Based on the theory and the results of research that researchers have conducted at Sukaraja Public Health Center with 35 respondents, that most of the respondents who experienced a decrease in blood sugar were 25 respondents (71.4%),

this was strengthened by doing a blood sugar check at any time.

So the conclusion from the results of theory and research can be concluded that the factor of blood sugar levels can be decreased, one of which is by doing physical activity to do prolanic exercise.

c. The relationship between prolanic exercise and a decrease in blood sugar in the elderly with diabetes mellitus.

Based on table 3, based on Table 3 above, it is known that the relationship between Prolanic Exercise and Blood Sugar Decrease in the Elderly with Diabetes Mellitus at the Sukaraja Health Center in 2019, there were 12 (34.3%) respondents who followed the provisions of prolanic exercise and there was no decrease in blood sugar. With anvalue of *odd ratio* 0.205, it can be concluded that there is no risk factor for prolanic exercise with a decrease in blood sugar in the elderly with diabetes mellitus.

The significant relationship value using computerization obtained *p value* 0.022 ≤ 0.05 (*alpha*), meaning that Ha is accepted and H0 is rejected. From this value, the results of the analysis state that there is a relationship between Prolanic Gymnastics and a decrease in blood sugar in the elderly with diabetes mellitus in 2019.

Prolanis exercise is a health service system in the context of maintaining chronic diseases to achieve optimal quality of life with cost effective and cost effective health services. efficient. The goal is to encourage participants with chronic diseases to achieve an optimal quality of life with the target of all participants with chronic diseases.

Blood sugar level is the amount of sugar or glucose in the blood. Even though it is constantly changing, blood sugar levels need to be maintained within normal limits so that disturbances do not occur in the body. Sugar levels are influenced by the intake of nutrients from food or drinks, especially carbohydrates, as well as the amount of insulin and the sensitivity of the body's cells to insulin. Blood sugar levels that are too high or too low will be bad for health, both in the short and long term.

Diabetes mellitus is a chronic progressive disease characterized by the inability of the body to metabolize carbohydrates, fats and proteins, leading to hyperglycemia (high blood glucose levels).

Diabetes mellitus is a metabolic disease characterized by chronic hyperglycemia caused by insulin resistance or the effects of insulin secretion.

The more chronic diseases that occur, the government, through BPJS Kesehatan, in collaboration with health services, designs a program with a chronic disease management model for chronic disease sufferers called "PROLANIS" or "Chronic Disease Management Program". The goal is to encourage participants with chronic diseases to achieve an optimal quality of life.

Diabetes mellitus cannot be cured, but blood sugar levels can be controlled. Diabetes mellitus sufferers should carry out the 4 pillars of diabetes mellitus management, namely education, nutritional therapy, physical exercise or exercise, and pharmacological intervention.

One of the great benefits of physical activity is prolanis exercise, including lowering blood sugar levels, preventing obesity, playing a role, in overcoming complications, blood lipid disorders and increasing blood pressure.

Another theory states that physical activity or prolanic exercise is related to the speed at which muscle blood sugar is recovered. When exercising is done the muscles in the body will react by using the glucose it stores so that the stored glucose is reduced. In this situation there will be a muscle reaction in which the muscles will experience glucose in the blood so that in the blood it decreases and this can leave blood sugar control.

From the research results of Anugrah Dhea, Siti Nafsiah. et al, 2014 examined "the behavior of using prolanis with blood sugar levels in diabetes mellitus patients in Purwokerto City in 2014" found 128 diabetes mellitus patients who participated in good exercise with 93 patients (72.7%) and 35 patients (27.3%) less well. The results of the parametric statistical test using the test *Chi-Square* obtained a *p-*

value of 0.018 (*p-value* <0.05), indicating that prolanical exercise has a relationship with health status.

Based on the results of the research and the theory above, the researchers concluded that there was an agreement between the theory and the results of the researchers, namely that prolanis exercise was associated with a decrease in blood sugar levels in people with diabetes mellitus. This is evidenced by the fact that there were 21 respondents who participated in the prolanic exercise and 9 respondents who experienced a decrease in blood sugar (25.7%). It was concluded that if the respondent did Prolanis exercise, it could reduce high blood sugar levels.

CONCLUSION

Based on the discussion as previously described, the conclusions of this study are as follows:

1. It is known that the frequency distribution of prolanic exercise in elderly people with diabetes mellitus is 21 respondents (60.0%) who follow the provisions of prolanic exercise.
2. It is known that the distribution of blood sugar frequencies in elderly people with diabetes mellitus, there are 20 respondents (57.1%) who have a decrease in blood sugar levels of 100-199.
3. It is known that Prolanic Exercise with a decrease in blood sugar when the elderly with Diabetes Mellitus at Sukaraja Community Health Center in 2019, there are 12 (34.3%) respondents who follow the provisions of prolanic exercise. Based on the results of the bivariate analysis using the analysis test *Kendall Tau* , the *p value* was 0.022 ≤ 0.05 (*alpha*), meaning that Ha was accepted and H0 was rejected. From this value, the results of the analysis state that there is a relationship between Prolanic Gymnastics and a decrease in blood sugar when elderly people with diabetes mellitus in 2019.

SUGGESTION

1. Educational institutions are expected to provide reference material and reading material for nursing management courses as well as a reference in carrying out further research related to

Prolanis exercise with a decrease in blood sugar at any time.

2. For Research Sites

   It is hoped that this research can be used as input and evaluation in the prolanis exercise program.

3. For further researchers

   a. It is hoped that in future studies to use a different research site.

   b. It is hoped that the results of this study can provide additional information related to prolanic exercise with a decrease in blood sugar in the elderly with diabetes mellitus.

REFERENCES

1. Hafizhah, 2016. Diabetes mellitus. http://eprints.umpo.ac.id/3450/2/BAB1.pdf. Accessed on June 30, 2019 at 22:23 WIB
2. Lathifah, NL, 2017. Guidelines for controlling diabetes mellitus - world health organization. https://extranet.who.int/ncdcc/Data/IDN_D1_Diabetes%20guidlines.pdf. Accessed on 30 June 2019 at 23.16 WIB
3. Yu J, Shab B, Chan J. A Markov Model Of The Cost-Effectiveness of Pharmacist Care for Diabetes in Prevention of Cardiovascular Diseases: Evidence from Kaiser Permanente Northern California. Journal Of Managed Care Pharmacy. 2013; 19 (2): 102-14
4. DUB Health, 2019. Definition of Prolanis. https://bpjs-keseh.go.id/bpjs.dmdocuments/06-PROLANIS.PDF. Accessed on 1 July 2019 at 19.44 WIB
5. Digilib.unila.ac.id, 2014. Definition of health services. htpp: //digilib.unila.ac.id/10047/11/BAB% 20ll.pdf. Accessed on 27 July 2019 at 17.19 WIB
6. Maxmanroe, 2018. Understanding gymnastics. https://www.maxmanroe.com/vid/umum/pengentuk-senam.html. Accessed on 1 July 21.05 WIB.
7. Endri W, 2017. Nursing Services. https://www.google.co.id/amp/s/endripku.wordpress.com/2017/11/23/pelayanan-keperawatan/amp/. Accessed on August 1, 2019 at 16.59
8. https: //www.maxmanroe.com/vid/umum/pengentuk-senam.html. Accessed on July 30, 2019 at 8:22 p.m.
9. S Febrina, 2017. Elderly (elderly) means elderly.

https://digilib.unila.ac.id/6613/15/BAB%2017.pdf. Retrieved July 30, 2019 at 21.07.

10. Nalesti M., 2015. Gymnastics textbook for the elderly. https://www.academia.edu/37825063/ Elderly Gymnastics Teaching Book. Retrieved 30 July 2019
11. Rudy B, Richard D. 2015. HandBook of Diabetes. Jakarta. Bumi Medika
12. Sumosardjuno, 2015. Practical knowledge of health in sports. Jakarta. Gramedia Pustaka.

CORRELATION HISTORY OF DIABETES IN PREGNANT MOTHERS WITH MACROSOMIA EVENTS

Nurbaeti Amilia, Siti Hanifatun Fajria, Desi Nurseha Merita, Siti Fadliatun N
Wijaya Husada Health Science Institute

ABSTRACT

Pregnancy is a diabetogenic condition characterized by weight gain and hormonal changes that stimulate insulin resistance in the tissues, which causes the body to not be able to maintain glucose in the normal range. Diabetes women can not overcome the increased need for insulin, causing plasma blood glucose to increase or so-called hyperglycemia. Gestational diabetes mellitus (DMG) is a disorder of carbohydrate tolerance that occurs or is first known when a pregnancy is in progress. This situation is common at 24 weeks of pregnancy and some patients will return to normal after delivery. Macrosomia or large baby is the birth weight of a baby exceeding 4000 grams. Macrosomia is also called giant baby. According to Cumningham all neonates weighing 4000 grams or more regardless of gestational age are considered macrosomia.

The purpose of this study was to determine the relationship of diabetes history in pregnant women with the incidence of macrosomia in the working area of Bogor sareal health center in 2019.

This type of research is an analytic survey with analytic research designs. Data collection methods used are cross sectional approach. The sampling technique in this study is Simple Random sampling. Data were processed using SPSS version 17 with Cramer's V statistical test.

The results obtained by data on the frequency of history of diabetes in pregnant women is the highest, there is a history of diabetes with the number of 46 mothers giving birth or 23.0% and those giving birth to the highest macrosomia babies with 32 babies or 16.0% of all mothers giving birth. Cramer's V results obtained p value 0,000 which is smaller than 0.05. There is a correlation between the history of diabetes in pregnant women with the incidence of macrosomia in the Work Area of Bogor City Health Center in 2019.

Key word : *Diabetes, Pregnant Women, Macrosomia*

INTRODUCTION

Pregnancy is a diabetogenic condition characterized by weight gain and hormonal changes that induce resistance. insulin in the tissues, which causes the body to not retain glucose within normal ranges. Diabetes mom can't cope with the increased need for insulin, causing glucose blood increased plasma or what is called *hyperglycemia*.[1]

Pregnancy or gestation lasts approximately 38-40 weeks from conception. During this time, the fetus has a placenta which functions as the respiratory, digestive and kidney systems during intrauterine life. Besides, the placenta also functions to distribute nutrients from mother to fetus to meet nutritional needs during pregnancy.

Based on data from the World Health Organization (WHO), Indonesia now ranks 4th in the largest number of pregnancies with diabetes world melitus. In 2009, the number of pregnancies with

diabetes in Indonesia it reaches 14 million people. Of this number, only 50% of sufferers are aware of the disease and about 30% of them take regular medication. According to several prevalence epidomological studies diabetes in Indonesia ranges from 1.5 to 2.3, except for Manado which tends to be higher at 6.1%.[2]

Gestational diabetes mellitus (DMG) is a disorder of carbohydrate tolerance that occurs or is known for the first time during pregnancy. This situation usually occurs at 24 weeks of gestation and some patients will return to normal after giving birth.[3] Pregnant women with *hyperglycemia* can be classified as pregnant women with diabetes who have settled before becoming pregnant (*pregestational*) or pregnant women with diabetes that just happened during pregnancy (*diabetes gestational mellitus*).

Called gestational diabetes when the impaired glucose tolerance that occurs during pregnancy returns to normal within 6 weeks of delivery. Diabetes mellitus (not gestation) is considered if impaired glucose tolerance persists after delivery. In this group, the condition of diabetes is experienced temporarily during pregnancy. This means that diabetes or glucose intolerance is first discovered during pregnancy, usually in the second or third trimester.13 Gestational diabetes occurs at weeks 24 to 28 during pregnancy. Although diabetes during pregnancy is one of the risk factors for developing type II diabetes. This condition is a temporary condition in which blood sugar levels will return to normal after childbirth.[3]

Pregnant women who have *gestational diabetes mellitus* have a high risk of *developing gestational diabetes mellitus* again in their next pregnancy, and also 17% - 63% of them will change and develop type 2 diabetes within 5 to 16 years.[3] *Gestational diabetes mellitus* can occur in pregnant women over 30 years of age, obese women (BMI ≥30), women with a history of diabetes mellitus in the parents or a history *of gestational diabetes mellitus* in previous pregnancies and giving birth to babies with birth weight ≥4000 grams and the presence of glucosuria.

Globally, the prevalence of diabetes mellitus in pregnancy is 16.9%. As many as 91.6% of cases of diabetes mellitus in pregnancy occur in countries with moderate and low economies, and limited access to maternal health services.[4]

Southeast Asia has the highest prevalence at 25%. *Gestational Diabetes Mellitus is* estimated to reach 380 million by 2025.[2] In Indonesia, the incidence of *gestational diabetes mellitus* (Diabetes in

pregnancy) is around 1.9-3.6% and about 40-60% of women have *diabetes. mellitus gestational* follow-up postpartum observation will suffer *gestational diabetes mellitus* or impaired glucose tolerance.[3] In West Java the incidence of *gestational diabetes mellitus* (diabetes in pregnancy) in 2013 was recorded at around 418,110 people out of the total population of 32,162,328 women in West Java who had *gestational diabetes mellitus*.[4]

The Pedersen hypothesis states that *hyperglycemia* in the mother cancause *hyperglycemia* alsoin the fetus because glucose can easily penetrate the placenta. This causes an excessive fetal insulin response resulting in excessive fetal growth which leads to large birth weight (*macrosomia*).

Macrosomia or large babies is the birth weight of the baby more than 4000 grams. *Macrosomia* is also called *giant baby*. According to Cumningham, all neonates weighing 4000 grams or more regardless of gestational age are considered *macrosomia*.[5]

Macrosomia is thecomplication *of gestational diabetes mellitus* most common. *Macrosomia was* defined as a baby born weighing ≥ 4000g. Study results at the end of the view of 40patients *diabetic Gestational mellitus* which was monitored for 3.5 years has the most frequent complications is the occurrence of *macrosomia*, this may be due toin general. *diabetes mellitus gestational* diagnosed late especially in our country.[5 The

incidence ofbabies *macrosomic* is about 5% of all births. *Macrosomia* is one of the causes that can complicate the delivery process that can cause birth trauma. Even newborns who are above normal weight cannot cry or breathe spontaneously and regularly at birth. If this condition persists for a long time, it can cause mental or physical disabilities.[6]

The prevalence of *macrosomia* in the world in women *with gestational diabetes mellitus* is 50%. *Gestational diabetes mellitus* which is not managed optimally will cause morbidity in mother and baby. Incidence of *macrosomia* in *gestational diabetes mellitus* with glycemic control bad is 40%.[7]

A major concern with infant delivery *macrosomic* is shoulder dystocia with the associated risk of permanent brachial plexus palsy. Shoulder dystocia occurs when the mother's pelvis is large enough to deliver the fetal head, but not large enough to deliver the shoulders of a fetus that is very large in diameter.[8]

The most common risk factor for babies born with *macrosomia* is diabetes mellitus experienced by the mother or

what is often called *gestational diabetes mellitus*. Diabetes is the most common medical complication of pregnancy. Patients can be separated into those with known pre-pregnancy diabetes (*overt* manifest) and those diagnosed during pregnancy (gestational).[8]

Several studies have shown that the weight of a newborn is influenced by various maternal factors, such as fetal constitutional, metabolic and genetic. Despite gestational glucose intolerance and *diabetes mellitus Gestationality* is a major factor in the birth ofbabies *macrosomic*, other research reports have shown that other maternal factors, such as maternal obesity, affect the weight of the newborn. Other risk factors that cause *macrosomia* include increased blood sugar levels during pregnancy, the sex of a male fetus, a history offetal labor *macrosomic*, increased gestational age, and smoking.[8]

Pregnant women with a history of giving birth to *macrosomia have a*5-10 times higher risk of having ababy again *macrosomic* than mothers who have never given birth to ababy *macrosomic.* The results of this study also show that the progeny *macrosomic* with gestational *diabetes mellitus* can be distinguished clearly in utero as characterized by a high growth rate of specialized insulin sensitive tissues including fat, heart, and subcutaneous liver.[8]

Management of pregnant women with *diabetes mellitus Gestational* therapy can be done in two ways, namely by therapy non pharmacological and therapy pharmacology. Non-pharmacological therapy consists of DM / MNT *(Medical Nutrition Therapy)*Diet, Diet / nutritional therapy, SMG (*Self Monitoring of Blood Glucose).* Pharmacological therapy consists of insulin, insulin is a polypeptide hormone consisting of 51 amino acids arranged in 2 chains, the A chain consists of 21 amino acids and the B chain has 30 amino acids.[9]

Based on a preliminary study conducted at 2 BPM (Independent Skill of Midwives), the Tanah Sareal Community Health Center in Bogor City on September 7, 2019 with a *survey* of baby birth data *macrosomic*, that in 2 BPM the work area of the Tanah Sareal Community Health Center, Bogor City in 2018-2019, was recorded the number of mothers giving birth at BPM Bidan Eka Budiarti, S.ST ,. Amd. Keb. In 2019 (January to September) as many as 134 mothers gave birth with babies born *macrosomic* 11with a history of diabetes there were 13 people in the mother. Meanwhile, in BPM Sri Utami, Amd. Keb. In 2018 to 2019, there were 266 mothers who gave birth, with the

number of babies born, *macrosomic* namely 21 babies with a history of diabetes in the mothers, there were 33 people. Total overall history of diabetes in the mother as many as 46 people in both the BPM and as many as 32 women with a history *of diabetes* gave birth to baby *Macrosomia* and the remaining 14 women with a history of diabetes does not give birth to a baby *macrosomia*.the remaining part of the total number of mothers who gave birth in both BPM mothers did not have a history of diabetes and gave birth to babies with normal weight.

Based on the above background, the researchers are interested in conducting research on the relationship of diabetes history in pregnant women with the incidence of *macrosomia* in the work area of the Tanah Sareal Health Center, Bogor City in 2019.

To determine the relationship of diabetes history in pregnant women withincidents *macrosomia* in the Work Area of the Tanah Sareal Health Center, Bogor City, 2019.

RESEARCH METHOD

This research is an *analytic survey that is a survey* or research that tries to explore how and why health phenomena occur. Then perform a dynamic analysis of the correlation between phenomena, both between risk factors and effect factors, between risk factors, and between effect factors regarding how risk factors are studied. The time approach used is *cross sectional*. Research design is a strategy to achieve what has been determined and acts as a guideline or research prosecution in the entire research process.[10]

This research method is carried out with theapproach *Cross Sectional* is a study to study the dynamics of the correlation between risk factors and effect factors, by means of an observational approach, using a checklist filled in by the researcher on the data obtained from the BPM and from related parties, namely mothers who have given birth in both BPM in the Work Area of Puskemas Tanah Sareal Bogor City and data collection at once at one time. The design of this study was to determine the relationship between the history of diabetes in pregnant women and the incidence of *macrosomia* in the Work Area of the Tanah Sareal Health Center in Bogor City in 2019.

This research was conducted in the Work Area of the Tanah Sareal Health Center, Bogor City on September 9, 2019. The population in this study were all mothers. giving birth at 2 BPM in the Work Area of the Tanah Sareal Community Health Center, Bogor City in

2019, totaling 200 mothers giving birth. The sampling method used in this research is *simple random sampling* or random with a lottery system. The sample taken is a population that has met the criteria.

The type of data in this study is in the form of secondary data, namely data collected by related agencies or agencies or not collected by the researcher himself and used by the researcher to complete and carry out research, namely data about the number of all mothers who gave birth in 2018-2019 who were in the Work Area of the Tanah Sareal Health Center, Bogor City.

Data analysis consisted of Univariate and Bivariate analysis. Univariate analysis was performed to obtain data descriptions in the form of frequency distribution and percentage of each independent variable, namely the history of diabetes in pregnant women and the dependent variable, namely the incidence of *macrosomia.* Bivariate analysis is carried out by connecting the independent variable with the dependent variable. The analysis carried out aims to have a statistically significant relationship. In this study, statistical hypothesis testing will be carried out using a test with theformulathe *Cramer's V,correlation* where bivariate analysis analyzesbetween a history of diabetes in pregnant women and the incidence of macrosomia in the work area of the Tanah Sareal Community Health Center, Bogor City in 2019.

RESEARCH RESULTS

This research was conducted in the working area of the Tanah Sareal Health Center, Bogor City. This research was conducted from 9 September to 13 September 2019 at 2 BPM in the Work Area of the Tanah Sareal Health Center, Bogor City. In this study the researchers looked at the data of all women giving birth based on medical record data to be research material. Collecting data, there were all 400 women giving birth in 2 BPM sareal lands, Bogor city, of the 400 women who gave birth as the research sample, there were 200 women giving birth, the measuring tool used a sheet *checklist*. This research was conducted to determine the Relationship History of Diabetes in Pregnant Bogor City in 2019.

Women with the Incidence of Macrosomia in the Work Area of the Tanah Sareal Health Center inThe results obtained in a study entitled The Relationship of Diabetes History in Pregnant Women with the Incidence of Macrosomia in the Work Area of the Tanah Sareal Health Center, Bogor City, 2019 is as follows:

Table 1
Frequency Distribution of Respondent Characteristics by Age of Pregnant Women in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019

No	Age	Frequency	Percentage (%)
1	Age 21-29	52	26.0
2	Age 30-39	148	74.0
Total		200	100

Source : *IBM SPSS Statistics* 17.0

Based on data from Table 1, the frequency distribution of respondent characteristics based on age in pregnant women in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019 shows the results of 200 respondents, as many as 148 respondents (74%) aged 30-39 years.

Table 2
Frequency Distribution of Diabetes History in Pregnant Women in the Work Area of the Tanah Sareal Community Health Center, Bogor City in 2019

No	History of *Diabetes Mellitus*	Frequency	Percentage (%)
1	There is a history of DM	46	23.0
2	There is no history of DM	154	77.0
Total		200	100

Source: *IBM SPSS Statistics* 17.0

Based on the data in Table 2, the Distribution of Frequency History of Diabetes in Pregnant Women shows the results of 200 respondents, there are 154 respondents (77%) who have no history of diabetes.

Table 3
Frequency Distribution of Macrosomia Incidents in the Work Area of the Tanah Sareal Health Center in Bogor City in 2019

No	Macrosomia Incidents	Frequency	Percentage (%)
1	Macrosomia	32	16.0
2	Non Macrosomia	168	84.0
	Total	200	100

Source: *IBM SPSS Statistics* 17.0

Based on the data in Table 3, the Frequency Distribution of Macrosomia Events shows the results of 200 respondents, there are 168 respondents (84%) with non-macrosomic baby weight.

Table 4 The
Relationship between Diabetes History in Pregnant Women and Macrosomia Incidence in the Work Area of Tanah Sareal Health Center, Bogor City, 2019

History of *DM*	Macrosomic events				Total		*P Value*	*OR (Odss Ratio)*
	Macrosomia		Non Macrosomia					
	F	%	F	%	F	%		
Have a history of diabete	32	16	14	7	46	23	0.000	0.304
No history of DM	0	0	154	77	154	77		
Total	32	16	168	84	200	100		

Source: *IBM SPSS Statistics* 17.0

Based on table 4, the Relationship of Diabetes History in Pregnant Women with Macrosomia Incidence of 200 respondents, 154 (77%) pregnant women did not have a history of diabetes and gave birth to non-macrosomic babies.

Thetest results *cramer* show a p value of 0.000 (*p value* <0.05), which means that Ho is rejected and Ha is accepted, so there is a relationship between Diabetes History in Pregnant Women and Macrosomia Incidence in the Work Area of Tanah Sareal Health Center, Bogor City in 2019. Odds Value The ratio is 0.304, which means that pregnant women with a history of diabetes have the opportunity to give birth to babies with macrosomia by 0.304 times greater than pregnant women who do not have a history of diabetes.

DISCUSSION

1. Univariate Analysis

Discussion is a gap that appears after the researcher conducts research and then compares the results of the study. This research is a research on the Relationship of Diabetes History in Pregnant Women with Macrosomia Incidence in the Work Area of Tanah Sareal Health Center, Bogor City in 2019.

a. Distribution of the frequency of history of diabetes in pregnant women in the Work Area of the Tanah Sareal Community Health Center, Bogor City in 2019

At the beginning of pregnancy, insulin and insulin development factors are the main determinants of fetal growth and fetal organ development. The production of insulin in the fetus, which begins between 8-10 weeks of gestation, is largely determined by the level of glucose in the mother, which is about 80% passed to the fetus through the placental membrane.[11] Mothers with offspring *of gestational diabetes mellitus* who have poor glycemic control are constantly exposed to high levels of glucose and insulin in the uterus, which can accelerate

fetal growth.[11] It is called gestational diabetes when the impaired glucose tolerance that occurs during pregnancy returns to normal within 6 weeks after delivery. Diabetes mellitus (not gestation) is considered if impaired glucose tolerance persists after delivery. In this group, the condition of diabetes is experienced temporarily during pregnancy. This means that diabetes or glucose intolerance is first seen during pregnancy, usually in the second or third trimester.[12] Gestational diabetes occurs at 24 to 28 weeks of pregnancy. Although diabetes during pregnancy is one of the risk factors for developing type II diabetes. This condition is a temporary condition in which blood sugar levels will return to normal after childbirth.[13]

Based on the results of the research, it shows that from the respondents in the work area of the Tanah Sareal Community Health Center, there are 154 respondents (77%) who do not have a history of DM in the work area of the Tanah Sareal Community Health Center, Bogor City.

The results of this study are comparable to research conducted by Heru Setiawan "The relationship between pregnant women with diabetes mellitus and the birth of macrosomia babies at RSAB Harapan Kita Jakarta in 2014" with a total of 30 respondents, 16 (51.7%) respondents did not have a history of DM.

From these data the researchers concluded that if pregnant women, especially those who have a history of diabetes during pregnancy, should reduce foods that are too sweet so that sugar levels are not too high.

b. Macrosmia Incidence in the Work Area of the Bogor City Health Center in 2019

Macrosomia is a baby born weighing> 4000 grams. The growth of fetuses *macrosomic* in the uterus tends to accelerate (after 38 weeks) whereas the growth of non-macrosomic fetuses is more linear during pregnancy. Pregnant women with a history of giving birth to *macrosomia have a* 5-10 times higher risk of having a baby again *macrosomic* than mothers who have never given birth to a baby *macrosomic.*[14]

Several studies have shown that the weight of the newborn is influenced by various maternal factors, such as fetal constitutional, metabolic and genetic. Despite gestational glucose intolerance and *diabetes mellitus gestational* is a factor that is the main cause of the birth of babies *macrosomia*, other research reports suggest that other maternal factors, such as maternal obesity, affect the weight of the newborn. Other risk factors that cause *macrosomia* include increased blood sugar levels during pregnancy, the sex of a male fetus, a history offetal labor *macrosomic*, increased gestational age, and smoking.[14]

Based on the results of the study showed that from the respondents in the working area of the Tanah Sareal Health Center, the results obtained from 200 respondents, there were 168 respondents (84%) with non-macrosomic weight babies in the working area of the Tanah Sareal Community Health Center, Bogor City.

The results of this study are comparable to research conducted by Idha Farahdiba "The relationship between a mother with diabetes and the birth of a macrosomic baby at Syekh Yusuf Gowa Hospital in 2018" with a total of 98 respondents, 80 (81.6%) respondents gave birth weighing < 4000. gram (non macrosomia).

From these data it can be concluded that macrosomia is a condition in which a baby is born with a weight> 4000 grams, the birth of a macrosomia baby is due to the mother's poor diet so that it causes diabetes in which mothers with a history of diabetes are very susceptible to birth of macrosomia babies or baby weight> 4000 gram. This requires the mother's knowledge of a good diet to prevent macrosomia by obtaining information from reading media about health, especially health in pregnant women.

2. Bivariate Analysis

a. The Relationship of Diabetes History in Pregnant Women with Macrosomia Incidence in the Work Area of the Bogor City Health Center in 2019

At the beginning of pregnancy, insulin and insulin development factors are the main

determinants of fetal growth and fetal organ development. The production of insulin in the fetus, which begins between 8-10 weeks of gestation, is largely determined by the level of glucose in the mother, which is about 80% passed to the fetus through the placental membrane.[14] Mothers with offspring *of gestational diabetes mellitus* who have poor glycemic control are constantly exposed to high levels of glucose and insulin in the uterus, which can accelerate fetal growth. Research has also shown that the growth of fetuses *macrosomic* in the uterus tends to accelerate (after 38 weeks) whereas non-macrosomic fetus growth is more linear during pregnancy. Pregnant women with a history of delivery have a *macrosomic* 5-10 times higher risk of re-giving birth babies *macrosomic* than mothers who have never given birth to babies *macrosomic.*[14]

Several studies have shown that the weight of the newborn is influenced by various maternal factors, such as fetal constitutional, metabolic and genetic. Despite gestational glucose intolerance and *diabetes mellitus Gestationality* is a major factor in the birth of babies *macrosomic*, other research reports have shown that other maternal factors, such as maternal obesity, affect the weight of the newborn. Other risk factors that cause *macrosomia* include increased blood sugar levels during pregnancy, the sex of a male fetus, a history of fetal labor *macrosomic*, increased gestational age, and smoking.[14]

Based on the cross-table about the results of statistical tests, the relationship between history of diabetes in pregnant women and the incidence of macrosomia in the work area of the Tanah Sareal Community Health Center, Bogor City in 2019, from 200 respondents, 154 (77%) pregnant women did not have a history of diabetes mellitus and gave birth to non-macrosomic babies . The test *Cramer's V* results obtained *p value* = 0,000, which means *p value* α <(0.05). This means that there is a correlation between the history of diabetes in pregnant women and the incidence of macrosomia in the work area of the Tanah Sareal Community Health Center, Bogor City in 2019.

This research is comparable to the research conducted by Arlia Oroh. "Relationship between Macrosomia and Gestational Diabetes Mellitus at the BLU Observation Section, Prof. DR.RD Kandou Manado in 2015 ", the results of the statistical test *Chi-Square* showed *p value* = 0.000, which means that there is a relationship between *gestational diabetes mellitus* and *macrosomia* in the BLU Obsgin Section of RSUP Prof. DR.RD Kandou Manado in 2015.

From the results of this study there are It can be concluded that the more mothers who have a history of diabetes during pregnancy, the higher the birth of macrosomic babies. Likewise, on the contrary, the more there is no history of diabetes in pregnant women, the lower the birth rate of macrosomic babies.

CONCLUSION

This chapter will present the results of the conclusions and suggestions of "The Relationship of Diabetes History in Pregnant Women in the Work Area of the Bogor City Health Center in 2019".

1. It is known that the distribution of the frequency of diabetes history in pregnant women in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019, of the 200 respondents, there are 154 respondents (77%) who do not have a history of DM.
2. It is known that the distribution of the frequency of macrosomia occurrences in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019, from 200 respondents, there are 168 respondents (84%) with non-macrosomic baby weight.
3. There is a relationship between a history of diabetes in pregnant women and the incidence of macrosomia in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019 with *p value* = 0.000, which means *p value* < α (0.05). The Odds ratio value is 0.304, which means that pregnant women with a history of diabetes have the opportunity to give birth to a baby with macrosomia by 0.304 times greater that of pregnant women who do not have a history of diabetes.

SUGGESTION

1. For STIKes Wijaya Husada

   The results of this study are expected to be used as a reference for the development of science and further research on the relationship between diabetes history in pregnant women and the incidence of macrosomia.

2. For the Tanah Sareal Community Health Center, Bogor City.

   To become a reference for midwives & nurses for early treatment of pregnant women with a history of diabetes, patients should be handled according to the applicable standards and regulations.

REFERENCES

1. Shadine, M. 2010. *Knowing Hypertension, Diabetes, Stroke, and Heart Attack*. Prints I. Jakarta: KEEN BOOKS
2. American Diabetes Association. 2015. Classification and Diagnosis of Diabetes. *Diabetes Care* 2015; 38 (Suppl. 1): S8 – S16.
3. Susilo & Wulandari. 2011. *The Right Way to Overcome Hypertension* : Yogjakarta CV. Andi Offset.
4. Infodata. 2013. *Center for data and information of the Indonesian Ministry of Health*. Accessed via: www.depkes.go.id. infodata on August 5, 2019.
5. Adam, JMF 2016. *Gestational Diabetes Mellitus, in Internal Medicine Textbook,* Volume 3, Edition 4, Publishing Center of the Department of Internal Medicine, FKUI, Jakarta.
6. Anonymous. 2019. *Fruit of Hope.* Accessed via: http://www.buah-hati-harapan.com on 5 August 2019.
7. Siregar, M. 2010. Relationship between blood sugar levels in third trimester pregnant women with birth weight of children at Pringadi Hospital Medan. Medan State University.
8. Cunningham FG, Levono Kaje, Bloom SL, Hauth JC, Rouse DJ, Spong CY, Williams. 2010. *Obstetric, (23rd ed).* The McGraw-Hill Companies, inc, 2010.
9. Afriansyah, Nurfi. 2009. *How to Cope with Diabetes, Researchers at the Center for Food Nutrition Research and Development, MOHRI.*
10. Manuaba, Ida Ayu Chandranita, Manuaba Ida Bagus Gde Fajar, Manuaba Ida Bagus Gde. 2009. *Introduction to obsetri lectures*. Jakarta: EGC
11. Tanya Trevors. 2009. *Neonatal Morbidity Among Macrosomic Infants*

in the Janes Bay Cree Population of Northern Quebec. Montreal.

12. Notoadmodjo, S., 2010. *Research Methodology*. Jakarta: PT Rineka Cipta.

PHYSICAL ACTIVITY CORRELATION WITH BLOOD SUGAR LEVELS IN DIABETES MELLITUS TYPE 2 PATIENT

Harun Al Rasid, Sara Tania Aprianty, Muhammad Tsani Musyafa, Diky Aditya Firmansyah

Wijaya Husada Health Science Institute

Abstract

Data of World Health Organization (WHO) until September 2012 showed a tendency to increase the incidence rate and the prevalence of type 2 DM which is large enough in the year ahead. It is estimated that DM sufferers around the world reached 347 million people and more than 80%. The habit of doing physical activity and exercise affects blood sugar levels. Diabetes mellitus disease is characterized by high levels of blood glucose. This research aims to determine if there is a physical activity correlation with blood sugar levels in patients with diabetes mellitus type 2 in Cimandala Village area in 2019.

This type of research is quantitative analytic with cross sectional design and implemented in Cimandala Village area on 29 August – 31 August 2019 with population number 80 and total number of 40 respondents using Purposive sampling technique. The instruments used are questionnaire sheets and observation sheets.

Univariate analysis was discovered for a variable physical activity of 40 respondents who had a heavy activity of 25 people (62.5%), an activity of 8 people (20.0%), and a light activity of 7 people (17.5%). For the results of the analysis of univariate blood sugar content 100-199 as much as 25 people (62.5%) and > 200 as many as 15 people (37.5%).

It is known that from 40 respondents were able to do heavy activities with 19 respondents (47.5%) With blood sugar level 100-199 in patients with diabetes mellitus type 2. Based on the Statistical test table sufficient analysis of the acquired P Value = 0.028 then P, Value of < α, so Ho rejected which means that the statistical test indicates there is a correlation of physical activity with blood sugar levels in patients with Diabetes Mellitus type 2 in Kelurahan Cimandala year 2019.

Physical activity performed by a person can tighten the sensitivity of insulin receptors so that glucose can be converted into energy through metabolism. One of the benefits of physical activity is to lower blood sugar levels in people with diabetes mellitus.

Keywords : activity, sugar levels, Diabetes

INTRODUCTION

In line with the changing times, the pattern of disease in Indonesia has shifted from infectious diseases and malnutrition to degenerative diseases, one of which is diabetes mellitus.[1] Diabetes mellitus is a group of diseases metabolic characterized by hyperglycemia that occurs due to abnormalities in insulin secretion, insulin action, or both.[2] Diabetes is a dangerous disease that attacks all members of the body.

Indonesia is one of the 10 countries with the highest number of diabetics. Indonesia was ranked 7th in 1995 and is predicted to rise to 5th place in 2025 with an estimated number of sufferers of 12.4 million.[3] Diabetes mellitus is a chronic disease characterized by blood glucose levels

greater than normal (≥ 200 mg / dL).[4] If left uncontrolled, this disease will cause diseases that can be fatal, such as heart disease, kidney disease, blindness, and amputation. Data from the World Health Organization (WHO) until September 2012 shows a fairly large trend of increasing incidence and prevalence of type 2 diabetes mellitus in the coming years. It is estimated that DM sufferers worldwide reach 347 million people and more than 80% of these cases occur in countries that have low and medium income per capita, including Indonesia.[5]

WHO predicts an increase in the number of diabetes mellitus sufferers in Indonesia from 8.4 million in 2000 to around 21.3 million in 2030. The International Diabetes Federation (IDF) in 2009, also predicts an increase in the number of people with diabetes mellitus from 7.0 million in 2009 to 12.0 million in 2030. Although there are differences in the incidence rate, the second report shows an increase in the number of people with diabetes mellitus by 2-3 times in 2030.3 Based on data from the Indonesian Central Statistics Agency in 2003, it is estimated that Indonesia's population aged over 20 years as many as 133 million people. The prevalence of diabetes mellitus in Indonesia ranges from 1.4 to 1.6% except in two places, namely in the Pekajangan area 2.3% and in Manado 6%.[6]

Most of the risk factors for diabetes mellitus are an unhealthy lifestyle such as lack of physical activity, unhealthy and unbalanced diet and obesity. Therefore, the most important thing from controlling diabetes mellitus is controlling risk factors. An important goal of diabetes mellitus management is to restore metabolic disorders so that all metabolic processes return to normal.[3]

The habit of doing physical activity and exercise will affect blood sugar levels. Diabetes mellitus is characterized by high blood glucose levels. In patients with diabetes mellitus, activities sedentary should be avoided such as watching television, using the internet, and sitting relaxed. Increased high physical activity such as brisk walking, cycling and muscle training is recommended. Exercise physical

Regularare aerobic in people with diabetes can improve insulin sensitivity and decrease cardiovascular risk. Walking, cycling, jogging, and swimming are aerobic exercises.

The number of diabetes mellitus sufferers is growing so fast, so many studies have been carried out aimed at reducing the number of sufferers and minimizing the impact of complications of diabetes mellitus which are closely related to blood sugar levels that are too high and can lead to death. Handling steps to minimize complications of type 2 diabetes mellitus can be done in various ways. One of them is by controlling the four main pillars in the form of education, food planning, physical exercise, and pharmacological interventions.

RESEARCH METHOD

The research design is the final result of a stage of decisions made by the researcher regarding how the research can be applied. The approach taken is *cross sectional,* which is a study to study the dynamics of the correlation between risk factors and effects, by approaching, observing or collecting data at once. The correlation in this method that will be examined is the relationship between physical activity and blood sugar levels in type 2 diabetes mellitus patients.[7]

This research was conducted in Cimandala Village, on the elderly suffering from diabetes mellitus accompanied by obesity. The reason for conducting this study was that there had never been a similar study regarding physical activity with blood sugar levels in patients with type 2 diabetes mellitus in Cimandala Village.

Population is the whole object of research or object under study.[7] The population in this study was 80 respondents who suffered from type 2 diabetes mellitus in Cimandala Village in 2019.

Data processing and data analysis were computerized using the SPSSprogram *for* windows. The analysis consisted of univariate and bivariate analyzes.

RESEARCH RESULTS

This research was conducted in Cimandala Village in 2019. With primary data, questionnaires were

distributed and blood sugar levels were measured to residents of Cimandala Village. This research was conducted on 29 August - 31 August 2019. This study aims to determine the relationship between physical activity and blood sugar levels in type 2 diabetes mellitus patients. The variables studied included physical activity (independent variable) and blood sugar levels (dependent variable). Respondents in this study were residents of Cimandala Village. The measuring instruments used were questionnaires and checking blood sugar levels by collecting data from 40 respondents. This research usedmethod *quantitative analytic* withapproach *cross sectional*, the sampling technique used was *purposive sampling technique*. After going through data collection, the next step is to find out the results of the research, the data processing is carried out, then the Univariate and Bivariate analysis are carried out. Univariate analysis is presented in the form of a frequency distribution which includes physical activity in Cimandala Village in 2019 and type 2 diabetes mellitus in Cimandala Output in 2019. Furthermore, bivariate analysis will be analyzed to determine the relationship between physical activity and blood sugar levels in type 2 diabetes mellitus patients in Cimandala Village. Year 2019.

Table 1
Frequency Distribution of Physical Activity in Patients with Type 2 Diabetes Millitus

No	Physical Activity	Frequency	Percentage (%)
1	Heavy	25	62.5%
2	Moderate	8	20.0%
3	Mild	7	17.5%
	Total	40	100%

Based on table 1 the frequency distribution of physical activity in type 2 diabetes mellitus patients in Cimandala Village in 2019 from 40 respondents, the results obtained were 25 respondents (62.5%) doing strenuous physical activity in type 2 diabetes mellitus patients.

Table. 2
Frequency Distribution of Sugar Levels Blood in Type 2 Diabetes Mellitus Patients

No	Blood Sugar Levels	Frequency	Percentage (%)
1	Normal	25	62.5%
2	Abnormal	15	37.5%
	Total	40	100%

Based on table 2 the frequency distribution of blood sugar levels in type 2 diabetes mellitus patients in Cimandala Village in 2019 from 40 respondents, the results obtained were 25 respondents (62.5%) had normal blood sugar levels.

Table 3
Analysis of the Relationship between Physical Activity and Blood Sugar Levels inPatients Type 2 Diabetes Mellitus

Physical Activity	Blood Sugar Levels				Total		*P Value*
	Normal		Abnormal				
	F	%	F	%	F	%	
Weight	19	47.5 %	6	15.0 %	25	62.5 %	0.028
Moderate	3	7.5 %	5	12.5 %	8	20.0 %	
Mild	3	7.5 %	4	10.0 %	7	17.5 %	
Total	25	62.5 %	15	37.5 %	40	100 %	

Based on table 3 of the results of the bivariate analysis regarding the relationship between physical activity and blood sugar levels in type 2 diabetes mellitus patients in Cimandala Village in 2019, it is known that of the 40 respondents, it was found that doing strenuous activity with 19 respondents (47.5%) with normal blood sugar levels in patients with type 2 diabetes mellitus. Based on the statistical test of the bivariate analysis table, it was obtained *P Value* = 0.028 and α = <0.05 then *P Value* <α, so that Ho is rejected, which means that the statistical test shows that there is a relationship between physical activity and blood sugar levels in Type 2 Diabetes Mellitus Patients in Cimandala Village in 2019.

DISCUSSION

a. Physical Activity in Type 2 Diabetes Mellitus Patients

Physical activity is any movement of the body with the aim of increasing and releasing energy or energy. Physical activity plays a role in controlling the body's blood sugar by converting glucose into energy.[8]

Lack of physical activity and obesity are the most important factors in the incidence of diabetes mellitus worldwide.[9] According to WHO what is meant by physical activity is an activity of at least 10 minutes without stopping by doing light, moderate and heavy activities. Strenuous activity is body movement that causes a lot of energy expenditure (calorie burning) so that breathing is much faster than usual. For example lifting water, climbing, walking fast, lifting weights, cutting down trees. moderate activity is a movement of the body that causes a large expenditure of energy or in other words, a movement that causes the breath to be slightly faster than usual. For example household chores (washing clothes by hand, mopping). While examples of light activities are walking and office work such as typing. In other words, physical activity is any movement of the body that increases energy expenditure and energy burning. Physical activity is categorized as sufficient if a person does physical exercise or exercise for 30 minutes every day or at least 3-5 days a week.[10]

Physical activity and regular exercise are very important in addition to avoiding obesity, as well as preventing diabetes mellitus. When moving, the muscles use more glucose than when they are not moving. Thus the blood glucose concentration will decrease through exercise / physical activity, insulin will work better, so that glucose can enter the muscle cells to be burned.[11]

Based on table 1 of the frequency distribution of Physical Activity in Type 2 Diabetes Mellitus Patients in Cimandala Village in 2019, from 40 respondents, 25 respondents (62.5%) performed strenuous activities.

From the research results that are in line with the research Anita Astuti 2017 with the title "The effect of physical activity on blood sugar levels in diabetes mellitus patients in the internal medicine clinic of Jombang Hospital". This study used aapproach *cross-sectional* with a sample of 83 respondents with type 2 diabetes mellitus in the general hospital in Jombang area who were taken by *consecutive sampling technique*. It is known that there were 42 respondents with heavy

physical activity (50.6%) where 42 respondents (15.7%) had low blood sugar levels and 28 respondents (33.7%) had high blood sugar levels. Data were analyzed using the SPSS for Windows program. The result of the *Spearman* Rank Pearson correlation test test showed that the value of p = 0.000. Then the results obtained $H_{1\ are}$ accepted and Ho is rejected There is an effect of physical activity on blood sugar levels in diabetes mellitus in the internal disease clinic room of Jombang Regional Hospital, Jombang Regency.

So the conclusion from the results of theory and research can be concluded that physical activity weight will affect the decrease in blood sugar levels because when exercising the muscles use blood sugar levels stored in the muscles and if the sugar is reduced, the muscles fill the void by taking sugar levels from the blood. This will result in decreased blood sugar levels thereby improving blood sugar levels.

b. Blood Sugar Levels in Type 2 Diabetes Mellitus Patients

Blood sugar (glucose) levels are levels of sugar found in the blood which are formed from carbohydrates in food and stored as glycogen in the liver and skeletal muscles. Blood sugar levels are the main energy source for body cells in muscles and tissues.[12]

Factors that affect blood sugar levels are internal and external factors. Internal factors, such as disease and stress, obesity, food, physical activity, treatment either with tablets or with insulin. Meanwhile, external factors include education, knowledge, closeness and exposure to information sources.

The benefits of physical exercise or exercise as diabetes mellitus therapy have long been recognized as one of the efforts to overcome diabetes mellitus in addition to medication and diet.[8] Physical exercise can increase tissue sensitivity to insulin. In type 1 diabetes mellitus, the increase in tissue sensitivity to insulin can reduce the need for insulin, whereas in type 2 diabetes mellitus the increase in tissue sensitivity is very

important in the regulation of blood glucose levels.

Based on table 2 of the frequency distribution of blood sugar levels in type 2 diabetes mellitus patients in Cimandala Village in 2019, from 40 respondents, it was found that 25 respondents (62.5%) had normal blood sugar levels.

This research is in line with research conducted by Cicilia L, Wulan PJ Kaunang, Fima LFG Langi. about "the relationship between physical activity and the incidence of diabetes mellitus in outpatients at the Bitung City Hospital 2018". The research design used by researchers in this study was an analytic survey with aapproach *cross sectional.* Shows that the incidence of diabetes mellitus with moderate physical activity with the incidence of diabetes mellitus there were 13 respondents (28.2%) while those without diabetes mellitus with moderate physical activity were 33 respondents (71.8%). With a normal blood level interval 80-190 mg / dl. Based on the test, the results obtained were *p value* = 0.026, which means that there is a relationship between physical activity and the incidence of diabetes mellitus in patients who are hospitalized in the internal poly with a significance value of $\alpha = 0.05$.

From the results of the study, it can be concluded that between the theory and the results of research that those affecting blood sugar levels in type 2 diabetes mellitus patients in the Cimandala village area in 2019 get disease and stress can change diet, exercise, use of drugs that are usually obeyed and this causes hyperglycemia, obesity can cause insulin receptors on target cells throughout the body to be less sensitive and the number is reduced so that insulin in the blood cannot be utilized, a balanced diet as needed can maintain blood sugar levels close to normal values, physical activity can increase tissue sensitivity to insulin , treatment with tablets or with insulin can stimulate pancreatic beta cells to secrete insulin or reduce glucose absorption in the intestine so as to reduce glucose levels in the blood.

Education for the public to carry out physical activities so that they can control blood glucose levels to remain stable, good knowledge of

diabetes mellitus can restore blood glucose levels, many sources of information about diabetes mellitus can increase patient knowledge so that patients can take appropriate action.

c. The Relationship between Physical Activity and Blood Sugar Levels in Type 2 Diabetes Mellitus Patients in Cimandala Village in 2019

In type 2 diabetes mellitus, exercise plays a role in regulating blood glucose levels. The main problem in type 2 diabetes mellitus is a lack of response to insulin (insulin resistance) so that glucose cannot enter the cells. The permeability of the membrane to glucose increases when the muscles contract because the muscle contracts insulin-like properties. Therefore, during physical activity such as exercise, insulin resistance decreases. Physical activity in the form of exercise is useful for controlling blood sugar and weight loss in type 2 diabetes mellitus.[13]

The major benefits of physical activity or exercise in diabetes mellitus include lowering blood glucose levels, preventing obesity, taking part in overcoming complications, blood lipid disorders. and increased blood pressure.[13]

Another theory states that physical activity is directly related to the speed at which muscle blood sugar recovers. When physical activity is carried out, the muscles in the body will react by using the stored glucose so that the stored glucose is reduced. In this situation there will be a muscle reaction in which the muscles will take up glucose in the blood so that glucose in the blood decreases and this can improve blood sugar control.

From the results of bivariate analysis regarding the relationship between physical activity and blood sugar levels in patients with type 2 diabetes mellitus in the cimandala village. It is known that of the 40 respondents, it was found that doing strenuous activity with 19 respondents (47.5%) with normal blood sugar levels in patients with type 2 diabetes mellitus. Based on the statistical test, the bivariate analysis table was obtained *P Value* = 0.028 and α = <0.05 then *P Value* <α, so that Ho is rejected, which

means that the statistical test shows that there is a relationship between physical activity and blood sugar levels in diabetes mellitus patients in the cimandala village in 2019.

This research is in line with the research conducted by Nurayati. and Adriani Merryana 2017 conducted a study entitled The relationship of physical activity with fasting blood sugar levels in type 2 diabetes mellitus. This study used adesign *cross sectional* with a study sample of 62 people. Collecting data with structured interview guides and questionnaires. Blood samples were taken using the spectrophotometer method by the medical analyst of the Mulyorejo Health Center laboratory. The analysis was performed using thetest *Spearman's Rho statistical*. The results showed that 62.9% of respondents had heavy physical activity and 58.0% of respondents had low fasting blood sugar levels. The results showed that there was a relationship between physical activity and fasting blood sugar levels in type 2 diabetes mellitus sufferers (p = 0.000).

From the results of the study, it can be concluded between theory and research that physical activity with blood sugar levels in type 2 diabetes mellitus patients in Cimandala Village in 2019. It is known that of the 40 respondents, it was found that doing strenuous activity with 19 respondents (47.5%) with sugar levels 100-199 blood in patients with type 2 diabetes mellitus totaled 6 respondents (15.0%). Based on the statistical test of the bivariate analysis table, it was obtained *P Value* = 0.028 and α = <0.05, then *P value* <α, so that Ho was rejected, which means test statistics show that there is a relationship between physical activity and blood sugar levels in type 2 diabetes mellitus patients in the Cimadala village in 2019.between physical activity and blood sugar levels in Type 2

CONCLUSION

1. Based on the results of the frequency distribution of Physical Activity in Type 2 Diabetes Mellitus Patients in Cimandala Village in 2019, there were 25 respondents (62.5%) who did strenuous activities.

2. Based on the results of the frequency distribution of Blood Sugar Levels in Type 2 Diabetes Mellitus Patients in Cimandala Village in 2019, it is known that 25 respondents (62.5%) had normal blood sugar levels of 100-199.
3. Based on the results of bivariate analysis regarding the relationship between physical activity and blood sugar levels in patients with type 2 diabetes mellitus in the cimandala village. It is known that of the 40 respondents, it was found that doing strenuous activity with 19 respondents (47.5%) with normal blood sugar levels in type 2 diabetes mellitus patients.Based on the statistical test of bivariate analysis tables, it was obtained *P Value* = 0.028 and α = <0.05 then *P value* <α, so that Ho is rejected, which means that the statistical test shows that there is a relationship between physical activity and blood sugar levels in patients with type 2 diabetes mellitus in the Cimadala village in 2019.

SUGGESTIONS

Based on the results of this study, there are several suggestions that the researcher can convey, including:

a. For Science

   The research results obtained are expected to add references to related research and also as a comparison material that will be carried out afterwards

b. For Cimandala Village

   Based on the results of the study, it was found that the relationship between physical activity and blood sugar levels in Type 2 Diabetes Mellitus Patients in Cimandala Village in 2019 has been carried out well.

REFERENCES

1. Suyono, S., 2011. *The trend of increasing number of people with diabetes mellitus* in: Soegondo, S., Soewondo, P., Subekti, I., Editor. *Integrated Diabetes Mellitus Management for doctors and diabetes educators*. Jakarta: Faculty of Medicine, University of Indonesia
2. PERKENI, 2011. *Consensus on Management and Prevention of*

Type 2 Diabetes Mellitus in Indonesia. www.perkeni.org. (31 May 2013)

3. Arisman, 2011. *Obesity, Diabetes Mellitus, and Dyslipidemia*. Jakarta: EGC
4. Purnamasari Dyah. *Diagnosis and Classification of Diabetes Mellitus*. In the Textbook of Internal Medicine. Volume III. Edition V. Jakarta: FKUI Publisher Center. 2011. p. 1882.
5. WHO http: / /www.who.int/ mediacentre / factsheets / fs312 / en / index.html on 23 July 2019
6. Suyono S. 2012 *Diabetes mlelitus in Indonesia in the Internal Medicine Textbook. Volume III. V*Edition.Jakarta: FKUI Publisher Center. Thing. 1873.
7. Notoatmodjo, Soekidjo. 2012. *Health Research Methodology.* Jakarta: Rineka Cipta
8. Directorate of non-communicable disease control. Directorate General of Disease Control and Environmental Health (DITJEN PP & PL), Ministry of Health RI. *Technical Guidelines for Measuring Risk Factors for Diabetes Militus.* 2008.
9. Rios, Manuel Serrano. 2011. *Type 2 Diabetes Mellitus. Barcelona* : Elsevier Espana.
10. RI Ministry of Health. 2011. *National Strategy for Application of Food Consumption Patterns and Physical Activity to Prevent Non-Communicable Diseases.*
11. Soegondo, Sid journalist. 2012. *Living Independently with Diabetes Mellitus*. Jakarta: FK UI Publisher Center.
12. Sustrani L. *Diabetes*. Jakarta: Gramedia; 2011. From http://eprints.undip.ac.id/51927/1/Scriptions_Nita_Rachmawati_PDF.pdf (Accessed on 7 April 2018).
13. Ilyas, EI, *Benefits of Physical Exercise for People with Diabetes*, in Soegondo, S, et al, *Integrated Diabetes Mellitus Management*, Jakarta: FKUI, 2011. From http://repository.uinjkt.ac.id/dspace/bitstream/123456789/597/1/92496-QURRATUAENI-FKIK.pdf (Accessed on 7 April 2018).

THE CORRELATION BETWEEN TYPE OF PERSONALITY WITH HYPERTENTION DEGREES

Tri Diani Agustuti, Yuni Shahroh, Yufi Aliyupiudin, Teguh Esa Santosa

Wijaya Husada Health Science Institute

ABSTRACT

Hypertension or high blood pressure is an abnormal and continuous increase in blood where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. Classification of blood pressure based on the degree of hypertension JNC-VIII theres four categories: normal, prehypertension, first degree hypertension, second degree hypertension. Factors that influence hypertension include genetic, age, sex, high salt consumption, obesity, stress, smoking, drinking alcohol, taking drugs (ephedrine, prednisone, epinephrine), and personality type. Personality type affects the emergence of hypertension can be seen from how someone uses their coping stress. Personality type here is personality type A. Type A behavior patterns cause hypertension associated with being ambitious, like to compete, work never tired, always being chased by time and always feel never satisfied.

This study aims to determine the correlation between type of personality with hypertention degrees in Sukajaya health centerBogor district 2019.

This research is a quantitative analytic descriptive research with cross sectional design. The sample of this study was 85 respondents. The sampling technique in this study uses accidental sampling. Data is processed by Chi Square statistical test..

The results of 85 respondents showed as many as 37 respondents had a type A personality type with hypertension degree I. (43.5%) Statistical test results using chi square,\, obtained p value of 0.042 (<0.05). Because p value <0.05 then Ho is rejected and Ha is accepted. From the results of the study found, there is a correlation between type of personality with hypertention degrees in Sukajaya health centerBogor district 2019.

The conclusion of this study is there is a correlation between type of personality with hypertention degrees in Sukajaya health centerBogor district 2019. Suggestions from researchers are expected that the results of this study can be used as information about the description of the personality type and degree of hypertension experienced by patients at the Sukajaya Health Center.

Keywords : Personality type, degree of hypertension

INTRODUCTION

Hypertension is *the silent disease* because people do not know they have hypertension before checking their blood pressure. Hypertension is the biggest cause of stroke, both systolic and diastolic blood pressure.[1] Hypertension, also known as high blood pressure, is a condition in which the blood vessels are constantly increasing in pressure. Blood is carried from the heart to all parts of the body in vessels. Every time the heart beats, it pumps blood into the veins. Blood pressure is created by the force of blood pushing

against the walls of the blood vessels (arteries) as they are pumped by the heart. The higher the pressure, the harder it is for the heart to pump.[2] Hypertension is an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg on two measurements with an interval of five minutes in a state of rest / calm. The classification of hypertension according to the JNC (*Joint National Committee*) is divided into 3, namely, prehypertension with systolic 120 - 139 and / or diastolic 80 - 89, hypertension degree 1 with systolic 140 - 159 and / or diastolic 90 - 99, hypertension grade 2 with systolic 160 or> 160 and / or diastolic 100 or> 100.[3]

According to WHO (*World Health Organization*) in 2015 there were 1.13 billion people in the world who had high blood pressure.[4] Based on the 2018 RISKESDAS data, the prevalence for blood pressure measurement results due to hypertension rose from 25.8 percent to 34.1 percent.[5] Based on data from the health profile of Bogor Regency in 2017, the population> 18 years with hypertension was 162,866 people, where 70,575 men and 92,290 women. In Sukajaya Puskesmas, the prevalence is 17.75 percent or as much as 1,540 people with hypertension, of which 505 are male and 1035 are female.[6]

Factors that can influence the presence of hypertension are lifestyle (alcohol, smoking), obesity (overweight), lack of exercise, heredity, stress and personality type.[7]

Personality is a general trait of a person. This personality is a behavior that is shown by the individual in the social environment so that the social environment can capture and have the desired impression of him. Overall behavior is systematically influenced by thoughts, activities and feelings. This personality is used to describe the nature of the individual which makes the difference between himself and others.[8] There are many kinds of personality types, one of which is type A and B. The personalities personality types A and B were first introduced by Frieldman and Ray Rosenman. They concluded that people with type A personality

are very competitive and achievement-oriented, feel that time is always pressing, find it difficult to relax and become impatient or angry when faced with tardiness or with people who are seen as non-committal. Meanwhile, people with type B are more able to relax without feeling guilty and work without seeing lust, do not have to rush that causes impatience and not easily angry.[9]

Personality types influence the emergence of hypertension. It can be seen from how a person uses coping stress. Negative emotions and emotional control depend on the personality type of each individual.[7]

According to research conducted by Rut AL Tandi in 2018, it shows that there is a relationship between personality types and the incidence of hypertension in outpatients at the Kakaskasen Community Health Center in Tomohon City, which was carried out by distributing questionnaires and measuring blood pressure. The data were processed with a computer program, analysis *Chi Square Test* with α 0.05. The results of statistical tests using the *Chi Square Test* obtained *pvalue*= 0.000. [10]

Based on a preliminary study conducted at the Sukajaya Community Health Center on August 23, 2019, which coincided with the POSBIDU (Integrated Assistance Post) schedule. Researchers measured blood pressure and distributed questionnaires to 10 respondents. The results obtained from 10 respondents who suffer from hypertension, 2 of them have pre hypertension, 5 respondents with grade 1 hypertension and 3 respondents with grade 2 hypertension. Of the 10 respondents, 8 respondents have type A personality and 2 others are type B personality. The possibility exists that there is a relationship between personality type and the degree of hypertension.

In general, the purpose of this study is to determine the relationship between personality types and the degree of hypertension at the Sukajaya Community Health Center, Bogor Regency in 2019.

RESEARCH METHOD

This type of research is *descriptive quantitative analytic*, which is a research method that aims to see a description of the phenomena that occur in a certain population and try to explore how and why these phenomena occur. Then perform a dynamic analysis of the correlation between phenomena or between the independent variable and the dependent variable.[11,12]

For the design of this study using aapproach *cross sectional*, which is an analytical research design that aims to determine the relationship between variables in which the dependent variable and the independent variable are identified at one time unit (p*oint time approach*). Each research subject was observed only once and measurements were made of the character status or subject variables at the time of examination.[11,13]

Thevariable *independent* in this study is the personality type. Thevariable *dependent* in this study is the degree of hypertension.

In this research, it was carried out at the Sukajaya Community Health Center, Bogor Regency. The time of this study was 23-27 September 2019. The population in this study were hypertension patients at the Sukajaya Community Health Center, Bogor Regency, with 108 hypertension patients in July 2019.

The sample in this study was taken using *accidental sampling technique*. This technique is used by taking cases or respondents who happen to be there or are willing to be in a place according to the research context. The total sample size is determined using the Slovin formula:

Description:

n = Number of sample members

N = number of population

d = level of confidence desired

Based on the calculations obtained above, the total sample studied was 85 respondents.

The tools used in collecting data used a questionnaire for personality types and a tension meter to determine the degree of hypertension. The questionnaire used is a questionnaire about personality type A. This questionnaire consists of 20 closed statements of questions

in this questionnaire using ascale *Guttman* with yes and no answers.

Univariate analysis was carried out on the variables from the research results. The independent variable is the personality type and the dependent variable is the degree of hypertension. Bivariate analysis is used to test the hypothesis by determining the relationship between the independent variables and theStatistical Test theory variable *Chi-Square*.

RESEARCH RESULTS

The general description characteristic of the place of this research was carried out at the Sukajaya Community Health Center, Bogor Regency on 23-27 September 2019. Sukajaya Health Center, which is located in Sukajaya District, Bogor Regency. Sukajaya Puskesmas has 6 Assisted Villages with Assisted Villages, namely: Sukajaya Village, Sipayung Village, Sukamulih Village, Jaya Raharja Village, Pasir Madang Village, Cileuksa Village.

This study aims to determine the relationship between personality types and the degree of hypertension in Sukajaya District Health Center. Bogor in 2019.

The variables studied included the dependent variable on the degree of hypertension and the independent variable for personality type.

The following is a table of respondents' descriptions based on the questionnaires distributed regarding the frequency distribution of the hypertension respondent descriptions at the Sukajaya Community Health Center, Bogor Regency:

Table 1 Frequency Distribution of Research Respondents by Age at the Sukajaya Community Health Center, Bogor Regency in 2019

Age	Frequency	Percentage (%)
16-25 Years	6	7.1
26-35 Years	5	5.9
36-45 Years	32	37.7
46-55 Years	26	30.5
56-65 Years	11	12.9
66-75	5	5 , 9

Years		
total	85	100

Based on table 1, the frequency distribution of research respondents based on age at Puskesmas Sukajaya, Bogor Regency, from 85 respondents showed that 32 respondents were in the age range of 36 - 45 years. (37.7%).

Table 2 Frequency Distribution of Research Respondents by Gender at the Sukajaya Community Health Center, Bogor Regency in 2019

Gender	Frequency	Percentage (%)
Male	15	17.6
Female	70	82.4
Total	85	100

Based on table 2, the frequency distribution of research respondents based on gender at Puskesmas Sukajaya, Bogor Regency, out of 85 respondents showed that 70 respondents were female. (70%).

Table 3 Frequency Distribution of Research Respondents based on Smoking Habits at the Sukajaya Health Center, Bogor Regency in 2019

Smoking Habit	Frequency	Percentage (%)
Yes	17	20
No	68	80
Total	85	100

Based on table 3, the frequency distribution of research respondents based on smoking habits at the Sukajaya Community Health Center, Bogor Regency, out of 85 respondents showed that 68 respondents did not smoke. (80%).

Table 4 Frequency Distribution of Research Respondents based on Latest Education at the Sukajaya Community Health Center, Bogor Regency in 2019

Age	Frequency	Percentage (%)
Elementary school	25	29.4
Junior high school	35	41.2
Senior high school	15	17.6

Diploma	6	7.1
Bachelor	4	4.7
Total	85	100

Based on table 4 the frequency distribution of research respondents based on education at the Sukajaya Community Health Center, Bogor Regency, out of 85 respondents showed 35 respondents whose last education was junior high school. (41.2%).

Table 5 Frequency Distribution of Research Respondents based on High Sodium Food Eating Habits at Sukajaya Public Health Center, Bogor Regency in 2019

Habit of Consuming Salty Foods	Frequency	Percentage (%)
Yes	75	88.2
No	10	11.8
Total	85	100

Based on the frequency distribution table of research respondents based on the habit of consuming high-sodium foods at the Sukajaya Community Health Center, Bogor Regency, out of 85 respondents showed that 75 respondents had a habit of eating foods that were high in sodium or salty. (88.2%).

Table 6 Frequency Distribution of Research Respondents based on Compliance with Medication at the Sukajaya Community Health Center, Bogor Regency in 2019

Compliance with Medication	Frequency	Percentage (%)
Yes	42	49.4
No	43	50.6
Total	85	100

Based on table 6, the frequency distribution of research respondents based on adherence to taking medication at the Puskesmas Sukajaya, Bogor Regency, from 85 respondents showed that 43 respondents did not have compliance in taking medication (50.6%).

Table 7 Distribution of Personality Types in Hypertension Patients at Sukajaya Health Center, Bogor Regency in 2019

Personality Type	Frequency	Percentage (%)
Type A	69	81.2
Type B	16	18.8
Total	85	100

From the results of the table above, it is known that of the 85 respondents the frequency distribution of personality types in hypertensive patients at Sukajaya Health Center, Bogor Regency shows 69 respondents with personality type A. (81.2%).

Table 8 Frequency Distribution of Hypertension Degrees at Puskesmas Sukajaya, Bogor Regency, 2019

Degree of Hypertension Grade	Frequency	Percentage (%)
Pre Hypertension	35	41.2
Hypertension I	40	47.1
II Hypertension	10	11.8
Total	85	100

From the results of the table above, it is known that the frequency distribution of the degree of hypertension at Puskesmas Sukajaya, Bogor Regency, from 85 respondents shows that 40 respondents with grade I hypertension (47.1%).

Table 9 Relationship between Personality Types and Degrees of Hypertension at Sukajaya Public Health Center, Bogor Regency in 2019

Degree of Hypertension	Personality Type				Total		*P Value*
	Type A		Type B				
	N	%	N	%	N	%	
Pre hypertension	25	29.4	10	11.8	35	41.2	0.042
Hypertension degree I	37	43.5	3	3.5	40	47.7	
Hypertension degree II	7	8.2	3	3.5	10	11.8	
Total	69	81.2	16	18.8	85	100	

From the table above shows the results of the analysis of the relationship between personality types and degrees hypertension at Puskesmas Sukajaya, Bogor Regency in 2019 from 85 respondents showed as many as 37 respondents were type

A personality types with grade I hypertension (43.5%). The results of statistical tests using *chi square*, the results obtained *p value* of 0.042 (<0.05). Because *p value* <0.05, H_o rejected and H_a accepted, it can be concluded that there is a personality type relationship with the degree of hypertension in Bogor District Health Center Sukajaya 2019.

DISCUSSION

1. Personality Type

Based on table 7, it is known that of the 85 respondents the frequency distribution of personality types in hypertensive patients at Sukajaya Public Health Center, Bogor Regency shows 69 respondents with personality type A. (81.2%).

Personality is a general characteristic of a person contained in an individual that guides and gives direction to the visible individual behavior and invisible thoughts, and is not only something, but does something. According to Meyer Friedman and Ray Roseman, personality types are divided into 2, namely: personality type A and personality type B. People at type A are considered more likely to experience higher levels of stress because they put themselves under time pressure. by creating a certain time limit for their life, whereas people with type B are the opposite of type A.[14]

The traits of type A personality are thinking and doing two things once; scheduling more activities in less time; does not show or is not interested in the environment or beauty; getting other people to speak quickly; very impatient if you have to queue or drive a car behind a slow-moving vehicle; always move hands when talking; frequently shaking feet and tapping fingers; explosive speech patterns; make always arrive on time as worship; it was hard to just sit there doing nothing; when playing, you always want to win, even if you play with children; assess the success of yourself and others by comparing the number (number of patients who came, articles written, etc.); when talking, he often wet his lips, nodded his head, clasped his hands hitting the table or sighed; can't wait to see

other people do the things you think can be done faster and better; likes to blink or raise eyebrows. [9,14,15]

The characteristics of type B personality, namely: fair ambition, not aggressive and healthy in competing and not pushing yourself; calm, not easily irritated and not easily angry (controlled emotions); vigilance within reasonable limits as well as self-control and trust is not excessive; unhurried way of speaking, acting at the right time, non-hyperactive behavior; can manage the time at work (provide time for rest); in organizing and leading to be accommodating and humane; prefer to cooperate and not push yourself when faced with challenges; good at managing time and calm (relaxed), not in a hurry; easy to get along with, friendly and can generate empathy to achieve togetherness (*mutual beefit*); not rigid (flexible), can respect other people's opinions, does not feel that he is the most righteous; can free oneself from all kinds of problems of life and work while on vacation; in controlling things able to restrain and control oneself; patient; do a job one by one; better able to understand other people; can relax after finishing work; leads to things that are worthy of respect; playing games for fun, not victory; It's hard to be candid for fear of hurting others.[9,14,15]

This research is in line with the research conducted by Rut AL Tandi with the title of the relationship between personality type and the incidence of hypertension in outpatients at the Kakaskasen Public Health Center in Tomohon City, which was conducted in 2018. The results of this study illustrate that of the 220 respondents, 122 respondents were found have a type A personality (55.5%).[10] This research is also in line with the research conducted by Anis Prabowo with the title of the relationship between personality type and the degree of hypertension in female hypertensive patients aged 30-50 years at Pajang Surakarta Health Center which was conducted research in 2018. The results of this study illustrate that of the 30 respondents, 22 were found. respondents who have personality type A (73.3%).[16]

According to the researcher's analysis of the above theory quotations, there is harmony with the results of the research that the researchers conducted with the results of the above research. Personality types in hypertensive patients at Puskesmas Sukajaya, Bogor Regency, out of 85 respondents showed 69 respondents with personality type A (81.2%). This can be attributed to respondents who are hypertensive patients.

2. Degree of Hypertension

Based on table 8, it is known that the frequency distribution of the degree of hypertension at the Sukajaya Health Center, Bogor Regency, from 85 respondents, shows that 40 respondents with grade I hypertension (47.1%).

Hypertension or what is called high blood pressure is an abnormal increase in blood that changes and continuously where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. Blood flow in people with hypertension will be difficult to flow because of the contraction of the arterioles and eventually cause an increase in blood pressure. The workload of the heart will also increase with hypertension, as a result of this the heart will be damaged as well as blood vessels.[17]

Classification based on the degree of hypertension JNC-VII (*The Eighth Joint National Committee*) which is based on the average measurement of two or more blood pressures at two or more clinical visits for adult patients (age ≥ 18 years). The blood pressure classification includes four categories, namely: normal with systolic blood pressure (TDS) <120 mmHg and / or diastolic blood pressure (TDD) <80 mmHg; Prehypertension is not considered a disease category but identifies patients whose blood pressure is likely to increase to the classification of hypertension in the future. Prehypertension values with systolic blood pressure (TDS) 120-139 mmHg and / or diastolic blood pressure (TDD) 80-89 mmHg; First degree hypertension with systolic blood pressure (TDS) 140-159mmHg and / or diastolic blood pressure

(TDD) 90 - 99 mmHg; Second degree hypertension with systolic blood pressure (TDS)> 160mmHg and / or diastolic blood pressure (TDD)> 100 mmHg [18]

Factors that influence hypertension include heredity / genetics, age, sex, high salt consumption, obesity (obesity)), stress, smoking, drinking alcohol, taking drugs (*ephedrine, prednisone, epineprine*), and personality type.[7,18]

The results of this study contradict research conducted by Riza Fikriana with the title of the relationship between personality type and blood pressure in hypertension sufferers which was conducted in 2017. The results of this study illustrate that of the 56 respondents, 37 respondents with stage 2 hypertension (66.1%).[19]

According to the researcher's analysis of the above theoretical quotations, it is contrary to the results of the research that the researchers conducted with the results of the above research. The degree of hypertension at Puskesmas Sukajaya, Bogor Regency, out of 85 respondents, showed that 40 respondents had grade I hypertension (47.1%). This can be related to the factors that influence hypertension experienced by hypertensive sufferers in their respective research sites.

3. Relationship Type of Personality with Degrees of Hypertension

Based on table 9 shows the results of the analysis of the relationship between personality types and degrees of hypertension at the Sukajaya Community Health Center, Bogor Regency in 2019, out of 85 respondents, there were 37 respondents with type A personality type with grade I hypertension (43.5%). The results of statistical tests using *chi square*, the results obtained *p value* of 0.042 (<0.05). Because *p value* <0.05, H_o rejected and H_a accepted, it can be concluded that there is a personality type relationship with the degree of hypertension in Puskesmas Sukajaya Bogor Regency Year 2019.

Hypertension related to the increase in systolic or diastolic blood pressure or the pressure of both. Hypertension can be defined as

persistent high blood pressure where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. In the elderly population, hypertension as a systolic pressure of 160 mmHg and a diastolic pressure of 90 mmHg.[20] One of the classifications of hypertension based on the degree of hypertension is according to the JNC (*Joint National Committee*) which is divided into 3, namely prehypertension with systolic 120 - 139 and / or diastolic 80 - 89, hypertension grade 1 with systolic I40 - 159 and / or diastolic 90 - 99, 2 systolic hypertension degree 160 or> 160 and / or diastolic 100 or> 100.[18]

factors that influence hypertension include heredity / genetics, age, gender, high salt intake, obesity (obesity), stress , smoking, drinking alcohol, taking drugs (*ephedrine, prednisone, epineprine*), and personality type.[7,18]

Personality type affects the emergence of hypertension can be seen from how a person uses coping stress. Negative emotions and emotional control depend on the personality type of each individual. The personality type here is the type A.

The personality type A is often associated with cardiovascular disease based on the traits shown in the type A behavior. Regarding how the type A behavior pattern causes hypertension, it is associated with ambitious, competitive, work never tired, always pressed for time and always felt never satisfied. These properties will release *ketecholamine* which can cause the prevalence of serum cholesterol levels to increase, so that it will facilitate the occurrence of atherosclerosis. Stress will increase the resistance of peripheral blood vessels to cardiac output so that it will stimulate sympathetic nerve activity. This stress can be related to work, socio-economic class and personal characteristics.[7,18]

This research is in line with research conducted by Rut AL Tandi with the title of the relationship between personality types and the incidence of hypertension in outpatients at the Kakaskasen Public Health Center in Tomohon City, which was conducted in 2018. The

results of statistical tests using the *Chi Square Test* obtained *pvalue*= 0,000.[10] This research is also in line with the research conducted by Anis Prabowo with the title of the relationship between personality type and the degree of hypertension in female hypertensive patients aged 30-50 years at Pajang Surakarta Health Center which was conducted research in 2018. The results of this study indicate that there is a relationship between personality type A and B with hypertension, in which personality type A tends to have hypertension more than personality type B (p = 0.001). [16] However, the results of the study contradict the research conducted by Riza Fikriana with the title of the relationship between personality type and blood pressure in hypertensive patients, which was conducted in 2017. The results of this study showed that there was no significant relationship between personality type and blood pressure in hypertensive patients (p= 0.974). [19]

According to the researcher's analysis of the theory quote above. The relationship between personality type and the degree of hypertension at Puskesmas Sukajaya, Bogor Regency, 2019 from 85 respondents showed that 37 respondents had type A personality with grade I hypertension. (43.5%) The results of statistical tests using *chi square* showed a *p value* of 0.042 (<0,05). Because *p value* <0.05, H_o rejected and H_a accepted, it can be concluded that there is a personality type relationship with the degree of hypertension in the health center of Bogor Regency Year 2019. Sukajaya personality type can affect the degree of hypertension. It is evident from the factors that influence hypertension, one of which is a personality type, from previous research conducted by Anis Prabowo, although the time and place are different, the results show that the relationship between personality type and the degree of hypertension where personality type A tends to have hypertension compared to personality type B .

CONCLUSION

From the discussion of research conducted in Puskesmas Sukajaya

date 23 to 27 September 2019 regarding the relationship with the degree of hypertension Personality type conclusions can be drawn as follows:

1. The frequency distribution of the degree of hypertension at Sukajaya Health Center from 85 respondents showed 69 respondents with personality type A (81.2%).
2. The frequency distribution of the degree of hypertension at Puskesmas Sukajaya, Bogor Regency, from 85 respondents showed that 40 respondents had grade I hypertension (47.1%).
3. Analysis of the relationship between personality types and the degree of hypertension at the Puskesmas Sukajaya, Bogor Regency, 2019 from 85 respondents showed that 37 respondents had type A personality types with grade I hypertension. (43.5%) The results of statistical tests using *chi square* showed a *p value* of 0.042 (< 0.05). Because *p value* <0.05, H_o rejected and H_a accepted, it can be concluded that there is a personality type relationship with the degree of hypertension in Bogor District Health Center Sukajaya 2019.

SUGGESTION

Based on the above conclusions, the researcher can provide several suggestions, namely as follows:

1. Theoretical

   As an effort to apply nursing science to increase knowledge and insight about hypertension and personality types.
2. Practical
   a. For Sukajaya Community Health Center

      As research information and documentation of further research data on personality types with degrees of hypertension.
   b. For STIKes Wijaya Husada

      As additional information and scientific application in hypertension material that has been obtained and input for future researchers
   c. For Respondents

      For information regarding the description of blood pressure

experienced and the type of personality they have.

REFERENCES

1. WHO. 2013. *Silent Killer, Global Public Crisis.* https://www.who.int/campaigns/world-health-day/2013/en. Retrieved 26 June 2019 at 08:23:14
2. WHO. 2013. *Hypertension*. https://www.who.int/topics/hypertension/en/. Retrieved 26 July 2019 at 08:30:14
3. Ministry of Health RI. 2016. *Hypertension*. http://www.depkes.go.id/download.php?file=download/pusdatin/infodatin/infodatin-hytension.pdf. Downloaded on 23 June 2019 at 17:10:07
4. WHO. 2015. *Global Health Observatory (GHO) Blood Pressure data*. https://www.who.int/gho/ncd/risk_factors/blood_pressure_prevalence/en/. Accessed on 26 June 2019 at 08:42:29
5. Ministry of Health. 2018. *Portrait Healthy Indonesia from RISKESDAS 2018*. https://www.depkes.go.id/article/view/18110200003/potret-sehat-indonesia-dari-riskesdas-2018.html. Retrieved 26 June 2019 at 09:00:06
6. Bogor District Health Office. 2018. *Book Bogor District HealthProfile.* https://dinkes.bogorkab.go.id/buku-profil-dinkes-2018/. Retrieved 26 June 2019 at 19: 06:53
7. Wolff, Hans Peter. 2009. *Hypertension How to Detect and Prevent High Blood Pressure from an Early Age*. Jakarta: Buana Popular Science
8. Alwisol. 2012. *Personality Psychology (Revised Edition).* Malang: UMM Press
9. Friedman, Meyer and Diane Ulmer. 1985. *Type A Behavior and Your Heart*. New York: Afred A. Knopf
10. Tandi, RAL 2018. *Relationship between Personality Types and Incidence of Hypertension in Outpatients at Kakaskasen*

Public Health Center in Tomohon City. https://ejournal.unsrat.ac.id/index.php/kesmas/article/viewFile/22516/22206. Downloaded on 22 July 2019 at 20:17:39

11. Dharma, Kelana Kusuma. 2011. *Nursing Research Methodology (Guide to Implementing and Implementing Research Results) Revised Edition*. Jakarta: Trans Info Media
12. Sugiyono. 2015. *Quantitative Research Methods, Qualitative and R &D*.Bandung: Alfabeta
13. Notoatmodjo, Soekidjo. 2012. *Health Research Methodology*. Jakarta: Rineka Cipta
14. Hawari, Dadang. 2009. *Stress and Depression Management*. Jakart: FKUI Publisher Center
15. Wijono, S. 2010. *Job Satisfaction & Stress.* Salatiga: Sari Press
16. Prabowo, Anis. 2018. *Relationship between Personality Types and Degrees of Hypertension in Female Hypertension Patients aged 30-50 years at Pajang Surakarta Health Center*. http://www.ejournal.stikesmukla.ac.id/index.php/motor/article/view/344. Downloaded on July 22 2019 at 20:30:45
17. Udjianti, June Wok. 2011. *Cardiovascular Nursing*. Jakarta: Salemba Medika
18. Palmer, Anna and Ryan William. 2010. *Simple Guide for High Blood Pressure.* Jakarta: PT Gelora Asmara
19. Fikriana, Riza. 2017. The *Relationship between Personality Types and Blood Pressure in Patients with Hypertension*. http://download.garuda.ristekdikti.go.id/article.php?article=898297&val=14123&title=HUBUNGAN%20TIPE%20KEPRIBADIAN%20DENGAN%20TEKANAN%20DARAH%20PADA%20PENDERITA%20HIPERTENSI.

Downloaded on 1 June 24 2019 at 22:06:12

20. Majid, Abdul. 2017. *Nursing Care in Patients with Cardiovascular System Disorders.* Yogyakarta: New Pustaka Press
21. Chitrayana, Nancy. 2012. *Personality Type A and Risk of Hypertension in Adults*. http://journal.fkm.ui.ac.id/kesmas/article/download/408/405. Downloaded on June 25, 2019 at 17:17:02
22. Anies. 2018. *Degenerative Disease.* Yogyakarta: Ar-Ruzz Media
23. Aziza, Lucky. 2009. *Hypertension the Silent Killer.* Jakarta: Indonesian Doctors Association
24. Murmalina, Rina. 2011. *Obesity Prevention and Management Guide for Families.* Jakarta: Elex Media Komputindo
25. Indonesian Hypertension Doctors Association. 2019. *Consensus for Hypertension Management 2019.* http://www.inash.or.id/uploaded/event/event_Update_konsensus_2019123191.pdf. Downloaded on August 14, 2019 at 17:18:39
26. Suryabrata, Sumadi. 2016. *Personality Psychology*. Jakarta: PT Raja Grafindo Persada
27. Feist. 2009. *Personality Theory Volume 1*. Jakarta: Salemba Humanika.

AGE CORRELATION AND PHYSICAL STRESS TO CHANGES IN BLOOD PRESSURE IN PRE OPERATIVE PATIENTS

Sariaman Purba, Yuyung Susanti, Rani Devayanti, Kiki Baihaki

Wijaya Husada Health Science Institute
Email : wijayahusada@gmail.com

Abstract

The World Health Organization (WHO), the number of patients with operating actions year after year have increased. In 2012 there were 148 million patients throughout the patient's hospital with surgical action, in the year 2015 estimated 11% of the world's disease burden could be repeated by surgery and WHO stated that surgical cases are a problem Health for the community. The purpose of research for the correlation of age and physical stress to changes in blood pressure in patients pre operative at Hospital Kabupaten Ciawi Bogor In 2019.
The type of research used is descriptive analytic using Cross Sectional design and using data analysis that is Univariat analysis, Bivariat analysis and multivariate analysis. The study was done at the Hospital Kabupaten Ciawi Bogor on 13th September 2019 to 20th September 2019. Sampling using non probability sampling by accidental sampling sample of 21 respondents. The instruments are obtained in the form of an observation sheet and a closed questionnaire sheet in the statistical test using Kendall tau analysis.
Results of univariate analysis for age variables with age criteria of 11 respondents (36.7%), variable physical stress weight categories of 13 respondents (43.3%) and Variable change blood pressure by change high blood pressure (hypertension) as 19 respondents (63.3 %). The results of the analysis bivariat obtained ρvalue= 0,000 meaning that more than of α (<0,05) so that there was a correlation between the ages of to the completely altered the pressure of the blood and obtained ρvalue= 0,000 meaning that more than of α (<0,05) so there was a correlation between physical stress with changes in pressure in patients pre operation blood hospital Kabupaten Ciawi Bogor in 2019. Multivariate analysis or value OR exp (B) variable aged is 0,613 and value OR exp (B) 4941413871,162 physical stress.
In order for local health workers can provide information about the results of this study can be input for policy planning related to nursing care primarily about pre operative.

Keywords *: Ages, Physical Stress, Blood Pressure*

INTRODUCTION

Surgery is a potential or actual threat to a person's integrity that can generate physiological and psychological stress reactions. The Indonesian Surgical Chamber of Nurses Association (HIPKABI) defines surgery as an invasive medical procedure for diagnosis, treatment of disease, trauma, and deformities.[1] Patients undergoing surgery almost always show emotional reactions such as anxiety. In addition, patients also often experience concerns about financial problems, family responsibility, work and fear of a poor prognosis.[2]

Stage preoperative begins when the decision for surgery was made and ends when the patient was transferred to the operating table. The success of the operation as a whole really depends on this stage so that mistakes made at this stage will be fatal in the next stage. Therefore, a comprehensive assessment of the patient's physical and psychological functions is necessary for the success and success of an operation.[1]

Data from the *World Health Organization* (WHO) shows that the number of patients with surgery has increased from year to year. In 2012, there were 148 million patients in all hospitals in the world with surgery. In 2015 it was estimated that 11% of the world's disease burden could be handled by surgery and WHO stated that surgical cases were a health problem for the community.[3]

Whereas in Indonesia, surgery ranks 11th out of the first 50 disease treatments in hospitals throughout Indonesia with as many as 1.2 million surgical patients. The number of visits to the general surgical installation at Marzoeki Mahdi Hospital, Bogor City, surgery includes special surgery, major surgery, medium surgery and minor surgery throughout 2016, namely 371 patients, decreased throughout 2017, namely as many as 363 patients.[4]

Blood pressure is the force needed so that blood can flow in circulating blood vessels to reach all the tissues of the human body which consists of two pressures, namely systolic which is the blood pressure when the heart is closed and diastolic which is the blood pressure when the heart relaxes again. Human blood pressure can always change according to the heart rate which is divided into three groups, namely low blood pressure (hypotension), normal blood pressure (normotension) and high blood pressure (hypertension).[5]

The results of the preliminary study conducted by the researchers in the Jasmin Room at Ciawi Hospital, Bogor Regency, the number of operations from May to July 2019 was 450 patients. On average every month as many as 150 patients undergo surgery at Ciawi Hospital, Bogor Regency in 2019. From the results of the study, 10 patients will undergo *pre* surgery, 7 patients experience changes in blood pressure, these changes in blood pressure are caused by ignorance of the procedure to be undertaken, lack of information, and hear from other people about the

unpleasant experience due to surgery and 3 patients who will perform *preoperative* no change in blood pressure. Thus researchers interested in conducting research on the relationship Age and Physical Stress on Changes in Blood Pressure in Patients *Pre* Operation in hospitals Ciawi Bogor Regency Year 2019.

The purpose of research is known the relationship of age and physical stress to changes in blood pressure in patients with *preoperative* in Ciawi Hospital District Bogor in 2019.

RESEARCH METHOD

The type of research used is *descriptive analytic*. *Analytical descriptive* is a research method carried out with the main objective of making an objective description or description of a situation which is used to solve and answer problems. Using a design *Cross Sectional.*

The research was conducted at room Jasmin Ciawi Bogor District Hospital on September 13 to September 20, 2019. The population in this study were patients *preoperative* 150 respondents. The sample in this study was 30 samples using techniques *non-probability sampling* by *accidental sampling.*

The research variables consisted of age, physical stress and changes in blood pressure. Data analysis used univariate, bivariate and multivariate analyzes, where the univariate analyzes in this study were Age, Physical Stress and Changes in Blood Pressure. Bivariate analysis analyzed the relationship between age and changes in blood pressure and Physical Stress with Changes in Blood Pressure. Multivariate analysis to analyze the relationship Age and Physical Stress on Changes in Blood Pressure in Patients *Pre* Operations.

RESEARCH RESULTS

This study was conducted to determine the relationship between age and physical stress on changes in blood pressure. With the number of respondents who have studied as many as 30 samples.

Table 1 Minimum on patients preoperative in hospitals Ciawi Bogor District 2019

No	Usia	Frekuensi	Persentase (%)
1	Dewasa Awal	5	16,7 %
2	Dewasa Akhir	7	23,3 %
3	Lansia Awal	7	23,3 %
4	Lansia Akhir	11	36,7 %
	Total	30	100%

Based on Table 1 it can be seen in patients with age preoperative in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with a final elderly age criterion of 11 respondents (36.7%).

Table 2 Stress Physical in patients *pre* operation in hospitals Ciawi Bogor District 2019

No	Stres Fisik	Frekuensi	Persentase (%)
1	Ringan	3	10,0 %
2	Sedang	10	33,3 %
3	Berat	13	43,3 %
4	Sangat Berat	4	13,3 %
	Total	30	100 %

Based on Table 2 can be seen physical stress on the patient *pre* operation in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with physical stress weight categories as many as 13 respondents (43, 3%).

Table 3 Changes in blood pressure in patients with *preoperative* in hospitals Ciawi Bogor District 2019

No	Perubahan Tekanan Darah	Frekuensi	Persentase (%
1	Normal	11	36,7 %
2	Hipertensi	19	63,3 %
	Total	30	100 %

Based on Table 3 can be seen changes in blood pressure in patients with *preoperative* in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with changes in high blood pressure (hypertension) as 19 respondents (63.3%).

Table 4 Relationship Age of Change Blood Pressure in patients *pre* operation in hospitals Ciawi Bogor District 2019

Usia	Perubahan Tekanan Darah				Total		*P value*
	Normal		Hipertensi		F	%	
	F	%	F	%			
Dewasa Awal	4	13,3%	1	3,3%	5	16,7%	
Dewasa Akhir	4	13,3%	3	10,0%	7	23,3%	
Lansia Awal	2	6,7%	5	16,7%	7	23,3%	0,000
Lansia Akhir	1	3,3%	10	33,3%	11	36,7%	
Total	11	36,7%	19	63,3%	30	100%	

Based on Table 4 it can be seen on the statistical test the relationship of age to changes in blood pressure of 30 respondents categories of elderly end with the change of high blood pressure (hypertension) as many as 10 respondents (33.3%) Statistical test results obtained *ρvalue* = 0.000, which means α (<0.05) so that there is a relationship between age with Blood pressure Changes in Patients *Pre* Operation in hospitals Ciawi Bogor Regency Year 2019.

Table 5 relationship with Physical Stress Changes in blood pressure in patients with *preoperative* in hospitals Ciawi Bogor District 2019

Stres Fisik	Perubahan Tekanan Darah				Total		*P value*
	Normal		Hipertensi		F	%	
	F	%	F	%			
Ringan	3	6,60%	0	0%	3	10,00%	
Sedang	8	26,70%	2	6,70%	10	33,30%	
Berat	0	0%	13	43,30%	13	43,30%	0,000
Sangat Berat	0	0%	4	13,30%	4	13,30%	
Total	11	36,70%	19	63,30%	30	100%	

Based on table 5 it can be seen on the statistical test the relationship of physical stress with changes in blood pressure of 30 respondents categories of physical stress weight with changes in high blood pressure (hypertension) as many as 13 respondents (43, 3%). Statistical test results obtained *ρvalue* = 0.000, which means *α* (<0.05) so that there is a relationship between the Physical Stress Blood Pressure Changes InPatients *Pre* Surgeryin hospitals Ciawi Bogor Regency Year 2019.

Table 6 Relation to Age and Physical Stress on Changes in Blood Pressure patient *pre* operation in hospitals Ciawi Bogor District 2019

No	Variabel	P	*OR Exp (B)*	95% *CI For Exp (B)*	
				Lower	Upper
1	Usia	0,604	0,613	0,097	3,888
2	Stres Fisik	0,997	4941413871,162	0,000	

Based on table 6 can be known statistical results there is no relationship between age and physical stress to changes in blood pressure in patients with *preoperative* in hospitals Ciawi Bogor regency in 2019 the results obtained value *OR Exp* (B) variable age is 0.613 and the value of *OR Exp (B*) for physical stress variable is 4941413871.162. From the analysis and physical stress with *OR Exp* (B) is 4,941,413,871.162 have a higher chance for a change in blood pressure in patients with preoperative.

DISCUSSION

a. Age

Based on Table 1 on the age distribution of patients *preoperative* in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with a final elderly age criterion of 11 respondents (36.7%).

This study is comparable to a study conducted by Zeni Wahyuningsih 2014 regarding "The

Relationship between Anxiety and Increased Blood Pressure in Preoperative Patients in Bougenvil Room, Dr. Soegiri Lamongan in 2014 "with the results obtained that respondents aged <20 years were 6 respondents (20%), ages between 20-35 years were 11 respondents (36.7%) and age >50 years were 13 respondents (43.3%).[6]

Age is defined as the length of one's existence measured in units of time in terms of chronology, normal individuals who show the same degree of anatomical and physiological development.[7]

From the research results, it can be concluded between the theory and the results of the study that age differences affect blood pressure. Systolic and diastolic pressures gradually increase with age into adulthood. For every 1 year increase in age, the systolic blood pressure will increase by 0.369 and by 0.283 for diastolic blood pressure.

The results of these studies indicate that the older a person is, the higher his blood pressure. In the elderly, the arteries are harder and less flexible with blood pressure. This results in an increase in systolic pressure. Diastolic pressure also increases because the walls of the blood vessels no longer retract flexibly as blood pressure drops. So that the authors can conclude that there is an agreement between the theory and the results of the research.

b. Physical stress

In Table 2 on the distribution of physical stress on the patient *pre* operation in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with physical stress weight categories were 13 respondents (43.3%).

This study is comparable to research conducted by Anik 2017 concerning "The Relationship between Anxiety Levels and Increased Blood Pressure in Preoperative Elective Patients in the Surgical Room in 2017" with the results obtained from 30 respondents that 17 respondents (56.7%) experienced severe anxiety and 13 respondents (43.3%) experienced moderate anxiety.

Stress is a condition of a person with tension and anxiety, fear and worry which is caused by an imbalance between human demands

and abilities which is accompanied by emotional tension and has an influence on a person's physical and psychological (mental) condition.[8]

This heavy category of stress can cause symptoms, including feeling unable to feel positive feelings, feeling no longer strong enough to do an activity, feeling that there is nothing to be expected in the future, sadness and depression, hopelessness, loss of interest in everything, feel worthless as a human being, think that life is useless. The increasing stress experienced by final year students will gradually decrease energy and adaptive response.[8]

From the research results it can be concluded between the theory and the results of the research that stress is a feeling experienced when someone receives pressure. Emotions, anxiety, fear, physical stress and pain can increase blood pressure because stimulation of the sympathetic nervous system increases cardiac output and arteriolar vasoconstriction, thereby increasing blood pressure yield. Physical aspects have an impact on decreasing a person's condition during times of stress so that the person experiences pain in his body organs, such as headaches, indigestion. So that the authors can conclude that there is an agreement between the theory and the results of the research.

c. Blood Pressure Changes

Based on Table 3 on the distribution of blood pressure changes in patients *pre* operation in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with changes in blood pressure (hypertension) were 19 respondents (63.3%).

This study is comparable study conducted by Susanti 2017 on "The Relationship Anxiety With Increased Blood Pressure in Patients *Pre* Elective Surgery at the Hospital General Ahmad Yani Metro City Year 2017" with the result that the majority of hypertension of 61.5% and respondents who have a level of anxiety very heavy most of them have hypertensive blood pressure which is equal to 58.8%.

Blood pressure is the pressure inside the blood vessels when the heart pumps blood around the body.

Blood pressure is the force of blood flowing in the walls of blood vessels that leave the heart (arteries) and return to the heart of the veins.

Human blood pressure can be classified into 3 groups, namely low blood pressure (hypotension), which is a decrease in systolic blood pressure of more than 20-30% compared to the baseline measurement or systolic blood pressure <100 mmHg. Normal blood pressure (normotension) is a measure of normal adult blood pressure ranging from 120/80 mmHg. Blood pressure in life varies naturally, as infants and children normally have much lower blood pressure than adults. And persistent high blood pressure (hypertension) where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. According to WHO, hypertension is an increase in systolic pressure greater than or equal to 160 mmHg and or diastolic pressure equal to or greater than 95 mmHg.[6]

From the research results, it can be concluded between the theory and the results of the study that blood pressure is differentiated between systolic blood pressure and diastolic blood pressure. Systolic blood pressure is the blood pressure when it contracts (contracts) whereas, diastolic blood pressure is the blood pressure when it relaxes again (relaxes). Human blood pressure can be classified into 3 groups, namely low blood pressure (hypotension), normal blood pressure, and high blood pressure (hypertension). The rising and falling of the blood pressure bubble corresponds to the pumping of the heart to circulate blood in the arteries. So that the authors can conclude that there is an agreement between the theory and the results of the research.

d. Relationship between Age and Changes in Blood Pressure in preoperative patients at Ciawi District Hospital in 2019

Based on table 4, the results of statistical tests on the relationship between age and changes in blood pressure from 30 respondents in the late elderly category with changes in high blood pressure (hypertension) were 11 respondents (36.7 %) Statistical test results obtained *ρvalue* = 0.000, which means α (<0.05) so

that there is a relationship between age with Blood pressure Changes in Patients *Pre* Operation in hospitals Ciawi Bogor Regency Year 2019.

this study is comparable study conducted by Susi Sasmalinda 2014 on "Factors Affecting Changes in Patient Blood Pressure at Puskesmas Malalo Batipuh Selatan in 2014" with the results at the age of 40-59 years 18.51%, then at the age of ≥ 60 years to 25.93%. The results of statistical tests obtained a *P-value* <0.05 (0.026 <0.05) so that there is a relationship between age and changes in blood pressure of patients at the Malalo Batipuh Selatan Health Center in 2014.

Age is defined as the length of time a person is measured in terms of time. chronologically, normal individuals who show the same degree of anatomical and physiological development.[7]

Age is the age of an individual who is counted from the time of birth to several years. The more old enough, the maturity level of a person will be more mature in thinking and working. In terms of public trust, someone who is more mature will be more trusted than someone who is not mature enough.[7]

Blood pressure is the pressure inside the blood vessels when the heart pumps blood around the body. Blood pressure is the force of blood flowing in the walls of blood vessels that exit the heart (arteries) and return to the heart veins.[8]

Human blood pressure can be classified into 3 groups, namely Low blood pressure (hypotension) is a decrease in systolic blood pressure of more than 20-30% compared to the baseline measurement or systolic blood pressure <100 mmHg. Normal blood pressure (normotension) is a measure of normal adult blood pressure ranging from 120/80 mmHg. Blood pressure in life varies naturally, as infants and children normally have much lower blood pressure than adults. And persistent high blood pressure (hypertension) where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. According to WHO, hypertension is an increase in systolic pressure greater than or equal to 160 mmHg and or diastolic pressure equal to or greater than 95 mmHg.[6]

Based on the above theory can be concluded that the age effect on blood pressure changes in patients with *preoperative.* Age differences affect blood pressure. Systolic and diastolic pressures gradually increase with age into adulthood. The results of these studies indicate that the older a person is, the higher his blood pressure. In the elderly, the arteries are harder and less flexible with blood pressure. This results in an increase in systolic pressure. Diastolic pressure also increases because the walls of the blood vessels no longer retract flexibly as blood pressure drops. So that the authors can conclude that there is an agreement between the theory and the results of the research.

e. Correlation between Physical Stress and Changes in Blood Pressure inPatients *Preoperative* at Ciawi District Hospital in 2019

Based on table 5 of the statistical test results of the relationship between physical stress and changes in blood pressure from 30 respondents in the category of severe physical stress with changes in blood pressure (hypertension) as many as 13 respondents (43 , 3%). Statistical test results obtained *ρvalue* = 0.000, which means *α* (<0.05) so that there is a relationship between the Physical Stress Blood Pressure Changes InPatients *Pre* Surgeryin hospitals Ciawi Bogor Regency Year 2019.

This study is comparable study conducted by Katrin Indah Islami 2015 on "The Relationship Between Stress and Hypertension in Outpatients at the Rapak Mahang Community Health Center, Kutai Kartanegara Regency, East Kalimantan Province in 2015" with the results of respondents suffering from hypertension, 33 respondents (70.2%) experienced stress and 14 respondents (29.8%) who don't experience stress. After the statistical analysis test was carried out with the Contingency Coefficient correlation test, the p value was obtained <0.001 which means that there is a very significant correlation with a value of r = 0.473 which means that the strength of the correlation tested is moderate, with a positive correlation direction (+) which means unidirectional.

Stress is defined as tension, pressure, inner pressure, tension and

conflict. Stress also refers to changes, both positive and negative, in the environment of an organism, which receive a response from that organism.[8]

This heavy category of stress can cause symptoms, including feeling unable to feel positive feelings, feeling no longer strong enough to do an activity, feeling that there is nothing to be expected in the future, sadness and depression, hopelessness, loss of interest in everything, feel worthless as a human being, think that life is useless. The increasing stress experienced by final year students will gradually decrease energy and adaptive response.[8]

Blood pressure is the pressure inside the blood vessels when the heart pumps blood around the body. Blood pressure is the force of blood flowing in the walls of blood vessels that leave the heart (arteries) and return to the heart veins.[6]

Human blood pressure can be classified into 3 groups, namely low blood pressure (hypotension), which is a decrease in systolic blood pressure of more than 20-30% compared to the baseline measurement or systolic blood pressure <100 mmHg. Normal blood pressure (normotension) is a measure of normal adult blood pressure ranging from 120/80 mmHg. Blood pressure in life varies naturally, as infants and children normally have much lower blood pressure than adults. And persistent high blood pressure (hypertension) where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. According to WHO, hypertension is an increase in systolic pressure greater than or equal to 160 mmHg and or diastolic pressure equal to or greater than 95 mmHg.[9]

Stress can increase blood pressure at any time. The hormone adrenaline will increase when we are stressed, and it can cause the heart to pump blood faster so that blood pressure increases. If the stress lasts long enough, the body will try to make adjustments so that organic abnormalities or pathological changes occur. Symptoms that will appear are hypertension or ulcer disease. Stress can increase blood pressure for a while and when the

stress is gone, blood pressure can return to normal.

Based on the above theory can be concluded that physical stress affects the blood pressure changes in patients with *preoperative.* Based on data from the questionnaire, respondents experienced stress before performing surgery as experienced by individuals, including headaches, sleep disorders, indigestion, eating disorders, skin disorders, and excessive sweat production. So that the authors can conclude that there is an agreement between the theory and the results of the research.

f. The Relationship between Age and Physical Stress on Changes in Blood Pressure in Preoperative Patients at Ciawi Hospital, Bogor Regency in 2019

Based on Table 6 shows the results of multivariate analysis, it turns out that the *OR Exp (B*) value of the age variable is 0.613 and the *OR Exp (B*) value of the stress variable physical is 4,941,413,871.162, which turns out is no relationship between age and physical stress to changes in blood pressure in patients with *preoperative.* From the analysis and physical stress with *OR Exp* (B) is 4,941,413,871.162 have a higher chance for a change in blood pressure in patients with *preoperative* in Ciawi Bogor District Hospital in 2019.

This study is comparable study conducted by Sumadi 2015 on "The Relationship between Age Phase and Anxiety Level in *Pre* Operation at Pondok Al Karomah Wonosobo, Central Java in 2015" with the results of 11 respondents (44.0%) having no anxiety, 11 respondents (44.0%) experiencing moderate anxiety and 3 respondents (12.0%) experienced severe anxiety with a *p value of* 0.574, which means *p value* 0.05, so there is no relationship between the level of age and the level of anxiety in *preoperative* at Pondok Al Karomah Wonosobo, Central Java in 2015.

Age is the individual's age calculated from the time of birth to several years. The more old enough, the maturity level of a person will be more mature in thinking and working. In terms of public trust, someone who is more mature will be

more trusted than someone who is not mature enough.[8]

Stress is a condition of a person with tension and anxiety, fear and worry which is caused by an imbalance between human demands and abilities which is accompanied by emotional tension and has an influence on a person's physical and psychological (mental) condition.[8]

Blood pressure is the pressure inside the blood vessels when the heart pumps blood around the body. Blood pressure is the force of blood flowing in the walls of blood vessels that leave the heart (arteries) and return to the heart veins.[6]

Age differences affect blood pressure. Newborns have a mean systolic pressure of 73 mmHg. Systolic and diastolic pressures gradually increase with age into adulthood. For every 1 year increase in age, the systolic blood pressure will increase by 0.369 and by 0.283 for diastolic blood pressure. The results of these studies indicate that the older a person is, the higher his blood pressure. In the elderly, the arteries are harder and less flexible with blood pressure. This results in an increase in systolic pressure. Diastolic pressure also increases because the walls of the blood vessels no longer retract flexibly as blood pressure drops.

Human blood pressure can be classified into 3 groups, namely low blood pressure (hypotension), which is a decrease in systolic blood pressure of more than 20-30% compared to the baseline measurement or systolic blood pressure <100 mmHg. Normal blood pressure (normotension) is a measure of normal adult blood pressure ranging from 120/80 mmHg. Blood pressure in life varies naturally, as infants and children normally have much lower blood pressure than adults. And persistent high blood pressure (hypertension) where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. According to WHO, hypertension is an increase in systolic pressure greater than or equal to 160 mmHg and or diastolic pressure equal to or greater than 95 mmHg.[9]

Stress can increase blood pressure at any time. The hormone adrenaline will increase when we are stressed, and it can cause the heart to pump

blood faster so that blood pressure increases. If the stress lasts long enough, the body will try to make adjustments so that organic abnormalities or pathological changes occur. Symptoms that will appear are hypertension or ulcer disease. Stress can increase blood pressure for a while and when the stress is gone blood pressure can be normal again

Based on the above theory can be concluded that the age and physical stress had no effect on blood pressure changes in patients with *preoperative.* So that the researcher can conclude that there is a correspondence between the theory and the research results.

CONCLUSION

1. Knowing the frequency distribution of the age of the patient *pre* operation in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with late adult age criteria as much as 11 respondents (36.7%).
2. Knowing the frequency distribution of physical stress on the patient *pre* operation in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with physical stress weight categories were 13 respondents (43.3%).
3. Knowing the frequency distribution of blood pressure changes in patients *pre* operation in hospitals Ciawi Bogor District 2019 of 30 respondents showed that respondents with changes in high blood pressure (hypertension) were 19 respondents (63.3%).
4. It is known that there is a relationship between age and changes in blood pressure from 30 respondents in the late elderly category with changes in high blood pressure (hypertension) as many as 10 respondents (33.3%) The results of statistical tests obtained are *ρvalue* = 0,000 which means α (<0.05) so there is a relationship the Age of Change of Blood pressure in Patients *Pre* Operation in hospitals Ciawi Bogor Regency Year 2019.
5. It is known that there is a relationship between physical stress and changes in blood pressure from 30 respondents in

the category of severe physical stress with changes in hypertension blood pressure as many as 13 respondents (43.3%). Statistical test results obtained *ρvalue* = 0.000, which means *α* (<0.05) so that there is a relationship between the Physical Stress Blood Pressure Changes InPatients *Pre* Surgeryin hospitals Ciawi Bogor Regency Year 2019.

6. Knowledgeable no relationship between age and physical stress to changes in blood pressure in patients with *preoperative* in hospitals Ciawi Bogor regency in 2019 the results obtained values *OR Exp* (B) the age variable is 0.613 and the value of *OR Exp*(B)variable physical stress is 4,941,413,871.162 . From the analysis and physical stress with *OR Exp* (B) is 4,941,413,871.162 have a higher chance for a change in blood pressure in patients with *preoperative* in Ciawi Bogor District Hospital in 2019.

SUGGESTION

1. For hospital

   Expect to increase nursing services and conduct checking blood pressure for patients who will face actions *preoperative*

2. For Educational Institutions

   As a developer of science and readings from reference subjects of nursing and KDM particularly associated with blood pressure in patients with preoperative.

REFERENCES

1. HIPKABI (2014). *Pre Operation Measures.* Accessed via Accessed via http://repository.unimus.ac.id/489/2/BAB%20I.pdf on August 15, 2019 at 11.00 WIB,
2. Sari, Muttaqin Dan. (2014). *Pre Operation Measures.* Accessed via http://repository.unimus.ac.id/489/2/BAB%20I.pdf on 15 August 2019 at 11.00 WIB
3. Ministry of Health of the Republic of Indonesia. (2015). *Surgical Actions*. Accessible via http://elib.stikesmuhgombong.ac.id/714/1/DUWI%20TANTRI%20NIM.%20A11300875.pdf on August 18, 2019 at 20.00 WIB
4. RSMM. (2017). *Marzoeki Mahdi Hospital Annual Report Bogor*. Accessible via

https://www.rsmmbogor.com/cdn/File/LAPTAH_RSMM%20BOGOR%202017%20.pdf on 11 September 2019 at 21.30 WIB

5. Legiran, Azis & Bellinawati. (2015). *Health Psychology*. Accessible via http://eprints.umm.ac.id/43350/3/jiptummpp-gdl-riniismaya-50225-3-babii.pdf on August 19, 2019 at 21.00 WIB.
6. Suzanne, L. (2017). *Stress*. Accessible via http://eprints.umm.ac.id/43350/3/jiptummpp-gdl-riniismaya-50225-3-babii.pdf on August 19, 2019 at 21.00 WIB
7. Gunawan. (2015). *Blood pressure*. Accessible via http://repository.usu.ac.id/bitstream/handle/123456789/54284/Chapter%20I.pdf?sequence=5&isAllowed=y on 15 August 2019 at 11.00 WIB
8. Hanifah, Maryam. (2014). *Age*. http://digilib.unimus.ac.id/files//disk1/121/jtptunimus-gdl-sitituslih-6010-2-babii.pdf on August 19, 2019 at 21.00 WIB.
9. Sasmalinda, Susi. (2014). *Factors That Affect Changes in Blood Pressure*. Accessible via http://ejournal.unp.ac.id/students/index.php/mat/article/view/1260 on October 1, 2019 at 20.00 WIB

THE CORRELATION BETWEEN BREAKFAST HABITS AND NUTRIONAL STATUS OF STUDENTS

Ratih Suryaman, Noor Siti Noviani Indah Sari, Agus Triwinarto, Dewi Atikah, Panca Pratiwi
Wijaya Husada Health Science Institute

ABSTRACT

Children are next generation of the nation. In Indonesia, school age ranges from 6-12 years. Problems with school-age children Most people pay attention to nutritional status. Especially the issue of nutritional status. The results of the 2018 Basic Health Research Report (Riskesdas) owned 3.5% of very thin children, 6.7% thin children and 8% fat children. Nutritional status due to several factors including breakfast.
This study aims to study the correlation of breakfast with nutritional status in school children MI Asysyukur Bogor District in 2019. This type of research is a quantitative research with descriptive analytic design with cross sectional research. The population in this study was 218 respondents. How to take the sample in this study with a simple random sampling technique with a sample size of 109 respondents. Collection list obtained through a checklist. Analysis of the data used is univariate and bivariate (Kendall Tau).
Based on the frequency of breakfast habits as many as 81 (74.3%) of respondents have good breakfast habits. Based on nutritional status, 80 (73.4%) respondents had good nutritional status. Of 109 respondents there were 75 (68.8%) respondents who had breakfast habits with good nutritional status. The results of bivariate analysis using the Kendall Tau analysis test obtained p value of 0,000 ≤ 0.05 (alpha) so that Ha is accepted and H0 is rejected. In correlation between breakfast habits and nutrional status of students MI Asysyukur Bogor District in 2019. Habits breakfast good will do not nutrition good, including habits breakfast less than good will have nutritional status of less good. Research can used as a guide to give the science habits breakfast habits breakfast with the status nutrition. That would give either sense for all students in MI Asysyukur Bogor district for status nutrition.

Keywords : breakfast habits, nutrional status

INTRODUCTION

Children are the nation's next generation. These children will become the nation's investment in the future. The quality of a nation can be seen from the quality of its own children. Thus, the need for special attention to the development of children, especially at school age. School age ranges from 6 years to 12 years. At this school age, children's development is influenced by various factors, one of which is the child's nutritional needs.[1] At school age, children experience optimal growth and development, but tend to slow down compared to when they are infantile, such as experiencing an increase in height and weight.[2] Towards the end of school age, boys and girls will experience an increase in body size and usually girls will be taller than boys. All of these things can go well, if children's nutrition can be fulfilled properly too.[3]

Problems with school-age children, especially issues of nutritional status, need attention from various parties, especially parents. School-age children really need parental attention, especially in meeting their daily nutritional needs.[4] Problems related to nutrition tend to be high. There are still 3% of school-age children who

have severe vitamin A deficiency, and around 16.2% of school-age children who are malnourished. It was explained that there are still 37% of school age children who are malnourished and as many as 87.67% have insufficient calcium intake.[5]

Recently, the most common problem among school-age children is malnutrition, including the problem of poor nutritional status. Based on the results of research conducted in 76 countries, the problem of school-age children with malnutrition and wasting is the most prominent problem in Southeast Asia and Africa, while in America there are only less than 10% of children with malnutrition and underweight.[6] In Africa, the problem of school children with malnutrition reached 31.9%.[6] In Indonesia alone, the problem of malnutrition in children consists of stunting with a prevalence of 42.6%, and malnutrition (very thin and underweight children) which has a prevalence of 14.4%. In West Java, there are nearly 11.5% children with very short problems, and 19.3% with short problems. In addition, problems related to nutrition in the West Java region are children with very thin problems, which are around 3.5%, children with thin problems, which are around 6.7% and with obese children, about 8% of the total population in West Java.[7]

Nutritional problems in this case nutritional status are also closely related to the pattern of food intake in children, one of which is breakfast. The 2017 Sulaksa study entitled *"The Relationship between Breakfast Nutritional Intake and Physical Fitness Levels of Class IV, V, and VI Students at SD Negeri 2 Wates, Wates District, Kulonprogo Regency"* Nutritional intake of breakfast contributed 47% to the physical fitness level of grade IV, V students , VI at SD Negeri 2 Wates, Wates District, Kulonprogo Regency. Subsequent research by Lutfiani 2015 *"The relationship between nutritional status and breakfast habits with children's learning achievement at SD Negeri Tlogosari Kulon 09 Semarang*" states that there is a relationship between breakfast habits and learning achievement.

The high level of nutrition problems in Indonesia needs special attention because it will have a negative impact on children's growth and development. A person with malnutrition will experience a slowdown in growth and development, even allowing for growth failure. If the problem of malnutrition is allowed to drag on, it will have an impact on the quality of the country itself. Most of the expenditure will be spent only on nutritional problems that could have been prevented as early as possible.[1]

Nutritional status is the interpretation of data obtained using a variety of methods to identify populations or individuals at risk or with poor nutritional status.[10] Nutritional status is an expression of the balance of a certain variable. Food consumed every day has an influence on a person's nutritional status. Thus, nutritional status can be concluded as a term that refers to the state of the body due to the consumption of nutrients.[8]

There are two factors that influence nutritional status, namely direct and indirect causes. The direct causes are child food and infectious diseases. The emergence of KEP (Protein Energy Deficiency) is not only caused by lack of food consumption but also caused by disease. Children who get enough food but often suffer from diarrhea or fever can suffer from KEP. Children who don't have enough food, weaken their immune system, are prone to infection, lack of appetite and finally KEP. The indirect cause that affects nutritional status is food security in the family such as providing breakfast, childcare patterns and health services and environmental sanitation.[9]

Fulfilling nutritional needs is one form of application of Maslow's Hierarchy of Needs Theory. Maslow in his theory states that there are 6 basic human needs including physiological needs, safety and security, love and being loved, self-esteem and self-actualization and the need for self-transcendence which Maslow added towards the end of his life. Physiological needs are the most basic needs that must be achieved. One of the fulfillment of physiological needs is nutrition related to breakfast habits to support good nutritional status.[10]

Behavior can be defined as a response or reaction from an individual to stimuli or the environment. Human behavior can be defined as human activity that can be observed directly or by outsiders. Breakfast which in English gives *breakfast,* comes from the words *break* and *fast*. Breakfast has the meaning to re-feed the body after the body is not fed during sleep throughout the night. The Ministry of Health of the Republic of Indonesia 2010 defines breakfast or breakfast as an activity to consume food in the morning before the activity, which consists of staple foods and side dishes or in the form of snack foods. Breakfast is very important for everyone, because breakfast is not just a stomach booster, but also provides energy for children to do activities. Breakfast is able to restore the body's metabolic function, after fasting all night. Morning meal or breakfast is considered very important and should not be missed. This is because breakfast can help to refuel the body,

provide energy and provide a great opportunity to start daily activities with a sufficient nutritional boost.[11]

The problem that causes children to not have breakfast habits is the child's appetite, where children usually don't want to eat in the morning. Furthermore, there is no time due to getting up late or not having breakfast available, and there is no appetite in the morning and the fear of being fat.[12]

Several studies have shown that breakfast habits are related to blood glucose levels in the morning which have an impact on children's learning concentration at school. This study showed that the average glucose level of school-age children who did not eat breakfast before going to school was lower than that of students who ate breakfast, where this glucose level ultimately affected the student's learning concentration in school. Students who eat breakfast and have a higher glucose level have a higher concentration of learning than those who don't eat breakfast.[12]

Similar studies have also been conducted in several other countries. The same thing is shown in the results of the study. Chitra & Reddy's 2010 research stated that breakfast habits have an effect on increasing the nutritional intake of school children. The 2012 Kleinman research proves that there is a relationship between breakfast and the fullness of nutritional intake on children's academic achievement in school. Thus it can be concluded that the habit of breakfast for school age children is important because it affects achievement, learning performance and nutritional status of school age children.

The relationship between breakfast habits and nutritional status is an effort to improve or maintain a good nutritional status, namely by getting breakfast used to. Skipping breakfast will cause a decrease in the brain's ability to concentrate on learning which is then followed by a decrease in the ability of other body functions which will interfere with the physical and cognitive development of children so that if it occurs continuously it will affect nutritional status.

MI Asy Syukur is one of the schools in West Java province, precisely in Bogor Regency, which is in the Cijeruk sub-district, Warung Menteng Village. The socio-economic abilities of children at MI Asy Syukur are very diverse and the income ranges of parents also tend to be religious. The ability of parents to fulfill nutrition in children allows to improve nutritional status in children and fulfillment of breakfast. However, based on the results of observations that have been made, there are still many students at

MI Asy Syukur who are fat and thin, buy breakfast at school, snack food and drinks that do not fill them up every morning, and some even skip breakfast.

Based on the results of a preliminary study conducted on July 29 2019 at MI Asy Syukur Bogor Regency which was obtained from interviews with 20 randomly selected respondents, data was obtained that 7 children routinely ate breakfast at home, 6 children rarely ate breakfast and 7 children Never have breakfast on the grounds that they are not used to it, breakfast is not available at home, stomach ache when having breakfast and limited pocket money, where the allowance is usually used for snacks at rest time.

Based on the above understanding, the researchers are interested in conducting research with the title "The Relationship between Breakfast Habits and Nutritional Status of School Children at MI Asy Syukur, Bogor Regency in 2019".

RESEARCH METHOD

The type of research used is quantitative research with a descriptive analytic design with aapproach *cross sectional.* Quantitative research, namely in data collection, where research is based on the philosophy of positivism. This method is a scientific method because it meets concrete, objective, measurable, rational, and systematic scientific principles. Meanwhile, descriptive design is a method that functions to describe or give an overview of the object under study through data or samples that have been collected as is without analyzing and making general conclusions. Furthermore, the definition of *cross sectional* is a type of research that emphasizes the time / measurement of the data observation of the independent and dependent variables only once at a time. In this type the independent and dependent variables are assessed simultaneously at one time, so there is no follow-up. Of course, not all research subjects must be observed on the same day or time, but both the independent variable and the dependent variable are assessed only once.[13]

This research was conducted at MI Asy Syukur Bogor Regency with the total population in this study were children aged 6-12 years, which is the number of all students at MI Asy Syukur Bogor Regency in 2019. In this study the population of students in MI was determined. Asy Syukur Bogor Regency totals 218.

Population is a generalization area consisting of: objects / subjects that have a certain quantity and characteristics that are determined by the researcher to be studied and then draw conclusions. So the

population is not just people, but objects and other natural objects.

If the population is> 100, then 5-25% can be taken as a sample. The sample is part of the number and characteristics of the population. When the population is large, and researchers may not study everything in the population. for example, because of limited funds, energy and time, researchers can use samples taken from that population. In this study the researcher took 5% of the population as many as 218, meaning that the sample size was 5% x 218 respondents. The variables of this study consisted of habits breakfast with nutritional status in school children at MI Asy Syukur. Data processing and data analysis using computerized data. The analysis consisted of univariate and bivariate analysis, where the bivariate analysis used thestatistical test *Kendall Tau* to analyze the relationship between breakfast habits and nutritional status of school children at MI Asy Syukur, Bogor Regency.

In this study, the location that was determined to carry out the research was MI Asy Syukur Bogor Regency. The sampling method in this study used *simple random sampling,sampling* which is atechnique from members of the population that was carried out randomly without paying attention to the strata in the population of 109 respondents to school children at MI Asy Syukur. Research data collection was carried out on September 16-17 2019. The study was assisted by 2 research assistants using a *checklist* sheet and observation sheet.

RESEARCH RESULTS

Table 1

Frequency Distribution of Respondent Characteristics Based on Classes of School Children at MI Asysukur Bogor Regency

No	Class	Frequency	Percentage (%)
1	Class 1	18	16.5
2	Class 2	18	16.5
3	Class 3	18	16.5
4	Class 4	18	16.5
5	Class 5	18	16.5
6	Class 6	19	17.4
	Total	109	100

Source: Processed *SPSS 17*

Based on table 1 The frequency distribution of respondent characteristics based on the class of school children in MI Asy Syukur, Bogor district, in 2019, it is known that most of them are in grade 6, namely (17.4%) respondents.

Table 2

Frequency distribution of respondent characteristics based on gender of school children at MI Asy Syukur Bogor Regency

No	Gender	Frequency	Percentage (%)
1	Female	54	49.5
2	Boys	55	50.5
	Total	109	100

Source: Processed *SPSS 17*

Based on table 2 The frequency distribution of respondent characteristics based on the sex of school children in MI Asy Syukur, Bogor district, in 2019, it is known that most of them are male, namely 55 (50.5%) respondents.

Table 3
Frequency Distribution of Respondent Characteristics Based on Age of School Children at MI Asys Syakur

No	Age	Frequency	Percentage (%)
1	6 Years	3.4	3.7
2	7 Years	14	12.8
3	8 Years	18	16.5
4	9 Years	18	16.5
5	10 Years	18	16.5
6	11 Years	18	16.5
7	12 Years	19	17.4
	Total	109	100

Source: Processed *SPSS 17*

Based on table 3 The frequency distribution of respondent characteristics based on age is known that
most of them are 12 years old, namely 19 (17.4%) respondents.

Table 4
Habits of Breakfast for School Children at MI Asy Syukur Bogor Regency

No	Breakfast Habits	Frequency	Percentage (%)
1	Poor	28	25.7
2	Good	81	74.3
	Total	109	100

Source: Processed *SPSS 17*

Based on Table 4, it is known that the frequency distribution of breakfast habits for school children at MI Asy Syukur, Bogor Regency in 2019, there were 81 (74.3%) respondents with good breakfast habits.

Table 5
Distribution of Frequency of Nutritional Status of School Children in MI Asy Syukur Bogor Regency

No	Status Nutritional	Frequency	Percentage (%)
1	Poor nutrition	29	26.6
2	Good nutrition	80	73.4
	Total	109	100

Source: Processed *SPSS 17*

Based on table 5, it is known that the distribution of nutritional status in school children at MI Asy Syukur Bogor in 2019, 80 (73.4%) respondents have good nutritional status.

Table 6

Relationship between Breakfast Habits and Nutritional Status of School Children at MI Asy Syukur Bogor Regency in 2019

Breakfast Habits	Nutritional Status				Total		P Value	OR Value
	Malnutrition		Good Nutrition					
	F	%	F	%	F	%		
Poor	23	21.1	5	4.6	28	25.7	0.000	57.500
Good	6	5.5	75	68.8	81	74.3		
Total	29	26.6	80	73.4	109	100		

Source: Processed *SPSS 17*

Based on table 4.6, it is known that the relationship between breakfast habits in school-age children at MI Asy Syukur, Bogor district in 2019 shows that out of 109 respondents who have a good breakfast habit with good nutritional status, 75 (68.8%) of respondents.

The results of statistical data tests using thetest *Kendall Tau* obtained *p value* 0.000 ≤ 0.05 (*alpha*), which means that Ha is accepted and H0 is rejected. From this value, the results of the analysis state that there is a relationship between breakfast habits and nutritional status in school-age children at MI Asy Syukur, Bogor Regency in 2019. The *Odds Ratio (OR) value* of 57,500 means that respondents who have good breakfast habits will have a chance of 57,500 times. fold to obtain good nutritional status.

DISCUSSION

1. Univariate Analysis

Based on the univariate results of the frequency distribution of each independent variable (breakfast habits) and the dependent variable (nutritional status).

a. Breakfast

Habits Breakfast or breakfast habits is an activity to consume food that is carried out in the morning before the activity, which consists of staple foods and side dishes or in the form of snack foods. Breakfast is very important for everyone, because breakfast is not just a stomach booster, but also provides energy for children to do activities. Breakfast is able to restore the body's metabolic function, after fasting all night. Morning meal or breakfast is considered very important and should not be missed. Breakfast should be 15-30 minutes after waking up, the longest breakfast can be tolerated until 09.00. This is because breakfast can help to refuel the body, provide energy and provide a great opportunity to start daily activities with a sufficient nutritional boost.[14]

Factors that influence breakfast habits are age, gender, availability of breakfast and pocket money. Younger people often eat breakfast than adults, this is because younger children tend to get more parental attention. Men eat breakfast more often because girls have a fear of being fat. Availability of breakfast will make children meet nutritional adequacy, the habit of children skipping breakfast makes a solution to eat during recess.[15]

Based on the results of research on the frequency distribution of school children's breakfast habits at MI Asy Syukur, Bogor Regency in 2019, from 109 respondents, it was stated that most of those who had good breakfast habits were 81 (74.3%) of respondents.

This is supported by previous research with title The relationship between breakfast habits and nutritional status of students of SD Muhammadiyah special program Surakarta, the result is that good breakfast habits are 44 (78.6%).

From the theory and research results, the researchers assumed that the habit of having breakfast every day was influenced by age, gender, availability of breakfast and pocket money.

b. Nutritional Status Nutritional

status is a state of balance between the intake and needs of nutrients the body needs for growth and development, especially for children under five, activities, health care, healing for those who suffer from illness and other biological processes in the body.[8] Nutritional status is the interpretation of data obtained using a variety of methods to identify populations or individuals at risk or with poor nutritional status.[9]

There are two factors that influence nutritional status, namely direct and indirect factors. The direct factor, namely food intake, is the amount of single or varied food a person eats with the aim of meeting physiological, psychological and sociological needs. and infectious disease is a disease caused by a biological agent. Meanwhile, the indirect factor, namely food security, is the ability of the family to meet the food needs of all family members in a sufficiently good amount and in the amount of nutrition, child care patterns and health services are the ability of families and communities to provide time, attention and support for children to grow and develop. the best physically, mentally and socially.[9]

Benefits of Breakfast The first is Helping in the fulfillment of daily nutrition, that is, a person cannot do it with just one meal. In Indonesia, usually someone will eat 3 times a day to meet their daily nutritional needs, namely

breakfast or what is often called breakfast, lunch and dinner. The recommended breakfast is one third of the daily nutritional requirement or about 15-30% RDA.[8]

Benefits of the second breakfast is Helping in maintaining the ideal body weight because often researchers reveal that breakfast is related to a person's BMI. That people who don't have breakfast will have a high intake of fat, cholesterol and energy but their intake of fiber, vitamins and minerals is low. In addition, someone who skips breakfast tends to consume foods with high calories in the next hour because they feel very hungry.[8]

Benefits of breakfast the third is to increase concentration in learning because breakfast is said to be a special nutrition for the brain. Thus, if a child skips breakfast, the child tends to be less concentrated in learning. The energy from breakfast intake contains blood glucose which is very necessary for brain performance, with sufficient glucose levels the brain can work properly so that children can concentrate and receive every lesson well. Vice versa, if a child skips breakfast, the brain will lack nutrition so that the child tends to be sleepy and cannot absorb lessons well.[8]

Based on the results of the research on the distribution of the frequency distribution of the nutritional status of school children at MI Asy Syukur Bogor Regency in 2019 from 109 respondents, it was stated that most of those who had good breakfast habits were 80 (73.4%) respondents.

This is supported by previous research by Retno Dewi Noviyanti on the title Relationship between Breakfast Habits and Nutritional Status of Students at Muhammadiyah Elementary School, Surakarta Special Program, the result is that 29 respondents have a good nutritional status (51.8%).

From the theory and research results, the researchers assumed that good nutritional status was influenced by direct factors, namely food intake and infectious diseases. Furthermore, the indirect factors are food security, childcare patterns and health services and environmental sanitation.

2. Bivariate Analysis of the Relationship between Habits Breakfastand Nutritional Status of School Children at MI Asy Syukur Bogor Regency in 2019

Breakfast or breakfast habits are an activity to consume food that is carried out in the morning before an activity, which consists of staple foods and side dishes or in the form of snack foods .

Nutritional status is a state of balance between the intake and needs of nutrients the body needs for growth and development, especially for activities, health care, healing for those who suffer from illness and biological processes in the body. Many things affect nutritional status, namely direct and indirect factors. Among them are food intake, one of which is the habit of having breakfast. If you skip breakfast it will cause a decrease in brain ability which is then followed by a decrease in the ability of other bodily functions which will interfere with the physical and cognitive development of children so that if it occurs continuously it will affect nutritional status.

Based on the results of research in table 4.6, data obtained from 109 respondents who have a good breakfast habit with good nutritional status are 75 (68.8%) respondents. The results of statistical data tests using thetest *Kendall Tau* obtained a p value of 0.000 ≤ 0.05, meaning that Ha is accepted and H0 is rejected, from this value, the results of the study are there is a relationship between breakfast habits and nutritional status of school children at MI Asy Syukur Bogor Regency in 2019. At the OR (*odds ratio*) = 57,500, it can be seen that a good breakfast habit will have a 57,500-fold chance of getting good nutritional status.

This is supported by previous research entitled The relationship between breakfast habits and nutritional status in school children at Islamic Elementary School Tambak Bayan Yogyakarta, breakfast habits in the good category, the majority calculation results are in the frequent category, obtained p-value = 0.000 < 0.05.

Based on the theory and research results, the researchers assume that good breakfast habits will affect good nutritional status as well. Conversely, the habit of having a poor breakfast will affect the nutritional status as well.

CONCLUSION

1. It is known that the frequency distribution of the characteristics of respondents by class is known that most of them are in class 6, namely 19 (17.4%) respondents.
2. It is known that the frequency distribution of the characteristics of respondents based on gender is known that most of them are male, namely 55 (50.5%) respondents.
3. It is known that the frequency distribution of the characteristics of respondents based on age is mostly 12 years old, namely 19 (17.4%) respondents.

4. It is known that the frequency distribution of breakfast habits among school children at MI Asy Syukur is 81 (74.3%) of respondents with good breakfast habits.
5. It is known that the frequency distribution of nutritional status among school children in MI Asy Syukur is 80 (73.4%) respondents who already have a good nutritional status
6. It is known that the relationship between breakfast habits and nutritional status in school children at MI Asy Syukur Bogor Regency in 2019 from 109 respondents who have good breakfast habits with good nutritional status is 75 (68.8%) of respondents. The results of statistical data tests using thetest *Kendall Tau* obtained p value = 0.000 ≤ 0.05, meaning that Ha is accepted and H0 is rejected, from this value, the results of the study are there is a relationship between breakfast habits and nutritional status of school children at MI Asy Syukur Bogor Regency in 2019.

SUGGESTION

1. Educational institutions are

   expected to provide reference materials and reading materials for child nursing, community nursing and breakfast habits, as well as a reference in carrying out further research on nutritional status.
2. For Research Sites

   It is hoped that this research can be used as a guide to be able to provide knowledge about the importance of breakfast habits with nutritional status. So that it can provide a good understanding for all students of MI Asy Syukur Bogor Regency in 2019 regarding nutritional status.

REFERENCES

1. Wong, DL, Hockenberry, M, Wilson, D., Winkelstein, & Schwartz. 2014. *Wong's Textbook of Pediatric Nursing* (Vol 1, 6th ed.). (Interpreting: Agus Sutarna, Neti Juniarti, HY Kuncara). Jakarta: EGC
2. Potter, PA, & Perry, AG 2013. *Books Nursing Fundamental Teachings* (7^{th} ed., Vol. I) (D. Sjabana, Editors, & A. Ferderika, Penerj.) Jakarta: Salemba Medika
3. Behrman, RE, Kliegman, RM, & Arvin, AM 2014. *Nelson's Child Health Science* (15th Ed) (A. Samik Wahab, Editor). Jakarta: EGC
4. Sasmita, DN. 2015. *Nutritional status of school-age children and the relationship with dietary intake of vitamin A for children aged 10-12 years*

at SD Negeri X Taman Rahayu Bekasi [Thesis] .. Universitas Indonesia

5. Virtual Medical Center. 2010. *Nutrition for School Children*. Australia retrieved from www.myvmc.com/lifestyle/nutrition-for-school-children/. Accessed on 20 July 2019. At 09.00 WIB.
6. Best, C. New Finger. et al. 2015 *The nutritional status of school-aged children: why should we care ?*. Italy:*United Nations World Food Program.* Accessed on July 20, 2019, at 10.00 WIB.
7. *Health Research and Development Agency*. RI Ministry of Health. 2018. *RISKESDAS*. Accessed on 21 July 2019. At 09.00 WIB.
8. Devi, L. 2012. *Nutrition of school children*. Jakarta: Kompas
9. Prastiani, DB, Nursasi, AY, & Widyastuti. 2014 [Essay]. University of Indonesia. Accessed on 23 July 2019. 19.00 WIB.
10. Asmadi. 2014. *Basic Concepts of Nursing*. Jakarta: EGC
11. Phillip, JD 2013. *The effect of breakfast eating on academic achievement among developmental college students*. *ProQuest Dissertations and Theses: 1996; ProQuest Dissertations & Theses (PQDT) pg.n / a.*
12. Almatsier, S. 2013. *Basic Principles of Nutrition Science.* Jakarta: Gramedia Pustaka Utama
13. Sugiyono. 2015. *Administrative Research Methods.* Bandung: Alfabeta
14. Department of Health. 2015. *Smart Book of Nutrition Awareness Independent Family Counseling* (KADARZI). Accessed on www.gizi.depkes.go.id/ nutrition guide / download / karatezi.DOC. Accessed on 23 July 2019. At 21.00 WIB.
15. Swarjana, IK 2015. *Health research methodology*. Revised edition. Yogyakarta: ANDI

THE IMPACT OF HEALTH PROMOTION VIA INSTAGRAM ON KNOWLEDGE AND ATTITUDE TOWARD SMOKE-RESTRICTED AREA OF STUDENTS OF PUBLIC HEALTH FACULTY OF STIKES WIJAYA HUSADA BOGOR

Beny M P Simanjutak, Sasni Triana Putri, Annisa Dwi Yuniastari, Rachmy Setyasari
Wijaya Husada Health Science Institute

Abstract

Smoke-Restricted Arearefers to a room or an area where it's prohibited to do the act of smoking, or produce, sell, advertise, and/or promote tobacco/cigarette products. Since 2009, Bogor City has established a Regional Regulation (Peraturan Daerah) Number 12, Year2009, About Smoke-Restricted Area and it changed to Regional Regulation Number 10, Year 2018. Knowledge and attitude of the Bogor City citizens toward the Smoke-Free Area regulation are needed to contribute to the success of the regulation. Knowledge of this regulation can be spread by various ways, one of them is bya process of education or by health promotion using Instagram. This research has a purpose to find out the impact of health promotion via Instagram on knowledge and attitude toward Smoke-Restricted Area of students of Public Health Faculty ofSTIKes Wijaya Husada of Bogor City Year 2019.

The research method used is quantity method. The research design is Quasi Experimental with the approach of non-equivalen control group. This research was conducted in Faculty of Public Health of STIKes Wijaya Husada Bogor from August the Thirteen to September the One, 2019, with 32 respondents, using systematic sampling.

The result before and after health promotion using wilcoxon test is 0.0 and 0,001,. The mann-whitney testwith significance level of 0.05 shows p value for knowledge is 0.008 and for attitude is 0.030. Because means p value < 0.05, therefore there is an impact of health promotion via Instagram on knowledge and attitude toward Smoke-Restricted Area of students of Public Health Faculty of STIKes Wijaya Husada of Bogor City.

The result shows that health promotion via Instagram impacts knowledge and attitude toward Smoke-Restricted Area of students of Public Health Faculty of STIKes Wijaya Husada of Bogor CityYear 2019.

Keywords : Smoke-Free Area, Health Promotion, Instagram.

INTRODUCTION

The number of smokers around the world is increasing, from data *World Health Organization* (WHO)in 2013, nearly two-thirds of smokers worldwide live in 10 countries, namely in China, India, Indonesia, Russia, United States, Japan, Brazil, Bangladesh, Germany and Turkey. An estimated 900 million or 84% of the world's smokers live in developing countries. Based on a survey of deaths due to smoking in 2020, there are 8.4 million deaths in the world population every year, and in 2030 it

will reach 10 million people. This will increase if it is not handled immediately.[1 2]

Indonesia is in the 3rd position with the largest number of smokers in the world after China and India and remains the 5th largest cigarette consumer after China, the United States, Russia and Japan in 2007. More than 40.3 million Indonesian children aged 0- 14 years died with smokers and was exposed to secondhand smoke in the environment. Based on the 2018 Basic Health Research (Riskesdas) data, the prevalence of tobacco consumption among the population 15 years and over has decreased from 2016, although from 2007, 2010 and 2013 it tended to increase from 34.2% in 2007, in 2010 to 34 , 3%, and increased by 36.3% in 2013. In 2016 it decreased to 32.8% but the prevalence of tobacco consumption increased in 2018 to 33.8%. 62.9% men and 4.8% women still consume tobacco in 2018.[4 The]

number of smokers every day and sometimes in West Java in 2018 reached 32%. West Java Province has the highest rank of daily smokers and sometimes at the age of 10 years and over. It is not denied that the existence of this data shows that the number of smokers in West Java is very large.[3]

In this case the government seeks to formulate various regulations and policies that can be implemented in overcoming the harmful effects of smoking, including through Health Law No. 36/2009. Based on these various policies, one of the policies that must be implemented by all regions in Indonesia is to establish a No Smoking Area (KTR) which can be started from health, education and other public places institutions. This is in accordance with Health Law no. 36/2009 article 115 paragraph 2 which states that "Local governments are required to establish smoking-free areas in their regions".[5]

Non-smoking area (KTR) is a room or area that is declared prohibited from smoking or producing, selling, advertising and / or promoting tobacco products. Meanwhile, a special smoking area is a room designated specifically for smoking activities that is inside the KTR. The aim of implementing KTR in general is to reduce the number of morbidity and mortality due to

smoking, whereas in particular, the application of KTR can help to create a clean, healthy, safe and comfortable environment; provide protection for non-smokers; reduce smoking rates; prevent newbie smokers and protect the younger generation from the abuse of Narcotics, Psychotropics and Addictive Substances (Drugs).[3]

Since 2009 the City of Bogor has enacted Regional Regulation Number 12 of 2009 concerning Non-Smoking Areas and has undergone changes to the City Regulation of Bogor Number 10 of 2018 and Regulation of the Mayor of Bogor Number 7 of 2010 concerning Guidelines for Implementing Regional Regulations on Non-Smoking Areas. According to Perda No. 12/2009 concerning KTR Article 7 paragraph (2), Smoking Free Areas as referred to in paragraph (1) include public places, workplaces, places of worship, places to play and / or gather for children, public transport vehicles, and the environment. a place for the teaching and learning process, health facilities and sports facilities.[6]

Application of No Smoking Areas (KTR) which has existed since 2009 is echoed and implemented in 8 (eight) areas in Bogor City. However, based on the Health profile of the City of Bogor in 2017, the compliance of the 8 No Smoking Areas with the Bogor City Regional Regulations shows that 64.2% of the people of Bogor City comply with the prohibition of smoking in Smoking Free Areas, but as many as 35.8% of the people of Bogor City do not comply with the prohibition. . The data concludes that one third of Bogor City residents do not comply with the rules of the No Smoking Area.[7]

Smoking behavior in adolescents generally increases according to their developmental stage and often results in them experiencing nicotine dependence. Knowledge and attitudes towards the dangers of smoking and the existence of this No Smoking Area regulation need to be known because it will affect the success of the policy. Knowledge can be obtained in various ways, including the learning process of information obtained by a person, direct experience or from other

people's experiences and the process of education or health promotion education through Instagram. By knowing how much knowledge that person has about the dangers of smoking and smoking-free areas, then this will affect a person's attitude towards the No Smoking Area Policy (KTR).[8]

The internet is one of the information media that is widely used by teenagers today. The results of a survey conducted by the Indonesian Internet Service Providers Association (APJII) in 2016 found that 132.7 million or around 51.8% of Indonesia's population used internet services. 75.5% of internet users are aged 10-24 years. The type of content accessed by the most internet users was social media, amounting to 97.4%. The large number of adolescents who use social media should be able to be used by the government or health workers to disseminate information related to health and health policies.[9]

Instagram is a photo and video sharing application that allows users to take photos, apply digital filters and share them on various social networking services including Instagram itself. *Instagram* is one of the most popular social media today. Based on APJII's statistical data in 2016, *Instagram* is the second most visited social media content after *Facebook*, with 19.9 million visits or 15%.[9]

In a preliminary study conducted by researchers on August 1, 2019, out of 10 people, 3 people did not know about KTR (No Smoking Areas) and 7 other people knew about the existence of KTR and got information about KTR through posters or stickers they found, but only 1 person who understands about Smoking Free Areas, and 7 out of 10 people said that there is a need for socialization about KTR because many people do not know about the existence of KTR. The results of a preliminary study conducted by the author on August 1, 2019 on 10 students of the Wijaya Husada Bogor Public Health STIKes, found that 9 out of 10 students have and use social media *Instagram.* The results of subsequent preliminary studies showed that 6 out of 10 students stated that they were rarely exposed to information about Smoking Free

Areas. Researchers also carried out preliminary studies into public places such as city parks, modern markets, traditional markets, health facilities, and schools. In this observation, the researchers found employees or visitors who still violated the rules for the existence of the KTR. This is related to several studies from experts who state that the implementation of smoking-free areas has not been effective, because it has not been accompanied by intense socialization.[10]

The purpose of this study was to determine the effect of Health Promotion through Instagram on knowledge and attitudes of Non-Smoking Areas among Public Health students of STIKes Wijaya Husada, Bogor City in 2019.

RESEARCH METHOD

This research uses quantitative research methods. The design of this research is using *Quasy Experimental* with *the non-equivalent control group approach.* The population in this study was 60 people and the total sample used in this study were 32 active students of Public Health STIKes Wijaya Husada Bogor using the formula *Federer* which was then divided into 16 experimental groups who were given health promotion interventions through Instagram regarding No Smoking Areas and 16 people in the control group using technique *systematic sampling.* This research took place from 28 August to 1 September 2019.[15]

The variables of this study consisted of health promotion through Instagram as an independent variable (free) and changes in knowledge and attitudes towards Smoking Free Areas as the dependent variable (dependent). Data processing and data analysis using a computer program SPSS *for windows* series 17.The analysis consists of univariate analysis and bivariate analysis, where the bivariate analysis uses the normality test, the homogeneity test uses the *Levene* test and hypothesis testing on changes in knowledge and attitudes using the Test *Wilcoxon* and to see differences the effect of health promotion using the test *Mann-Whitney.*

RESEARCH RESULTS

Table 1 : Results of the *Wilcoxon Pretest-Posttest Test for* Knowledge of Non-Smoking Areas in the Experiment Group of STIKes Wijaya Husada Bogor Public Health Students in 2019.

	Pretest - Posttest
Z	-3.873[a]
Asymp. Sig. (2-Tailed)	.000

Based on table 1, the *output* of hypothesis testing using the Test *Wilcoxon* shows that the *asymp. sig (2-tailed) value* is 0,000. So it can be concluded that there is an influence on the results of the *pretest* and *posttest* on students' knowledge after a health promotion intervention is carried out in the No Smoking Area through Instagram.

Table 2: Results of the *Wilcoxon Pretest-Posttest* Knowledge of Non-Smoking Areas in the Control Group of STIKes Wijaya Husada Bogor Public Health Students in 2019.

	Pretest - Posttest
Z	-.831[a]
Asymp. Sig. (2-tailed)	.406

Based on table 2, the results *of* the hypothesis test using theTest *Wilcoxon* show that the asymp.sig (2-tailed) value is 0.406. So it can be concluded that there is no effect on the results of the *pretest* and *posttest* on student knowledge if no smoking area health promotion intervention is given through Instagram.

Table 3: Results of the *Wilcoxon Pretest-Posttest Test for the* Attitude of a No-Smoking Area in the Experiment Group of STIKes Wijaya Husada Bogor Public Health Students in 2019.

	Pretest-Posttest
Z	-3.690[a]
Asymp. Sig. (2-tailed)	.001

Based on table 3, the results *of* the hypothesis test using the Wilcoxon test show that the asymp.sig (2-tailed) value is 0.001. So it can be concluded that there is an influence on the results of the *pretest* and *posttest* student attitudes after being given health promotion interventions in the No Smoking Area via Instagram.

Table 4: Test Results for the *Wilcoxon Pretest-Posttest* Attitude of a Smoking Area in the Control Group of Public Health Students at

STIKes Wijaya Husada Bogor in 2019.

	Pretest - Posttest
Z	-1.293[a]
Asymp. Sig. (2-tailed).	196

Based on table 4, the results *of* the hypothesis test using the Wilcoxon test show that thevalue *asymp. sig (2-tailed)* is 0.196. So it can be concluded that there is no influence on the results of the *pretest* and *posttest* on the respondent's attitude after not being given a health promotion intervention for the No Smoking Area through Instagram Thetest was used to compare the significant differences between the intervention group and the control group *Mann-Whitney.*

Table 5: test results *Mann-Whitney* for Data *Posttest* Knowledge of No Smoking Areas on Experiment Group and Control Group of STIKes Wijaya Husada Bogor Public Health Students in 2019.

	Results *Posttest*
Mann-Whitney U	72,500
Wilcoxon W	208,500
Z-	2,670
Asymp. Sig. (2-tailed)	.008
*Exact Sig. [2 * (1-tailed Sig.)]*	.035[a]

Based on table 5, the results *of* the hypothesis test usingtest - *Whitney* the Mannshow that the asymp.sig (2-tailed) value is 0.008. So it can be concluded that there is a difference in knowledge of the No Smoking Area between the experimental group and the control group.

Table 6: Results of the Test *Mann-Whitney* for Data *Posttest on the* Attitude of No Smoking Areas on Experiment Group and Control Group of STIKes Wijaya Husada Bogor Public Health Students in 2019.

	Results *Posttest*
Mann-Whitney U	78,500
Wilcoxon W	214,500
Z	-2,165
Asymp. Sig. (2-tailed)	.030
*Exact Sig. [2 * (1-tailed Sig.)]*	.061[a]

Based on table 6, the results *of* the hypothesis test usingtest - *Whitney* theshow that the *Mannasymp.sig (2-tailed) value* is 0.030. So it can be concluded that there are differences in the attitude of the No Smoking Area between the experimental group and the control group.

DISCUSSION

a. Results of Knowledge Level on Non-Smoking Areas Before and After Health Promotion through Instagram for Public Health Students of STIKes Wijaya Husada Bogor in 2019.

The results of the study were from thedata *pretest* and *posttest* in the experimental group who were given health promotion in the No Smoking Area through Instagram. Because both of these data are non-parametric, the researchers used the Wilcoxon test for decision making. The results show the p value <0.005, namely 0.000, so there is an influence on the results of the *pretest* and *posttest* on the respondent's knowledge after a health promotion intervention for the No Smoking Area through Instagram.

The results of this study are comparable to research conducted by Hiyatul Rahmi, 2018 which examined the "Effect of Health Promotion through Instagram on Knowledge and" Awareness "Attitudes in Students of the Faculty of Public Health, Andalas University" with the results of his research obtained a *p-value* of 0.001 (p <0.05) which meaning that there are differences in BSE knowledge of FKM Unand students before and after being given health promotion through social media *Instagram*.

The provision of health promotion using a tool or media can affect a person's level of knowledge. The media used in health promotion must be adjusted to the goals of health promotion, so that it can attract attention and be effective in increasing knowledge of health promotion targets. The health promotion media chosen must be effective and efficient media. Social media is a medium that can be used as a health promotion medium. Disseminating information through social media is easier, cheaper and can reach a wider target audience, so that social media is one of the most effective and efficient media in health promotion. Health promotion through social media

can be done repeatedly. This can lead to the promotion goals being able to better understand the material.[12]

This is in line with the theory which states that the learning media used in learning activities can affect the effectiveness of learning. The development of science and technology (IPTEK), especially in the field of education, can be used as a learning tool or media so that it becomes more extensive and interactive, such as computers and the internet. The high number of internet media users, especially social media in Indonesia, can be used as a learning medium, one of which is by providing health promotion regarding Smoking Free Areas.[11]

According to the researcher's analysis, knowledge of Smoking Free Areas is very important for respondents to know. Based on the theory and research results, it can be concluded that the use ofsocial media *Instagram* can increase student knowledge. This happens becausesocial media *Instagram* is one of the most widely used social media by students. Therefore, the use ofsocial media *Instagram* as a health promotion media needs to be developed again in accordance with existing technological developments.

b. Results of the Attitude Level of a Non-Smoking Area Before and After Health Promotion through Instagram for Public Health Students of STIKes Wijaya Husada Bogor in 2019.

The results of the study were from thedata *pretest* and *posttest* in the experimental group who were given health promotion in the No Smoking Area through Instagram. Because both of these data are non-parametric, the researchers used the Wilcoxon test for decision making. The results show the value of asymp.sig <0.05, namely 0.001, so there is an influence on the results of the *pretest* and *posttest* on the respondent's attitude after the health promotion intervention in the No Smoking Area through Instagram

The results of this study are comparable to research conducted by Hiyatul Rahmi, 2018 which examined the "Effect of Health Promotion through Instagram on Knowledge and" Awareness "Attitudes in Students of the Faculty of Public Health, Andalas University" with the results of his research obtained a *p-value* of 0.001 (p <0.05) which this means that there are differences in BSE attitudes among FKM Unand students before and after being given health promotion through social media *Instagram*.

Attitude is the reaction or response of someone who is still closed to a stimulus or object. Attitude is the readiness of the willingness to act, in other words, the attitude is not yet an action but is a predisposition to closed behavior or reactions.[13 14]

The tendency of a person to respond either positively or negatively to a certain object through persuasion or role models from someone or from his social group. Changes in attitude are basically influenced by the factors of knowledge and belief / belief obtained from sensing results, one of which is obtained through education or the learning process. In order for an increase in attitude towards a positive direction, an increase in knowledge and understanding of objects must first be carried out knowledge (cognitive aspects) is one of the important domains that shape attitudes.[11]

According to the researcher's analysis, from the theory and research results it can be concluded that the use of social media *Instagram* can improve student attitudes. This happens because the use of social media which can increase knowledge will also affect a person's attitude. Therefore, the use ofsocial media *Instagram* as a health promotion media needs to be developed again in accordance with existing technological developments.

c. Analysis of the Effect of Health Promotion through Instagram on Public Health Students of

STIKes Wijaya Husada Bogor in 2019.

The researcher made a comparison between the control group and the experimental group from the results of thedata study *posttest*, the data was not normally distributed and had data that was not homogeneous. It was concluded that the data was non-parametric, then tested using thetest *Man-Whitney* to determine the average of the two groups. experimental and control groups that have been carried out *posttest.* In theresults of the *posttest* two groups there was a difference in student knowledge, because the *p value was* 0.008 <0.05 and the student's attitude was *p value* 0.030 <0.05. This situation is very helpful to see the influence after giving health promotion through Instagram.

The results of this study are comparable to the research conducted by Ahmad Jumanto regarding "The Effect of Providing Visual Education Media Through the Line on the Smoking Behavior of PSIK-UMY Students" with the results of his research that the effect of the educational media was proven by the Friedman Test on the treatment group given the intervention which also showed p = 0.005 with the highest mean behavior on the behavior measurement during the *pre-test* (9.89), which means that social media has an influence on health promotion.

Health promotion is actually a renewal of health education. Based on previous experience, it can be concluded that health education has not "enabled" (practices or actions) people to behave in a healthy manner, but only can they "know" (knowledge) and "enter" (attitudes). This happens because indeed having sufficient knowledge and attitude alone will not automatically turn into practice or action.[11]

The existence of media applications is very important in health promotion, because social media can directly interact with the community. The benefits of social media, namely Instagram in health promotion in today's era, are one of which makes it easier to receive information by targets, makes it easier to convey information, stimulates educational goals to pass information on to others and achieve

more goals. The health promotion that is given can be done repeatedly, one of which is regarding the No Smoking Area which can increase students' knowledge and attitudes so that it can increase student compliance and disseminate information on the No Smoking Area policy.[11]

Based on the pin analysis of the research results, it can be concluded that between the theory and the results of the study, there is a difference in the effect of health promotion through Instagram on the knowledge and attitudes of the No Smoking Area among the Public Health students of STIKes Wijaya Husada Bogor. Evidenced by *p*-value <0.05 then Ho is rejected and Ha is accepted.

Based on the explanation above, it can be concluded that the results of this study are the influence of health promotion through Instagram on the knowledge and attitudes of the No Smoking Area among Public Health students of STIKes Wijaya Husada Bogor.

CONCLUSION

1. The level of knowledge before and after health promotion in the No Smoking Area through Instagram for Public Health students of STIKes Wijaya Husada Bogor, it is known that the significance value of the Wilcoxon test is 0,000, because the p value <0.05, the results of the *pretest* and *posttest* have an effect on health promotion through Instagram on the level of knowledge. No Smoking Area for Public Health students of STIKes Wijaya Husada Bogor.
2. The level of attitudes before and after health promotion in the No Smoking Area through Instagram for Public Health students of STIKes Wijaya Husada Bogor, it is known that the significance value of the Wilcoxon test is 0.001, because the p value is <0.05, the results of the *pretest* and *posttest* have an effect on health promotion through Instagram on the level of attitudes. No Smoking Area for Public Health students of STIKes Wijaya Husada Bogor.

3. Analysis of the influence of health promotion through Instagram on knowledge and attitudes of Smoking Free Areas in Public Health students of STIKes Wijaya Husada Bogor. Health promotion through Instagram is said to be influential because it can be seen through thetest *Mann-Whitney* with a *p value of* knowledge of 0.008 and an attitude of 0.030 <α = 0.05, so Ho is rejected and Ha is accepted, so that there is a difference in the effect of health promotion through Instagram on knowledge and attitudes of the region. No Smoking for Public Health students of STIKes Wijaya Husada Bogor in 2019.

SUGGESTION

1. For researchers

   It is hoped that this research can be useful for researchers and can be used as basic research for further research and for future researchers it is hoped that they can continue and modify this research by using more creative methods and adding research variables that are not yet in this study.
2. For Educational Institutions

   It is hoped that it will be useful for the institution as literature material for further research, as a source of information about Smoking Free Areas, and as student material development and as a scientific reference regarding health promotion.
3. For Instagram users

   It is hoped that Instagram users will consider and take advantage ofpromotional media *online* to increase the knowledge and attitudes of students or social media users in the health sector.

REFERENCES

1. World Health Organization. *WHO Report on the Global Tobacco Epidemic 2013*. *Enforcing bans on tobacco advertising, promotion, and sponsorships the fourth in a series of WHO reports.* 2013.2
2. World Health Organization. *WHO Report on the Global Tobacco Epidemic* 2015. *Raising taxes on tobacco is the*

fifth in a series of WHO reports that tracks the status of the tobacco epidemic and the impact of interventions implemented to stop it. 2015.

3. Asizah. N. 2015.*Individual Factors Associated with the Smoking Actions of Students at Hasanuddin University*. Accessible via http://repository.unhas.ac.id/bitstream/handle/123456789/14640/SKRIPSI.com. Retrieved July 29, 2019, 13:38:02.
4. Indonesian Health Research. 2018. www.depkes.go.id. Retrieved on July 28, 2019, 20:32:18.
5. Azkha, N. 2013. *Study of the Effectiveness of the Implementation of City Regulation Policies on No-Smoking Areas (Ktr) in Efforts to Reduce Active Smokers in West Sumatra in 2013*. https://jurnal.ugm.ac.id. Retrieved 29 July 2019, 17:07:04.
6. Bogor City Regional Regulation Number 12 of 2009. www.data.kotabogor.go.id. Retrieved July 28, 2019, 12:34:23.
7. Bogor City Health Profile. 2017. www.depkes.go.id. Retrieved July 28, 2019, 14:05:25.
8. Sumahandriyani, P. 2015. *Knowledge, Attitude and Community Support Against No Smoking Area (KTR) Policy in 7 Regulated Areas in Batam City*. https://www.unud.ac.id/in/tugas-akhir1220015038.html. Retrieved 31 July 2019, 16:34:21
9. Indonesia APJII. 2016. Indonesian Internet User Penetration and Behavior. https://apjii.or.id. Retrieved August 1, 2019, 17:21:18.
10. Imam Maulana and Tri Krianto. 2012. *The Influence of Health Promotion Urgency of Non-Smoking Area (Ktr) on Smoking Behavior of Visitors and Canteen Guardians at Muhammadiyah University Yogyakarta*. https://www.google.com/url?sa=t&source=web&rct=j&url=http://lib.ui.ac.id/naskahringkas/2015-08/. Retrieved 2 August 2019, 22:45:18.
11. Kolid A. 2014. Health Promotion. Jakarta: Rajawali

Pres. https://lib.ui.ac.id. Retrieved August 1, 2019, 21:13:14

12. Notoadmodjo S. 2012. Health Promotion and Health Behavior. Jakarta: Rineka Cipta.
13. Notoatmodjo, S., 2010. *Health Research Methodology*, Jakarta: Rineka Cipta.
14. Sulistiawan, A., 2010. The *Relationship between Adolescent Knowledge about the Effects of Cigarettes on Health and Smoking Attitudes in Sltp N 2 GrogolSukohajo*. www.eprints.ums.ac.id. Retrieved July 31, 2019, 20:04:49.
15. A Muri Yusuf. 2016. Quantitative Research Methods, Qualitative and Combined Research, Jakarta: Prenadamedia Group.

RELATIONSHIP OF PUBLIC NUMBERS WITH *SICK BUILDING SYNDROME*

Diah Adni Fauziah, Akhmad Yani Suryana, Dian Novita, Putri Ayu Aisyah

Wijaya Husada Health Science Institute

ABSTRACT

Sick building syndrome (SBS) is a pile of symptoms that are complained of a person or a group of people for includes unspecific to health relating to the condition of certain. The purpose of this research to know the germ correlation with a sick building syndrome in employees who work at puskesmas ciawi bogor districts in 2019.The kind of research this is quantitative research with an approach analytic using a design of cross sectional, as well as using the fit and proper test data available for analysis cramer. And implemented in puskesmas ciawi bogor districts on the 17-19 september 2019 with the number of respondents 38 peoples. Uses the technique total sampling. An instrument that is used is identification faced with my answers about the incident when the town questionnaire sheets was sick building syndrome and sheets of observation to make a statement on as many points right away these encase the germs .

The result showed as much as 21 respondents (90,5 %) according to standard with the sick building syndrome negative. Based on the research obtained the p value = 0,000 which means p value and Ha< 0,05 and it received. It means there was a correlation between the germ with a sick building syndrome at puskesmas ciawi bogor districts in 2019.

The research is expected to be a input for the ciawi bogor districts to always improve the quality of ventilation and air flow in the work so that they could reduce the entry of bacteria and reduce the sick building syndrome.

Keywords ***:*** *The Germ, Sick Building Syndrome, Puskesmas*

INTRODUCTION

Today, developed countries and the rapid physical development reflects the complexity of symbols of modern life. In today's life, there are many skyscrapers that are a symbol of modernization. Modern life in the big cities of our country demands the availability of adequate infrastructure. One of them is a magnificent office building equipped with an Air Conditioning (AC) system. Buildings like this are usually closed and have their own air circulation.[1]

Hospitals and Community Health Centers (Puskesmas) are service centers that provide basic medical services and specialized medical, medical support services, nursing services, both outpatient and inpatient and installation services. The Puskesmas is a training center for health personnel as well as for biosocial research. Jam has functioned as a means of health care, the puskesmas is also a

gathering place for sick and healthy people, so that it has the potential to become a place for disease transmission and the possibility of health problems.[2]

Health problems are a problem that is felt by many people, especially workers. Workers are divided into two types according to their place, namely workers indoors and workers outdoors. Working indoors gives a fun and safe effect, for example working in offices, tall buildings, refreshing rooms, facing computers and sitting without doing strenuous physical activity. This is inseparable from health risks, because high work pressure will make employees work longer hours in air-conditioned rooms, are not exposed to sunlight and sit at the computer so that this can be a factor in the occurrence of health problems. One of the health problems in workers is Sick Building Syndrome or commonly abbreviated as SBS.[3]

The term Sick Building Syndrome (SBS) has two meanings, first, SBS is a collection of symptoms (syndromes) that a person or group of people complains about including non-specific feelings that disturb health related to certain building conditions. Second, SBS is a certain building condition related to complaints or non-specific health problems experienced by its occupants, so it is said to be a sick building.[4]

WHO reports 30% of new buildings worldwide complained to workers in 1984. Worldwide 2.7 million people died from air pollution of which 2.2 million were caused by indoor air pollution. Indoor Air Quality problems are often influenced by the emergence of indoor air quality, generally due to several things, namely lack of air ventilation (52%), presence of contamination sources in the room (16%) contamination from outdoors (10%), microbes (5%) , building materials (4%), others (13%).[5]

In Indonesia, concern for SBS has begun, according to the Head of the National Population Agency (BAKNAS) an estimated 2.7 million people died due to indoor air pollution. Whereas 70-80% of the majority of human time is spent indoors. In the appendix to the K3 Standard it has been explained that SBS health problems caused by poor indoor quality such as poor ventilation, too low or high humidity, too hot or cold room temperature, dust, mold, chemicals, air

pollutants, etc. arises when the work, equipment and work environment is not designed properly. Companies are obliged to carry out special health checks, specifically examinations related to SBS to workers if an exposure to potential health hazards is found and / or changes to work processes based on the requirements of the Minister of Manpower Regulation No. 5 of 2018 concerning Occupational Health and Safety Standards.[6]

Bogor City Health Office conducts air quality measurements with a target at 100 places that are included in the No Smoking Area (KTR) and Public Spaces, this measurement is carried out from August to September. From these measurements, it is known that most of the open space area in the city of Bogor is not suitable for breathing because it contains high carbon, namely 500 ug / m^3. The worst case was in a closed building, the figure reached 300 ug / m^3. From the results of these measurements, there is no area in the city of Bogor that meets the health requirements for breathing good air.[7]

The results of observations made on 10 respondents of Puskesmas Ciawi Bogor Regency found that there were 6 respondents who felt several symptoms such as fatigue, dizziness, dry throat, back pain and neck pain. Meanwhile, the other 4 respondents only occasionally felt the symptoms of SBS, the symptoms felt less or even disappeared when they left the building.

As well known from the measurement results of last year, the number of bacteria that are most numerous in the room as much as 999.96 Dental Poli CFU / m3, which means not in accordance with the standards KMK No. 1405 / Menkes / SK / XI / 2002 of <700 CFU / m^3. Therefore, researchers are interested in conducting a study entitled "The Relationship between Germ Numbers and Sick Building Syndrome at the Ciawi Community Health Center, Bogor Regency in 2019".

The purpose of this study was to determine the relationship between germ numbers and the incidence of sick building syndrome in employees who work at the Ciawi Community Health Center, Bogor Regency in 2019.

RESEARCH METHODS

This type of research is a quantitative analytic approach using a cross-sectional study design chosen because to study the dynamics of the correlation between risk factors and effects, by means of approach, observation or data collection at once (point time approach). That is, each research subject is observed only once and measurements are made of the character status or subject variables at the time of examination[8]

This research was conducted at the Ciawi Community Health Center, Bogor Regency on 17-19 September 2019. The population in this study were employees and work spaces at the Ciawi Health Center. Bogor Regency as many as 38 respondents and 8 work spaces. The samples in this study were 38 samples and 8 work spaces using the Nonprobability Sampling technique with the type of Total Sampling.

The variables of this study consisted of the independent variable, namely the number of germs and the dependent variable, namely the incidence of sick building syndrome. Analysis of data with univariate and bivariate analysis, where the univariate analysis in this study is the number of germs and the incidence of Sick Building Syndrome. Bivariate analysis analyzes the relationship between the number of germs and the incidence of Sick Building Syndrome.

RESEARCH RESULTS

This study was conducted to determine the relationship between the number of germs and the incidence of Sick Building Syndrome. With the number of respondents who have been researched as many as 38 respondents and 8 work spaces.

Table 1.Frequency Distribution of Germ Numbers at Puskesmas Ciawi Bogor Regency in 2019

No	Angka Kuman	Frekuensi	Presentase (%)
1	Tidak Sesuai Standar	3	37,5
2	Sesuai Standar	5	62,5
	Total	8	100

Based on table 1 above, it can be seen that out of 8 employee workspaces, there are 5 work spaces (62.5%) in accordance with the standards of the Minister of Health Regulation Number 1077 / MENKES / PER / V / 2011.

Table 2.Frequency Distribution of Sick Building Syndrome at Puskesmas Ciawi Bogor Regency in 2019

No	Kejadian *Sick Building Syndrome*	Frekuensi	Presentase (%)
1	Negatif	21	55,3
2	Positif	17	44,7
	Total	38	100

Based on table 2 above, it can be seen that of the 38 respondents, 21 respondents (55.3%) had negative experiences of Sick Building Syndrome.

Table 3.The Relationship between Germ Numbers and Sick Building Syndrome at the Ciawi Community Health Center, Bogor Regency, 2019

Angka Kuman	Kejadian *Sick Building Syndrome*				Jumlah		P_{value}	OR *Confident Interval* (CI) 95%
	Negatif		Positif					
	N	%	N	%	N	%		
Tidak Sesuai Standar	2	11,8	15	88,2	17	44,7	0,000	0,014 (0,002-0,112)
Sesuai Standar	19	90,5	2	9,5	21	55,3		
Jumlah	21	55,3	17	44,7	38	100,0		

Based on table 3 above regarding the statistical test results of the relationship between germ numbers and the incidence of sick building syndrome from 38 respondents, the results obtained were 19 respondents (90.5%) according to the standards of the Minister of Health Regulation Number 1077 / MENKES / PER / V / 2011 with the incidence of sick building negative syndrome. The results of statistical tests using the Cramer test obtained p value = 0.000, which means p value <0.05, so Ho is rejected and Ha is accepted. This means that there is a relationship between the number of germs and the incidence of sick building syndrome at the Ciawi Community Health Center, Bogor Regency in 2019. The results of the analysis also obtained an OR value of 0.014, which means that the room according to the standard has a chance or risk of not experiencing the incidence of sick building syndrome compared to rooms that are not according to standards.

DISCUSSION

a. Germ Numbers

Based on table 1 regarding the Frequency Distribution of Germ Numbers at the Ciawi Community Health Center, Bogor Regency, 2019 from 8 employee work spaces shows

that as many as 5 work spaces (62.5%) are in accordance with the standards of the Minister of Health Regulation Number 1077 / MENKES / PER / V / 2011 .

The results of this study are comparable to research conducted by Machfud Fauzi, 2015 which examined "The Relationship between Physical, Biological and Individual Characteristics and the Incidence of Sick Building Syndrome in Employees at Pandanaran Building, Semarang City, 2015" with the results of 8 measured workspaces showing that there were 6 employee work (75%) who meet the standards of the Minister of Health Regulation No. 1077 / MENKES / PER / V / 2011.

With the results obtained, the characteristics of the respondents in this study consisted of age, gender and length of work. Based on the results of research from 38 respondents, the age of most respondents was the group 36-45 years with a total of 12 respondents (31.6%) and group 46-55 years with a total of 12 respondents (31.6%). For the gender of the most respondents were women as many as 29 respondents (76.3%). And the length of work of the most respondents was 1-10 years with a total of 17 respondents (44.7%).

Germs according to Micahel J. Pelczer are microorganisms that are usually pathogenic. This trait can cause disease. The habitat for germs is very diverse both in the environment of water, soil, air and on the surface of an object.[9]

Bacteria are single-celled, nonchlorophyllic microorganisms (although there are exceptions) that reproduce by dividing themselves, and are so small that they are only visible under a microscope. Microorganisms that come from indoors, for example, are insects, bacteria, pet fleas, and fungi. Microorganisms scattered in the room are known as bioaerosol. Bioaerosol indoors can come from the outside environment and contamination from indoors. Bioaerosol from the external environment can be in the form of fungi originating from rotting organisms, dead plants and animal carcasses, Legionella bacteria from soil-borne that penetrate into space,

algae that grow near ponds or lakes and enter the room through the wind. and lots of insect larvae outdoors can penetrate closed buildings.

Contamination that comes from indoors mostly occurs at humidity between 25-75%. In this range, the spores of the fungus will increase and there will be an increase in mold growth, and sources of moisture in or around the room such as water reservoirs and water tubs in bathrooms.[9]

Bacteria, fungi, pollen, and viruses are types of biological contaminants. These contaminants can develop either in standing water that has accumulated in drains, humidifiers or in places where water can pool on floors, ceilings, carpets, or insulation. Sometimes insects or bird droppings can be sources of biological contaminants. Physical symptoms associated with biological contamination include coughing, chest tightness, fever, chills, muscle aches, and other forms of allergies such as irritation of mucous membranes and upper respiratory problems. The existing indoor bacteria, such as Legionella, can cause disease, be it Legionnaire's Disease or Pontiac Fever.[9]

Basically, age affects the body's endurance, the older the age, the lower the body's stamina. This is because when the age reaches 21-30 years, it is a productive age where at this age employees are usually required to show optimal work performance, so that their stamina can decrease.[10] The prevalence rates of SBS symptoms among women may reflect a general tendency for women to report higher rates of generalized psychosomatic complaints. Women may also be more sensitive to various factors related to the physical and psychosocial work environment.[10] Tenure can affect and reduce the lung function capacity of employees. The longer a person works, the more he or she has been exposed to the dangers caused by the work environment.[11]

From the results of the study it can be concluded that between the theory and the results of the research that which affects the room that has the number of germs according to the standard limit, it can be seen from the

characteristics of the respondents, the age of the employees studied is more dominant in the productive age group who are not required to show optimal performance, so that it does not decrease the employees' stamina at work and the work period of the employees studied were more dominant and did not include long-term service periods so that the employees had not been exposed to the dangers caused by the work environment.

So that researchers can conclude that there is an agreement between theory and research results.

b. The incidence of Sick Building Syndrome

Based on table 2 about the Frequency Distribution of Sick Building Syndrome incidents at the Ciawi Community Health Center, Bogor Regency, in 2019, of the 38 respondents, 21 respondents (55.3%) had negative incidents of Sick Building Syndrome.

This research is comparable to research conducted by Akhmad Zaelani, 2015 which examines the "Factors Affecting the Incidence of Sick Building Syndrome in Employees at the Distribution Department Region I Graha Sarana PT. Petrokimia Gresik 2015 "with the results of 49 respondents, there were 36 respondents (73.5%) who had negative experiences of Sick Building Syndrome.

With the results obtained, the characteristics of the respondents in this study consisted of age, gender and length of work. Based on the results of research from 38 respondents, the age of most respondents was the group 36-45 years with a total of 12 respondents (31.6%) and group 46-55 years with a total of 12 respondents (31.6%). For the gender of the most respondents were women as many as 29 respondents (76.3%). And the length of work of the most respondents was 1-10 years with a total of 17 respondents (44.7%).

Sick Building Syndrome is a syndrome or a collection of complaints that includes unspecified feelings of malaise that are often found in those who work in modern high-rise buildings, but SBS can also be found

in those who work in buildings modern low and not terraced.[12]

According to Aditama (2002), dividing complaints or symptoms into seven categories, namely mucous membrane irritations, such as eye irritation, pain, redness and wateriness; nasal irritations, such as throat irritation, sore swallowing, itching, sneezing, dry cough; neurotoxic disorders (nervous disorders / health problems in general), such as headache, weakness, tiredness, irritability, difficulty concentrating; lung and respiratory disorders, such as coughing, wheezing, shortness of breath, heaviness in the chest; skin disorders, such as dry skin, itchy skin; gastrointestinal disorders, such as diarrhea; other disorders, such as behavioral disorders, urinary tract disorders, etc.[13]

Basically, age affects the body's endurance, the older the age, the lower the body's stamina. This is because when the age reaches 21-30 years, it is a productive age where at this age employees are usually required to show optimal work performance, so that their stamina can decrease.[10] The prevalence rates of SBS symptoms among women may reflect a general tendency for women to report higher rates of generalized psychosomatic complaints. Women may also be more sensitive to various factors related to the physical and psychosocial work environment.[10] Tenure can affect and reduce the lung function capacity of employees. The longer a person works, the more he or she has been exposed to the dangers caused by the work environment.[11]

From the results of the study, it can be concluded that between the theory and the results of the research that the negative incidence of Sick Building Syndrome for employees of the Ciawi Community Health Center, Bogor Regency, can be seen from the characteristics of the respondents, the age of the employees studied is more dominant in the productive age group who are not required to show optimal performance. so that it does not reduce the stamina of the employees at work and the years of work of the employees studied are more dominant and do not include long-term work periods so that employees have not been exposed to

the dangers caused by the work environment.

So that the researcher can conclude that there is a correspondence between the theory and the research results.

c. The relationship between germ numbers and the incidence of Sick Building Syndrome

Based on table 3 of the results of the statistical test, the relationship between germ numbers and the incidence of Sick Building Syndrome at the Ciawi Community Health Center, Bogor Regency in 2019, of 38 respondents and 8 employee workspaces, there were 19 respondents (90.5%) accordingly. Standard Regulation of the Minister of Health Number 1077 / MENKES / PER / V / 2011 with the incidence of negative sick building syndrome.

The results of this study are comparable to research conducted by Dita Aini Aziziyani, 2019 which examines "The Relationship Between Temperature, Humidity and Germ Numbers and the Incidence of Sick Building Syndrome at Office X Jakarta in 2019" with the results of 40 respondents, there were 21 respondents (52.5%) who have a negative experience of Sick Building Syndrome and work in a room that does not have bacteria exceeding the standard limits of the Minister of Manpower Regulation Number 05 of 2018. The results of the study with the Chi-Square test obtained p value (0.02) <0.05 which means Ha accepted and Ho rejected means that there is a relationship between the number of germs and the incidence of sick building syndrome.

Germs according to Micahel J. Pelczer are microorganisms that are usually pathogenic. This trait can cause disease. The habitat for germs is very diverse both in the environment of water, soil, air and on the surface of an object.[9]

Bacteria are single-celled, nonchlorophyllic microorganisms (although there are exceptions) that reproduce by dividing themselves, and are so small that they are only visible under a microscope. Microorganisms that come from indoors, for example, are insects, bacteria, pet fleas, and

fungi. Microorganisms scattered in the room are known as bioaerosol. Bioaerosol indoors can come from the outside environment and contamination from indoors. Bioaerosol from the external environment can be in the form of fungi originating from rotting organisms, dead plants and animal carcasses, Legionella bacteria from soil-borne that penetrate into space, algae that grow near ponds or lakes and enter the room through the wind. and lots of insect larvae outdoors can penetrate closed buildings. Contamination that comes from indoors mostly occurs at humidity between 25-75%. In this range, the spores of the fungus will increase and there will be an increase in mold growth, and sources of moisture in or around the room such as water reservoirs and water tubs in bathrooms.[9]

Bacteria, fungi, pollen, and viruses are types of biological contaminants. These contaminants can develop either in standing water that has accumulated in drains, humidifiers or in places where water can pool on floors, ceilings, carpets, or insulation. Sometimes insects or bird droppings can be sources of biological contaminants. Physical symptoms associated with biological contamination include coughing, chest tightness, fever, chills, muscle aches, and other forms of allergies such as irritation of mucous membranes and upper respiratory problems. The existing indoor bacteria, such as Legionella, can cause disease, be it Legionnaire's Disease or Pontiac Fever.[9]

Sick Building Syndrome is a syndrome or a collection of complaints that includes feelings that are not specific from feeling unwell that is often found in those who work in modern buildings which are generally high levels, but SBS can also be found in those who work in modern low-rise and not terraced buildings.[12]

According to Aditama (2002), dividing complaints or symptoms into seven categories, namely mucous membrane irritations, such as eye irritation, pain, redness and wateriness; nasal irritations, such as throat irritation, sore swallowing, itching,

sneezing, dry cough; neurotoxic disorders (nervous disorders / health problems in general), such as headache, weakness, tiredness, irritability, difficulty concentrating; lung and respiratory disorders, such as coughing, wheezing, shortness of breath, heaviness in the chest; skin disorders, such as dry skin, itchy skin, gastrointestinal disorders, such as diarrhea; other disorders, such as behavioral disorders, urinary tract disorders, etc.[13]

Basically, age affects the body's endurance, the older the age, the lower the body's stamina. This is because when the age reaches 21-30 years, it is a productive age where at this age employees are usually required to show optimal work performance, so that their stamina can decrease.[10] The prevalence rates of SBS symptoms among women may reflect a general tendency for women to report higher rates of generalized psychosomatic complaints. Women may also be more sensitive to various factors related to the physical and psychosocial work environment.[10] Tenure can affect and reduce the lung function capacity of employees. The longer a person works, the more he or she has been exposed to the dangers caused by the work environment.[11]

Based on the theory and research results that researchers have conducted at the Ciawi Community Health Center, Bogor Regency, there is agreement with the results of the research of 38 respondents. Most of the respondents' perceptions about the suitability of the standard number of germs against the incidence of sick building syndrome mostly stated that it was according to the standard with a total of 19 respondents (90.5%) against the incidence of negative sick building syndrome. This is reinforced based on the answers to the questionnaire that the researcher has given to the respondents and the observation of the number of germs in each workspace of employees of the Ciawi Community Health Center, Bogor Regency.

The Cramer test results obtained p value = 0.000, which means that p value <0.05, then Ha is accepted, which means that there is a correlation between the number of germs and the incidence of Sick Building Syndrome

at the Ciawi Health Center, Bogor Regency in 2019. The results of the analysis also obtained an OR value of 0.014 which means room according to standards has a chance or risk of not experiencing the incidence of sick building syndrome compared to rooms that are not according to standards. For the confidence interval, it is obtained from 0.002 to 0.112, where the confidence interval does not contain a relative risk value of 1, thus indicating a relationship between the number of germs and the incidence of sick building syndrome at the 5% significance level.

From the results of the study, it can be concluded that between the theory and the results of the research that the influence of the relationship between the number of germs and the incidence of sick building syndrome at the Ciawi Community Health Center, Bogor Regency, can be seen from the characteristics of the respondents, the age of the employees studied was more dominant in the productive age group who were not required to show optimal performance, so that it does not reduce the stamina of employees at work and the work period of the employees studied is more dominant and does not include long-term work periods so that employees have not been exposed to the dangers caused by the work environment.

CONCLUSION

1. It is known that the frequency distribution of the number of germs at the Ciawi Community Health Center, Bogor Regency, in 2019 from 8 employee work spaces, there were 5 work spaces (62.5%) in accordance with the standards of the Minister of Health Regulation Number 1077 / MENKES / PER / V / 2011.
2. It is known that the frequency distribution of Sick Building Syndrome incidents at the Ciawi Community Health Center in Bogor Regency in 2019 from 38 respondents found that 21 respondents (55.3%) had negative incidents of Sick Building Syndrome.
3. It is known that the relationship between the number of germs and the incidence of sick building syndrome from 38 respondents, obtained the results of 19 respondents (90.5%)

according to the standards of the Minister of Health Regulation Number 1077 / MENKES / PER / V / 2011 with the incidence of negative sick building syndrome. The results of statistical tests using the Cramer test obtained p value = 0.000, which means p value <0.05, so Ho is rejected and Ha is accepted. This means that there is a relationship between the number of germs and the incidence of Sick Building Syndrome at the Ciawi Community Health Center, Bogor Regency in 2019. The results of the analysis also obtained an OR value of 0.014, which means that the room according to the standard has a chance or risk of experiencing negative sick building syndrome incidence 0.014 times smaller than the room that is not up to standard. For the confidence interval, it is obtained from 0.002 to 0.112, where the confidence interval does not contain a relative risk value of 1, thus indicating a relationship between the number of germs and the incidence of sick building syndrome at the 5% significance level.

SUGGESTION

1. For Puskesmas Ciawi, Bogor Regency.
   The results of this study are expected to provide useful information and input in improving the ventilation and cleanliness system in the employee's workspace.
2. For STIKes Wijaya Husada Bogor.
   The results of the research obtained are expected to be useful for institutions as literature literature for further research, used as a source of information about the number of germs with the incidence of sick building syndrome, and as a student material development and as a scientific reference on occupational safety and health (K3).
3. For further researchers, further research is needed to examine the number of germs with the incidence of sick building syndrome by using more modern tools and guaranteed measurement results.

REFERENCES

1. Usman, Hardiyanti. 2014. Factors Associated with the Incidence of Sick Building Syndrome (SBS) on PT Bosowa Berlian Motor Employees.

Jakarta: University of Indonesia (Thesis)

2. Decree of the Minister of Health of the Republic of Indonesia. No 1204. 2004. Concerning Hospital Environmental Requirements. Jakarta. Ministry of Health RI.
3. Sabah, A. 2011. Sick Building Syndrome in Public Building and Workplaces. New York: Springer.
4. Aditama, Tjandra Yoga and Hastuti, Tri. 2009. Occupational Health and Safety. Jakarta: University of Indonesia Publishers
5. Soemirat, Julie. 2012. Sick Building Syndrome and Air Quality. Bandung: Publisher ITB Bandung
6. Minister of Manpower Regulation No. 5 of 2018. Concerning Occupational Safety and Health. Jakarta: Jakarta Manpower Office
7. Rahmawati, Laily. 2015. Health Office Measures Air Quality in Bogor City. Accessible via https://megapolitan.antaranews.com/berita/14610/dinas-keseh-ukur-kpapan-udara-kota-bogor on August 28, 2019 at 18.00 WIB
8. Setiawan A, Saryono. 2010. Midwifery Research Methodology. Jakarta: Nuha Medika.
9. Sulistiowati. 2017. The Relationship Between Physical Quality and Indoor Air Microbiology With the Incidence of SBS at PT Private X. Jakarta: University of Indonesia. (Thesis)
10. Hartoyo, Slamet. 2017. Environmental Factors Associated with the Incidence of Sick Building Syndrome at the National Police Forensic Laboratory Center. Jakarta: University of Indonesia (Thesis)
11. Zaelani, Akhmad. 2015. Factors Affecting the Incidence of Sick Building Syndrome. Jember: University of Jember (Thesis)
12. Ruth, Sapphira. 2015. Description of Sick Building Syndrome (SBS) for PT Elnusa TBK Employees. Jakarta: University of Indonesia (Thesis)
13. Laila, Nur. 2016. Factors Related to Complaints of Sick Building Syndrome at the Rectorate Building, University of Indonesia. Jakarta: University of Indonesia (Thesis)

THE EFFECT OF BALANCE EXERCISE ON POSTURAL BALANCE IN ELDERLY

Julianto Laia, Satrio Kusumo Lelono, Yoyo Haryono, Lina Kurnia Lestari
Wijaya Husada Health Science Institute

Abstract

Elderly is someone who is in the stage of late adulthood or in other words, the stage of the late adult age, with a range of age from 60 years and above. The biggest problem that often occurs in the elderly is impaired balance and musculoskeletal disorders, resulting in the elderly are often dropped. One form of exercise intervention related to the elderly balance is to provide a regular and directed exercise to improve the balance of one of them with balance exercise.

The purpose of this research is to know the Effect of Balance Exercise on Postural Balance in the Elderly in Ciherang Kidul RW 02 Village Laladon, District Ciomas, Bogor Regency in 2019. This type of research is Quasi Experiment with Non Random Pretest & Posttest Control Group Design. The method of sampling in this study used purposive sampling technique with a total sample of 32 respondents. Data collection was obtained through observation with the Berg Balance Scale observation sheet and giving balance exercises using the standard operational balance exercise procedures.

The result of bivariate analysis using the Independent Sample T-Test, in the intervention group obtained values (ρ = 0.012 or ρ <0.05) and in the control group obtained values (ρ = 1,000 or ρ> 0.05). The results of the analysis of the effect of balance exercise on postural balance in both groups with the Paired Sample T-Test showed an average value of the difference in postural balance increase before and after the intervention is (ρ = 0,000 or ρ <0.05). This indicates that there is a difference in the postural balance increase in the intervention and control group which means there is a meaningful influence between the two variables. There Is The Effect Of Balance Exercise On Postural Balance In Elderly In Ciherang Kidul RW 02 Village Laladon District Ciomas Bogor Regency In 2019.

Based on the conclusions of the research results, as for suggestions for the elderly in Ciherang Kidul, it is expected that the elderly can practice balance exercise movements routinely at least 2 times a week with supervision from one of the families. Because balance exercise is done to improve postural balance and give the effect of increasing the strength of the lower extremity muscles.

Keywords ***:*** *Balance Exercise, Postural Balance, Elderly*

INTRODUCTION

Elderly or elderly is someone who is in the late adulthood stage or in other words, the stage of late adulthood, with an age range from 60 years and above.[1] Meanwhile, the process of aging is a natural process of life that occurs from the beginning of a person's life, and has several phases, namely children, adults, and old people.[2]

According to data from World Population Prospects: the 2015 Revision, in 2015 there were 901,000,000 people aged 60 years or over, comprising 12% of the global total. By 2050 the elderly population is projected to more than double in 2015,

to reach 2.1 billion.[3] Asia ranks first with the largest elderly population and Indonesia is among the top five countries with the largest number of elderly people in the world.[3] Based on the population census in 2010, the number of elderly people in Indonesia is 18.1 million people (7.6% of the total population). In 2014, the number of elderly people in Indonesia became 18,781 million and it is estimated that by 2025, the number will reach 36 million.[4]

The increase in the number of elderly people also has an impact on increasing the life expectancy in Indonesia. Life expectancy in Indonesia increased from 69.1% in 2005-2010 to 70.1% in 2010-2015.[5]

With the increase in the number of elderly people, the problems in the elderly are increasing, because the number of elderly people is increasing from year to year.[6]

The biggest problems that often occur in the elderly are balance disorders and musculoskeletal disorders that cause them to fall frequently.[7] Balance (balance) is the ability to maintain the muscle nerve system in an efficient position or attitude while we move.[8]

Balance disorders in the elderly are closely related to the risk of falling, the appearance of balance disorders in the elderly is caused by degenerative processes and decreased sensory (vestibular, properioceptive, visual) and musculoskeletal (muscle, joint, soft tissue strength) which will affect the body's center of gravity against the spilled plane.[9] This decrease in function causes a decrease in the ability to maintain postural balance or body balance in the elderly.[10] As for the balance problem of the elderly, it will affect the decrease in daily activities, the risk of the elderly falling, and not doing enough activities so that it directly affects social activities or work and results in decreased self-confidence in the elderly.[9]

From the problems that arise in the elderly, one form of exercise intervention related to the balance of the elderly is to provide regular and targeted exercises to improve balance, one of which is balance exercise.[10]

Balance exercise is a physical activity that is performed to increase body stability by increasing the muscle strength of the lower limbs.[11] The increase in muscle strength in the elderly will make the body stronger in supporting the body, so that it will be strong in maintaining its movements. This will make the elderly more postural in balance.[12]

The purpose of this study was to determine the effect of balance exercise on postural balance in the elderly in Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency in 2019.

RESEARCH METHOD

The design of this study used a Quasi Experimental design with Non Randomize Pre test and Post test Control Group Design. Where a study was conducted with two groups without randomization, one group was given treatment and the other group as a control, then observed before and after.[13]

This research was conducted in Ciherang Kidul RW 02 Laladon Village, Ciomas District, Bogor Regency on August 20 to September 10 2019.

The population in this study were 46 elderly respondents in Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency in 2019. With the technique of taking The sample in this study using purposive sampling, purposive sampling is a sampling technique with the consideration of the researcher.[14] So that the sample in this study was 32 samples with the division of groups in this study divided into 2 groups, namely intervention and control where each group contained a minimum of 16 samples.

The research variables consist of balance exercise and postural balance. Data processing and data analysis usingcomputer software statistical program for social science (SSS) version 20. Data analysis with bivariate using thetest Independent Sample T-Test and analysis results regarding the effect of balance exercise on postural balance in both groups using the Paired Sample T-Test.

RESEARCH RESULTS

This research was conducted on 20 August to 10 September 2019 to determine the effect of balance exercise on postural balance among the elderly in Ciherang Kidul RW 02 Laladon Village, Ciomas District, Bogor Regency in 2019. With 32 samples of respondents who had been studied.

Table 1 Frequency Distribution of Postural Balance Differences Before and After Balance Exercise in the Elderly Intervention Group

No	Treatment	N	Mean ± SD	P
1	Before Balance Exercise	16	40.44 ± 5.808	0.002
2	After Balance Exercise	16	47.06 ± 5,234	

Source: Processed primary data

Based on table 1 the difference in the average postural balance before and after the balance exercise in the elderly intervention group in Ciherang Kidul Rw 02, Laladon Village, Ciomas District, Bogor Regency, 2019 shows that the results of the table data above show the average pretest value the postural balance was 40.44 and at the post-test it increased to 47.06, so the increase was 6.62. Based on the results of the t test using the independent sample t test, it is concluded that giving atreatment balanced exercise can improve postural balance with the sig value. 0.002 <0.05. Thus, the results of the t-test show that there is a significant difference in the increase in the average postural balance before and after the balance exercise in the elderly intervention group.

Table 2 Frequency Distribution of Average Postural Balance Before and After Balance Exercise in the Elderly Control Group

No	Treatment	N	Mean ± SD	P
1	Before Balance Exercise (Control)	16	45.88 ± 5.439	1,000
2	After Balance Exercise (Control)	16	45 , 88 ± 5,439	

Source: Processed primary data

Based on table 2, the difference in the average postural balance before and after a balance exercise in the elderly control group in Ciherang Kidul Rw 02, Laladon Village, Ciomas District, Bogor Regency, 2019 above shows no increase or decrease in

postural balance because of the average value. - The resulting average is 0 for the two control groups or groups that are not given thetreatment balance exercise. From the results of the t test using the independent sample t test, it is concluded that not given atreatment balanced exercise cannot reduce or increase postural balance (ρ value 1,000> 0.05). So it can be concluded that the t-test results show no significant difference in the average postural balance before and after balance exercise in the control group at Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency in 2019.

Table 3 Effect of Balance Exercise on Balance Postural in the Intervention Group and the Control Group for the Elderly in Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency, 2019

No	Group	N	Mean ± SD Pretest	Mean ± SD Post-test	P
1	Intervention	16	40.44 ± 5.808	47.06 ± 5,234	0.000
2	Control	16	45.88 ±	5.439 45.88 ± 5.439	

Source: Processed Primary Data

Based on table 3 the effect of balance exercise on postural balance in the intervention group and the control group in the elderly in Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency in 2019, it can be seen that there is a difference between the intervention and control groups. If the research hypothesis is accepted if the actual probability value is smaller than the required probability (0.05). Based on the t-test analysis, after being tested using the paired sample t test, the p-value = 0.000, which means ρ-value <0.05. So that the decision taken is Ha accepted and H0 rejected, meaning that there is an effect of balance exercise on postural balance in the elderly in Ciherang Kidul RW 02 Laladon Village, Ciomas District, Bogor Regency in 2019.

DISCUSSION

a. The difference in the average postural balance before and after a balance exercise in the elderly intervention

group at Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency in 2019

Postural balance is the body's ability to maintain the center of body mass within the limits of stability determined by the base of the support.[15]

The balance and gait in the elderly also need to be assessed to determine the risk of falling. The body's ability to maintain coordination in a standing position and to prevent falls depends on the musculoskeletal system. Balance disorders are usually characterized by a unsteady gait.[6]

According to Gunarto (2005), one of the causes of balance disorders in the elderly is muscle weakness in the lower extremities. This weakness of the lower limb muscles can cause postural balance disorders, which can result in sluggishness of movement, short strides, decreased rhythm, the foot cannot tread firmly and tends to look unsteady or late in anticipating disturbances such as slips and trips.[16]

One of the solutions to overcome and prevent this balance disorder is an effort to provide exercise, one of which is balance exercise. Nyman (2007) stated that balance exercise is a physical activity that is done to increase the muscle strength of the lower limbs.[11]

In addition, it also supports Richardson's statement in Dharmmika (2005) which states that postural balance exercises with increased muscle strength can be carried out for 3 weeks and there are variations in the improvement of postural balance in each elderly person after theintervention balance exercise. This can be because each elderly is different in maximizing every movement in balance exercise, so the muscle strength obtained is different and in the end the postural balance is different.[16]

Based on table 1, the difference in the average postural balance before and after the balance exercise in the elderly intervention group at Ciherang Kidul Rw 02, Laladon Village, Ciomas District, Bogor Regency in 2019 shows that the results of the table data above show the average postural balance pretest value of 40.44 and at the time of post-test it increased to 47.06, so the increase was 6.62. Based

on the results of the t test using the independent sample t test, it is concluded that giving atreatment balanced exercise can improve postural balance with the sig value. 0.002 <0.05. Thus, the results of the t-test show that there is a significant difference in the increase in the average postural balance before and after the balance exercise in the elderly intervention group.

This research is in line with the research conducted by Ainun Saleha on "The Effect of Fitness Gymnastics for the Elderly on Postural Balance for the Elderly at the Karang Werdha Keramat Jaya Home, Sumbersari District, Jember Regency in 2016" The research design used in this study was pre-experimental with one group pre-test and post-test design. The sample in this study were 27 elderly who had met the inclusion criteria of the researcher. The sampling technique used nonprobability sampling with purposive sampling type. Analysisdata of wicoxon test (p <0.05). The results of this study the average postural balance of the elderly in the pre-test of the elderly had sufficient postural balance as many as 23 elderly (85.2%), poor postural balance were 3 elderly (11.1%), and good postural balance was 1 elderly (3.7 %) and post-test elderly had adequate postural balance as many as 16 elderly (59.3%), good postural balance increased by 11 elderly (40.7%), and none of the elderly had poor postural balance (0%). So, in this study, there is an effect of Gymnastics for the elderly on postural balance in the elderly with a significance value (p = 0.000).

From the description above, it can be concluded that there is harmony between the theory and the results of the study, because the provision ofinterventions balance exercise can increase body stability by increasing the strength of the lower extremity muscles. So that there is a significant difference between the average postural balance before and after the balance exercise in the elderly intervention group.

b. The difference in the average postural balance before and after a balance exercise in the elderly control group in Ciherang Kidul Rw 02, Laladon

Village, Ciomas District, Bogor Regency in 2019

Balance exercise is a series of movements designed to improve postural balance, both for static balance and dynamic balance. When this series of movements is carried out there is a process in the brain, which is called central compensation, in which the brain will try to adjust any signal changes as a result of this series of movements to adapt.[16]

The theory put forward by the American College of Sport Medicine, exercise that can increase muscle strength which in turn will improve postural balance in the elderly can be done 3-4 weeks of exercise with a frequency of 3 times a week.[16]

In accordance with the theory put forward by Nyman (2007) that exercise (balance exercise) can cause muscle contraction.

Based on table 2, the difference in the average postural balance before and after the balance exercise in the elderly control group at Ciherang Kidul Rw 02, Laladon Village, Ciomas District, Bogor Regency, 2019 above shows no increase or decrease in postural balance because the resulting average value is 0 against both the control group or the group that was not given atreatment balanced exercise. From the results of the t test using the independent sample t test, it is concluded that not given atreatment balanced exercise can not improve postural balance (ρ value 1,000> 0.05). So it can be concluded that the t-test results show no significant difference in the average postural balance before and after the balance exercise in the control group at Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency in 2019.

This research is in line with the research conducted. Anita Dyah Listyarini about "The Effect of Balance Exercise on the Body Balance of the Elderly in Singocandi Village, Kudus Regency in 2018" This type of research is Experiment Research with the design of One Group Pretest-Posttest With Control Design. The number of samples of 70 respondents with 35 samples of the intervention group and 35 samples of the control group, the sampling used the total sampling technique according to the

inclusion and exclusion criteria. The analysis of this study used the Wilcoxon test. The results showed that there was an effect of balance exercise on the body balance of the elderly in the experimental group and no effect on body balance in the non-experimental group because the non-experimental group was not given intervention with p value the experimental group's= 0.000 (P <0.05) and the group non-experimental p-value 0.317 (P> 0.05).

From the description above, it can be concluded that there is an agreement between the theory and the results of the study, because there is no significant difference between the average postural balance before and after the balance exercise in the control group. This is because the absence of balance exercise does not make a difference to improve postural balance.

c. Effect of balance exercises on postural balance in the intervention group and the control group in the elderly in Ciherang Kidul RW 02, Village Laladon District of Ciomas Bogor District 2019

Balance (balance) is the ability to maintain the nervous system the muscle is in a position or attitude efficient while we move.[17]

Balance disorders in the elderly are closely related to the risk of falling, the appearance of balance disorders in the elderly is caused by degenerative processes and decreased sensory function (vestibular, properioceptive, visual) and musculoskeletal (strength of muscles, joints, soft tissue) which will affect the body's center of gravity on spilled field.[9] This decrease in function causes a decrease in the ability to maintain postural balance or body balance in the elderly.[10]

As for the balance problem of the elderly, it will affect the decrease in daily activities, the risk of the elderly falling, and not doing enough activities so that it directly affects social activities or work and results in a reduced level of self-confidence in the elderly.[9]

From the problems that arise in the elderly, one form of exercise intervention related to the balance of the elderly is to provide regular and

directed exercises to improve balance, one of which is balance exercise.[10]

Balance exercise is a physical activity carried out to increase body stability by increasing the muscle strength of the lower limbs.[11] The increase in muscle strength in the elderly will make the body stronger in supporting the body, so that it will be strong in maintaining its movements. This will make the elderly more postural in balance.[12]

According to Madureira (2006), states that balance training is very effective for improving functional and static balance and mobility of the elderly. This balance exercise will also reduce the frequency of falls in the elderly, if done with an optimal frequency of 2 times a week for 3 weeks. Seeing the above, it is very interesting to find out more about the phenomenon that occurs in the postural balance of the elderly after being given a balance exercise.[18]

Based on table 3 the effect of balance exercise on postural balance in the intervention group and the control group in the elderly in Ciherang Kidul Rw 02, Laladon Village, Ciomas District, Bogor Regency in 2019, it can be seen that there is a difference between the intervention and control groups. If the research hypothesis is accepted if the actual probability value is smaller than the required probability (0.05). Based on the t-test analysis, after being tested using the paired sample t test, the p-value = 0.000, which means ρ-value <0.05. So that the decision taken is Ha accepted and H0 rejected, meaning that there is an effect of balance exercise on postural balance in the elderly in Ciherang Kidul RW 02 Laladon Village, Ciomas District, Bogor Regency in 2019.

This research is in line with the research conducted by Wenny Lazdia on "Balance Exercise Against Postural Balance in the Elderly at Pstw Kasih Sayang Ibu Batusangkar in 2014". This research method uses a pre-experimental one group pre-post test design with One Group Pre-Post test Design.. The population and sample of this study were elderly people with postural balance disorders who met the inclusion criteria using purposive sampling technique, namely 41 respondents. From the results of the

paired-t test by comparing the Postural Balance before the intervention (pre-test) and after the intervention (post-test) resulted in p = 0.000, meaning that there was a significant difference before and after the balance exercise for 3 weeks where the increase in the balance score where the mean different = 8.171. The results above show that there is an effect of balance exercise on the postural balance of the elderly at PSTW Kasih Sayang Ibu Batusangkar.

From the description above, it can be concluded that there is harmony between the theory and the results of the study, because the provision ofinterventions is balance exercise basically very influential in improving postural balance and has the effect of increasing muscle strength in the lower extremities because the increase in muscle strength in the elderly will make the elderly's body stronger. in supporting the body, likewise will be firm in maintaining its movements. So that it will make the elderly more balanced in posture.

CONCLUSION

1. The difference in the average postural balance before and after balance exercise in the elderly intervention group. Based on the results of the t-test using the independent sample t test shows that the sig. 0.002 <0.05. This means that there is an increase in postural balance after being given a balance exercise of 6.62. Thus, the results of the t-test show that there is a significant difference in the increase in the average postural balance before and after the balance exercise in the elderly intervention group. in Ciherang Kidul RW 02 Laladon Village, Ciomas District, Bogor Regency in 2019.
2. The difference in the average postural balance before and after thecarried out balance exercise was in the elderly control group in Ciherang Kidul Rw 02 Laladon Village, Ciomas District, Bogor Regency in 2019. Based on the results of the t test using the independent sample t test it concluded that not given atreatment balance exercise could

not reduce or improves postural balance (ρ value 1,000> 0.05). So it can be concluded that the results of the t-test show no significant difference in the average postural balance before and after the balance exercise in the elderly control group in Ciherang Kidul RW 02 Laladon Village, Ciomas District, Bogor Regency in 2019.

3. The effect of balance exercise on postural balance in the intervention group and the control group in the elderly in Ciherang Kidul Rw 02, Laladon Village, Ciomas District, Bogor Regency in 2019, it can be seen that there is a difference between the intervention and control groups. If the research hypothesis is accepted if the actual probability value is smaller than the required probability (0.05). Based on the t-test analysis, after being tested using the paired samples t test, the p-value = 0.000, which means that ρ-value <0.05. So that the decision taken is Ha accepted and H0 rejected, meaning that there is an effect of balance exercise on postural balance in the elderly in Ciherang Kidul RW 02 Laladon Village, Ciomas District, Bogor Regency in 2019.

SUGGESTIONS

1. For Educational Institutions

   It is hoped that it can further improve the facilities and infrastructure that support research and it is hoped that the results of this study can add sources of reference and information to female students at STIKes Wijaya Husada Bogor so that they can become a reference for further researchers.

2. For the Nursing Profession

   It is hoped that it can provide information through health education and counseling, especially regarding improving postural balance, and providing effective ways to handle it. One of them is with a balance exercise.

3. For the Elderly

   It is hoped that with this research, the elderly can practice balance exercise regularly at least 2 times a week with supervision from one of the families. Because balance

exercise is done to improve postural balance and give the effect of increasing the strength of the lower limb muscles.

4. For Further Researchers It is hoped that this research will become a reference material for further research on balance exercise. In addition, it is hoped that the next researchers will increase the number of samples and there is a need for monitoring in carrying out the balance exercise, the exercise time is determined with certainty so that the sample can be monitored to get better results regarding the balance exercise. And it is expected to use a real experimental design (True Experiment) because this design is one of the strongest designs in controlling threats to validity.

REFERENCES

1. Widyanto, Faisalo Chandra. 2014. Community Nursing. Yogyakarta: Nuha Medika.
2. Kholifah, NS 2016. Gerontic Nursing. http://bppsdmk.kemkes.go.id/web/. Retrieved 10 July 2019
3. Gusmitasari, Alfikadesna 2014. The Effect of Do-in Shiatsu Massage and Gym Therapy on the Elderly with the Risk of Injury: Fall at PSTW Yogyakarta Unit Budhi Luhur. Yogyakarta: STIKes'Aisyiyah (Thesis)
4. Indonesian Ministry of Health. 2014. elderly situation and analysis. Infodatin: Center for data and information from the Indonesian Ministry of Health http://www.depkes.go.id/resources/download/pusdatin/infodatin/infodatinlansia.pdf. Retrieved 27 May 2019
5. Central Bureau of Statistics. 2015. Elderly Population Statistics 2014. Jakarta: Statistics Indonesia
6. Goddess, Sofia Rhosma. 2014. Textbook of Gerontic Nursing. Yogyakarta: CV Budi Utama
7. Dewi, Nyoman Trisna. 2015. Differences in Aquatic Exercise Therapy and Low Impact Aerobic Gymnastics In Improving Balance Dynamic in the Elderly at Banjar Dharma Santi Denpasar. Denpasar: Udayana University (Thesis)

8. Central Bureau of Statistics. National Socio-Economic Survey (SUSENAS). 2014
9. Istimantika, Windi. 2016. The Difference Between the Effect of Tandem Gait Exercise and Resisted Exercise Using Thera-Bands on Balance in the Elderly. http://digilib.unisayogya.ac.id/id/eprint/2219. Downloaded July 20 2019, 06:02 WIB
10. Munawwarah, M., Nindya, P. 2015. Giving Training to the Elderly Could Improves Balance And Reduces The Risk Of Fall In The Elderly. Journal of Physiotherapy Volume 15 Number 1, April 2015. https://ejurnal.esaunggul.ac.id/index.php/Fisio/article/view/1118. Downloaded May 28, 20:22 WIB
11. Rohayani, Iin. 2017. The Difference of Effect of Balance Exercise and Gymnastics Elderly Against Improving the Balance of the Elderly at Wiralestari Xi Wirobrajan Posyandu Elderly. http://digilib.unisayogya.ac.id/id/eprint/2846. Downloaded May 27 2019, 08:52 WIB
12. Murtiyani, Ninik. 2019. Effect of 12 Balance Interventions Exercise Against Postural Balance in the Elderly. http://jurnalkeperawatan.lppmdianhusada.ac.id/index.php/jk/article/view/76. Downloaded May 22 2019, 09:22 WIB
13. Supardi, S, Surahman. 2014. Research Methodology for Pharmacy Students. Jakarta: CV. Trans Info Media
14. Sugiono. 2015. Statistics for Research. Bandung: Alfabeta
15. Bachtiar, Adilah. 2018. The Effect of Providing Ankle Strategy Exercise Against Changes in the Dynamic Balance Level of the Elderly at the Tresna Werdha Gau Mabaji Gowa Social Home. Makassar: Hasanuddin University (Thesis)
16. Lazdia, Wenny. 2014. Balance Exercise Against Balance Postural for the elderly at Pstw Kasih Sayang Ibu Batusangkar. http://injec.aipni-ainec.org/index.php/INJEC/article/view/63. Downloaded May 18 2019, 22:26 WIB

17. Wibowo, Yoyok Ari. 2018. Relationship Activeness Following Elderly Gymnastics with Body Balance in the Elderly. Jombang: College of Health Individuals Cendikia Medika Jombang (Thesis)
18. Sagala, Ronald. 2017. The Effect of Balance Exercise on the Balance and Muscle Strength of the Elderly with the Risk of Falling in Puskesmas.http://sciencemakarioz.org/jurnal/index.php/KOHESI/article/download/110/pdf. Retrieved 25 May 2019

ORIGINAL COMMUNICATION EVALUATION OF NONGLUCOSE CARBOHYDRATES IN PARENTERAL NUTRITION FOR DIABETIC PATIENTS

MA Valero[1], I Escobar[2], P Gomis[2], A de la Cámara[3] and Josephine M. De Leon [4]

[1]Clinical Nutrition, Hospital Doce de Octubre, Madrid, Spain; [2]Pharmacy Service, Hospital Doce de Octubre, Madrid, Spain; and [3]Epidemiology, Hospital Doce de Octubre, Madrid, Spain; [4]Centro Escolar University, School of Nursing, Mendiola, Manila Philippines

Abstract

Objective: There is little information on the advantages of nonglucose carbohydrates in total parenteral nutrition (TPN) for diabetic patients. The aim of this study is to evaluate glycemic control and insulin requirements in diabetic patients who received TPN with different sources of carbohydrates, and to determine whether insulin requirements are different when septic and non-septic diabetic patients are studied.
Materials and Methods: One-hundred and thirty-eight patients were randomly divided into two groups receiving either glucose (G), n ¼ 71, or glucose-fructose-xylitol 2 : 1 : 1 (GFX), n ¼ 67. There were no differences between the demographic or anthropometric characteristics of the groups, nor between the patients with diabetes mellitus type 1 and type 2, nor the initial TPN composition. Acceptable glycemic control was considered when glycemia reached < 200mg=dl.
Results: Glycemic control was attained in 79.7% of patients (74.6 vs 85.1%), in the same period of treatment. At the end of treatment, insulin requirements were not different (45 19 vs 45 26 UI=day) in both groups, while similar amounts of carbohydrates (191 36 vs 187 45 g=day) were infused. The ratio insulin=body weight and insulin=carbohydrates were equal in both groups. In the GFX group nonseptic and septic patients needed less and more insulin, respectively, than their counterparts in the G group. No major adverse events related to carbohydrate infusions were observed.
Conclusions: Either G or GFX could be used in TPN for diabetic patients, providing glycemic control in most cases with similar insulin requirements. GFX mixtures were slightly more beneficial to attain glycemic control in nonseptic patients, but septic diabetic patients had higher insulin needs in this group.

Keywords: parenteral nutrition; diabetes mellitus; glucose; fructose; xylitol

INTRODUCTION

Glucose is the most commonly used carbohydrate for total parenteral nutrition (TPN) solutions. Glucose utilization in the fasting state is largely (70%) noninsulin-dependent. However, in the postprandial state, glucose uptake is an insulin-dependent process in adipose and skeletal muscle tissues. There are pathological situations in which glucoseutilization is worsened (Van Eys, 1986). Diabetes mellitus is characterized by absolute (type 1) or relative (type 2) insulin deficiency. Under these conditions, glucose infusion may cause hyperglycemia (McMahon et al, 1989; Valero et al, 1996). Fructose and xylitol have been used as alternative sources of carbohydrates in intravenous infusions. These sugars are metabolized in the liver via insulin-independent pathways, so their use could decrease the plasma glucose concentration in diabetic patients receiving TPN solutions. Although there are reports in the

past on the use of alternative carbohydrates in TPN, there is a lack of specific information about the advantages of nonglucose carbohy- drates vs glucose in diabetic patients with or without sepsis. Further, in those reports the amount of these fuels provided was far above that presently considered as acceptable.

The aims of this study were (a) to compare the effects on metabolic control of glucose (G) vs glucose – fructose – xylitol mixtures (GFX) given in isocaloric amounts to diabetic patients during TPN infusion, and (b) to study whether insulin requirements were different when septic and nonseptic diabetic patients were considered.

MATERIAL AND METHODS

The patients were randomized into two groups: (1) glucose (G), as dextrose solutions (Laboratorio Grifols, Barcelona, Spain), (2) glucose – xylitol – fructose (GFX) 2 : 1 : 1, as Caloplasmal 1 (B Braun, Barcelona, Spain). The patients and investigators were unaware of the patients' solution assignments. The only person aware of the assignments was the research pharmacist, who kept the code sealed until the time of data analysis. Institutional review board approval of the study protocol was obtained.

Entry criteria

Diabetic patients over 18 y of age with digestive intolerance that required TPN were included. Patients were excluded if they showed gastrointestinal tolerance of oral or enteral diets, they had ketoacidosis or nonketotic hyperosmolar
coma, or when TPN was required for less than 5 days. None of our patients had a previous history of congenital fructose intolerance.

Demographic characteristics

One-hundred and thirty-eight patients, 68 women and 70 men were studied. Twenty-nine patients (21%) had a previous diagnosis of type 1 diabetes, and 109 (79%) of type 2. Forty-two (38.5%) of these patients were currently treated with diet, 53 (48.6%) with oral antidiabetic agents and 14 (12.8%) with insulin. All the patients were attended by our Nutritional Support Service and they received nothing orally. The indications for nutritional support were elective surgery in 81 cases (58.7%), urgent surgery in 16 (11.6%), gastrointestinal fistula in 12 (8.7%), pan-creatitis or pancreatic pseudocysts in 11 (8%), gastrointest- inal hemorrhage in four (2.9%) and other diseases in 14 cases (10.1%; Table 1). TPN was

required by absence of gastrointestinal function or by lack of enteral access.

Table 1 Distribution of diseases or treatment procedures in both groups

	G group (n¼71)	GFX group (n¼67)
Gastric cancer	13	14
Pancreatitis, pseudocysts	8	4
Pancreatic cancer	7	5
Esophagic cancer	0	1
[illegible]	-	-
Colorectal cancer	12	7
Bladder cancer	3	4
Acute gastric hemorrhage	3	6
Bone marrow transplant	5	3
Intestinal obstruction	5	3
Intestinal perforation	2	6
Gastrointestinal fistula	4	5
Aortic aneurism	2	0
Paralitic ileus	4	6
Caustic esophagitis	1	0
Liver transplant	0	1
Diarrhea	0	1

In the G group, 17 patients were classified as having type 1 diabetes and 54 type 2 (21 treated with diet, 25 with oral antidiabetic agents and eight with insulin). In the GFX group, 12 patients had type 1 diabetes and 55 type 2 (21 treated with diet, 28 with antidiabetic drugs and six with insulin). Seven patients in the G group and six patients in the GFX group had serum creatinine levels above 1.5 mg=dl before TPN infusion.

There were no differences between groups in age, gender, anthropometric characteristics, basal energy expen-diture or diabetes type (Table 2).

Table 2 Anthropometric parameters in diabetic patients receiving glucose (G group) and glucose–fructose–xylitol 2:1:1 mixture (GFX group; mean standard deviation or absolute value)

	G group (n¼71)	GFX group (n¼67)
Age (y)	69.6 9.2	67.6 10.6
Sex (m=f)	35=36	35=32
Weight (kg)	66.6 10.6	68.3 15.6
BMI (kg=m²)	25.9 4.5	26.7 6.1
BEE (kJ, kcal)	5287 647=1268 155	5287 714=268 171
Type 1=type 2	17=54	12=55

BMI, body mass index; BEE, basal energy expenditure (Harris JA, Benedict FG (1919): Biometric Studies ofBasal Metabolism in Man. Washington, DC: Carnegie Institute of Washington, Publication no. 297).

General procedures

Total caloric requirements were calculated according to sex, age, height and weight (Harris Benedict formula), as 130 – 150% of the basal energy expenditure (5.30 MJ=day, 1268 kcal=day). When the patients were obese, we used an adjusted body weight, by assuming that one-quarter of weight above the ideal or desirable is metabolically active (adjusted W ¼ ((ABW 7 IBW) 0.25) þ IBW), where ABW is actual body weight and IBW is ideal body weight (Tighe et al, 1993). The volume of TPN was given as 0.0042 ml=MJ (1 ml=kcal) at a constant rate of infusion, regulated by a volumetric infusion pump, unless volume restriction was indicated.

Individual prescriptions for macronutrients and standard trace elements (10 ml, Pharmacia, Barcelona,

Spain) and vitamin solutions (10 ml, Clintec, Madrid, Spain) were provided for all patients. Electrolytes were added as needed. At the start of the treatment, amino acids (Frea- mine 10%, Pharmacia & Upjohn, Barcelona) were provided at 1.33 0.3 g=kg of weight (87.1 17.2 g=day) as standard amino acids solution, and 0.92 0.17 g=kg (60.6 11.5 g=day) of fat was given as medium- and long-chain triglycerides (20% MCT=LCT50=50, Lipofundin, B. Braun, Barcelona). TPN was administered as an all-in- one mixture.

Seventy-one patients were assigned to receive G, and 67 patients the GFX 2 : 1 : 1 mixture. Patients were initially Given 2.86 0.53 g=kg=day of carbohydrates in the G group and 2.89 0.71 g=kg=day in the GFX group. In both groups the patients received similar caloric percentage of carbohydrates (44.7 5.1 vs 43.6 6.4%). Capillary glycemia was measured every 6 h.

Regular human insulin was provided in the TPN bags. Its infusion rate was regulated on the basis of capillary and serum glucose determinations. There were no differences between groups in composition of macronutrients in the solution at day 1 (Table 3). Acceptable glycemic control was considered when glycemia was within the 150 –200 mg=dl range. When glucose values were above 200 mg=dl, subcutaneous (s.c.) regular human insulin was administered according to an algorithm. When glucose values were above 200 mg=dl, two-thirds of the s.c. regular human insulin administered over a 24 h period was added to the TPN the following day. If acceptable glycemic control was not met, carbohydrates were reduced in the TPN, and lipids were increased to maintain the caloric content.

The administered carbohydrates were increased if the serum glucose levels were consistently below 200 mg=dl. Patients finished the study when they showed gastrointestinal tolerance of oral or enteral diets. Serum biochemical parameters were evaluated on day 0, then weekly, and on the last day of TPN infusion using an automated technique (Hitachi 717). These determinations included creatinine, glucose, electrolytes and liver function tests.

End points

End points were insulin requirements, number of patients who had glycemia within the 150 – 200 mg=dl range, as recommended (McMahon et al, 1989), and number of days until acceptable glycemic control was reached.

Statistical analysis

Data are expressed as mean standard deviation. The difference of means between the two groups was performed with the Student's t-test for variables with a normal distribution or with Wilcoxon matched-pairs signed-ranks test for abnormal distribution. A P-value below 0.05 was considered significant.

Results

TPN solutions were provided for 11.4 days as a mean (median 8 days, range 5 – 46 days), until the patients showed gastrointestinal tolerance of oral or enteral diets. On the first day of TPN infusion, 42 patients had glycemia above 200 mg=dl, 24 patients in the G group and 18 in the GFX group. Acceptable glycemic control was attained at 2.5 1.7 vs 2.4 2.1 days, respectively, since the beginning of TPN. At the end of treatment, glycemia was below 200 mg=dl in 79.7% of patients, when G (74.6%) or GFX (85.1%) was used. Insulin provided in the TPN bag, 45 19 vs 45 26 UI=day, and carbohydrates, 191 36 vs 187 45 g=day, was similar in both groups. The composition of macronutrients on the last day of TPN infusion is shown in Table 4. There were no differences in daily mean glycemia (Figure 1) nor in total daily insulin requirements, considering subcutaneous insulin and insulin in the TPN bag (Figure 2).

The ratio insulin : body weight (0.69 0.29 vs 0.68 0.41 UI=kg) and insulin : carbohydrates (0.25 0.16 vs 0.31 0.31 UI=g) were similar in the two groups. Insulin requirements were similar between the patients with type 1 diabetes in the G (53 21 UI) and in the GFX group (55 29 UI). Insulin requirements were also similar with type 2 in the G (42 18 UI) and in the GFX group (43 25 UI). There was no differences in insulin needs between type 1 and type 2 diabetic patients in the GFX. group (P ¼ 0.132), but less insulin was required in type 2 diabetes in the G group (P ¼ 0.05).

Table 3 Composition of macronutrients in TPN (3 in 1 admixtures) on day 1 (mean standard deviation)

	G group (n¼71)						GFX group (n¼67)					
	Total			Per kg			Total			Per kg		
Calories (kJ=kcal)	6914	1036=1654	248	103.4	15.5=25.4	4.6	7285	684=1743	166	106.6	10.1=26.4	4.6
Carbohydrates (g)		187 24			2.8 0.5			188 25			2.9 0.7	
Amino acids (g)		84 16			1.3 0.3			90 17			1.4 0.3	
Fat (g)		59 11			0.9 0.2			62 12			0.9 0.2	
Insulin (UI)		51 9			0.5 0.2			32 8			0.5 0.2	

Table 4 Composition of macronutrients in TPN (3 in 1 admixtures) on the last day (mean standard deviation)

	G group (n¼71)						GFX group (n¼67)					
	Total			Per kg			Total			Per kg		
Calories (kJ=kcal)	7043	999=1685	238	105.7	15.0=26.0	4.4	7315	901=1750	218	107.1	13.3=26.5	4.9
Carbohydrates (g)		191 36			2.9 0.7			187 45			2.9 0.9	
Amino acids (g)		83 19			1.3 0.3			89 17			1.5 0.3	
Fat (g)		58 12			0.9 0.2			65 13			0.9 0.2	
Insulin (UI)		45 19			0.7 0.3			45 26			0.7 0.4	

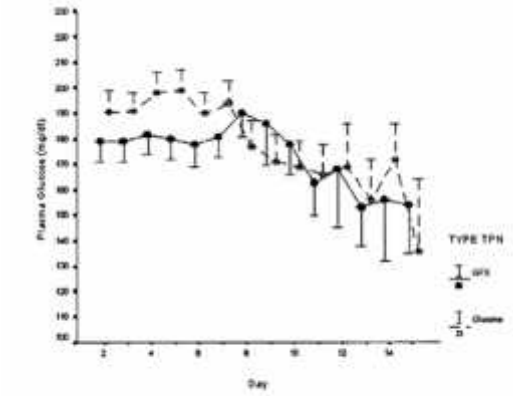

Figure 1 Daily mean values of plasma glucose (mg=dl) for patients with two types of TPN solutions (GFX, solution of glucose-fructose-xylitol 2 : 1 : 1). Results are expressed as mean standard deviation.

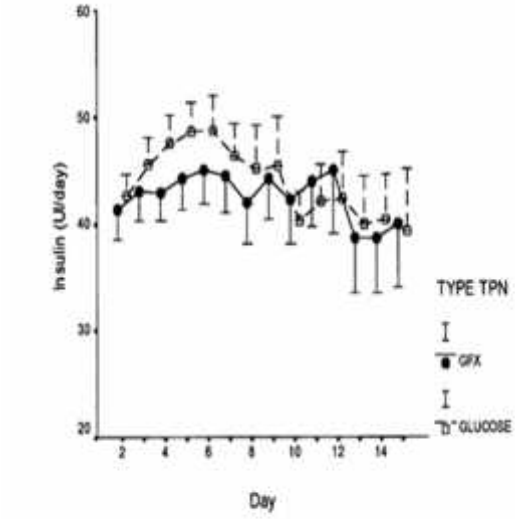

Figure 2 Daily doses of insulin in both groups of treatment. Results are expressed as mean standard deviation.

According to the definition of American College of Chest Physicians=Society of Critical Care Medicine (ACCP=SCCM) Consensus Conference (1992), 26 (18.8%) patients developed severe sepsis during the period of study: 10 patients in the G group (14.1%) and 16 (23.9%) patients in the GFX group. Septic patients in the GFX group received TPN with a slightly higher insulin 4.2 2.4 day in the GFX group (P ¼ 0.190). However, two patients in one group and seven in the other still had a poor glycemic control on the last day of TPN infusion. On the other hand, there were no differences in insulin requirements in the G group between septic and nonseptic patients (P ¼ 0.359), but higher doses of insulin were administered to septic patients in the GFX group ($P < 0.001$). No significant toxicity was seen in our study. Biochemical parameters were similar in both groups of treatment (Table 6). Liver function tests were modified during TPN therapy. In both groups there was a significant increase of alkaline phosphatase and GGT. In the GFX group the frequency of elevated bilirubin at day 1 and on the last day was 13.4%, but in the G group these percentages for the two days were 21.1 and 29.6%, respectively. However, the individual subjects included in these percentages were not identical on day 1 and on the last day. In neither group did any of the patients develop hypoglycemia, ketoacidosis or nonketotic hyperosmolar coma during TPN infusion.

Discussion

The main carbohydrate in the bloodstream is glucose. It is the carbohydrate most frequently used in TPN solutions, but there is an absolute or relative defect in glucose metabolism in

certain pathological conditions, such as premature newborn, critically ill and diabetic patients (Van Eys, 1986).

Table 5 Insulin requirements in nonseptic and septic patients (mean standard deviation)

	G group (n¼71)		GFX group (n¼67)	
	Total	Per kg	Total	Per kg
Nonseptic	44 17*	0.69 0.27	37 17*	0.56 0.31
Septic	50 27[†]	0.69 0.40	72 31[†]	1.04 0.51
P	0.359	0.99	<0.001	<0.001

*P¼0.026; [†]P¼0.084.

Table 6 Serum biochemical parameters at day 1 and at last day of TPN in both groups (mean standard deviation)

	Day 1				Last day			
	G group		GFX group		G group		GFX group	
Glucose (mg=dl)	188	58	189	71	199	77	200	82
Creatinine (mg=dl)	1.1	1.0	1.0	0.7	1.1	0.9	1.0	0.6
Sodium (mEq=l)	135	5	135	5	137	6	137	4
Potassium (mEq=l)	3.8	0.6	3.7	0.7	3.9	0.6	3.9	0.6
Bilirubin (mg=dl)	2.8	6.3	2.2	5.3	3.2	6.4	1.1	1.6
GOT(UI=l)	30	22	30	34	41	58	30	25
GPT(UI=l)	50	75	39	52	46	63	31	25
GGT(UI=l)	138	194	109	165	169	141[†]	157	170*
Alkaline phosphate (UI=l)	283	319	293	419	418	549	337	282*
LDH (UI= l)	162	60	176	73	184	73	180	72

*P < 0.05 between day 1 and last day in GFX group; [†]P < 0.05 between day 1 and last day in G group.

In patients with diabetes mellitus the nutrient requirements (Franz et al, 1994) and indications for TPN (ASPEN Board of Directors, 1993) are supposed to be similar to nondia- betic persons. Diabetic patients have insulin deficiency or insulin resistance or a combination of both. When they receive TPN, hyperglycemia may be a common metabolic complication (McMahon et al, 1989). Glucose infusion should ideally be limited to 3 – 4 mg=kg=min (Ziegler & Smith, 1993) and insulin added to the TPN solution as needed (Michael & Sabo, 1989).

On the other hand, while glucose has many physiologic properties, it also has some metabolic disadvantages. When the rate of glucose infusion is increased, there is a higher oxidation of the glucose to CO_2, with progressively higher respiratory quotients, and increased work of breathing (Askanazi et al, 1982). Excessive administration of carbo- hydrates leads to net lipogenesis in liver and adipose tissue, which replaces net fat oxidation (Quigley et al, 1993; Elwyn, 1987). It is associated with an increase in diet- induced thermogenesis from 6 to 33% (Schutz et al, 1983). Malnourished patients have much less glycogen deposit, lower diet-induced thermogenesis, and higher lipogenesis than normal subjects (Ziegler & Smith, 1993).

To avoid or minimize the detrimental effect of the excess of glucose, it must be administered in lower amounts or other carbohydrate sources should be used. Glucose substitutes used in TPN are fructose, glycerol, sorbitol and xylitol. The parenteral infusion of these substrates has been shown to have several advantages: a rapid metabolism, initially inde- pendent of insulin, a smaller effect on blood glucose con- centration as compared to glucose infusions, an antiketogenic effect

and a less damaging effect on veins (Sestoft, 1985). At the same time, during intravenous infusion of xylitol, glucose and insulin levels remain unchanged (Georgieff et al, 1984). Xylitol and fructose administration is more rapidly followed by a storage of large amounts of glycogen in the liver, compared with that of glucose (Fö er- ster et al, 1972). This will later reduce the need for gluconeogenesis from amino acids (Hessov, 1985). As with fructose, in critically ill experimental animals the infusion of xylitol leads to reduced gluconeogenesis, increased protein and muscle RNA content and improved nitrogen balance (Drews et al, 1992; Ardawi, 1992), but some investigators have failed to show a superiority of xylitol over glucose in rats (Fried et al, 1990).

In humans, the studies of these carbohydrates in comparison with glucose have usually been performed in healthy volunteers or in critically ill patients, but not in diabetic patients. The main goal of our study was to know more about the advantages of these carbohydrates in diabetic patients with and without sepsis. Lev-Ran et al (1987) compared, in a double-blind randomized study, glycerol and glucose given in iso caloric amounts as addition to amino acids for diabetic patients undergoing selective surgery.

The patients treated with glycerol solution required less insulin for the same degree of control of glycemia. These observations have been noted in healthy persons (Tao et al, 1983; Freeman et al, 1983) and in injured patients (Singer et al, 1992). However, during experimental administration of glycerol, hemolysis and hemoglobinuria, acute renal failure, hepatic fat accumula- tion and hypertrygliceridemia have been observed (Oken et al, 1966; Marin et al, 1975) especially when glycerol was administered at rates above than 0.74 g=kg=h (García de Lorenzo et al, 1996).

The mixtures of glucose, fructose and sugar alcohols offer the advantage of providing carbohydrates below their individual dose-limit of utilization and toxicity. The most commonly used combination is glucose, fructose and xylitol in the proportion of 2 : 1 : 1. Plasma glucose levels were significantly higher when glucose was given alone than when given with GFX mixture (Leutenegger et al, 1977; Ladefoged et al, 1982; Ohyanagi, 1994), but these studies did not include diabetic patients.

In the present study we observed no difference in glycemic control or in insulin requirements between the two solutions in diabetic patients. Metabolic control with serum glucose levels below

200 mg=dl was reached at the same period of treatment with G or GFX. In contrast, Leutenegger et al (1977) showed that the mean daily insulin requirements were significantly greater when glucose alone was given. In our study, insulin requirements were similar with both solutions, but nonseptic patients needed less insulin with GFX than with G solutions to attain similar metabolic control. However, septic diabetic patients treated with GFX mixture required higher insulin doses than nonseptic patients with the same treatment and septic patients treated with G. We think that our disagreement with the findings of Leutenegger et al (1977) could be due to the fact that they administered carbohydrates at doses clearly above present recommendations, and they did not include septic patients.

However, some caution should be exercised in evaluating our results; although the statistical differences were very marked, the sample of septic diabetic patients was small. Different toxicities associated with nonglucose carbohy- drates have been observed. Xylitol overdose has caused a few cases of deposits of oxalate crystals in the kidney and brain (Evans et al, 1973; Heye et al, 1991). Administration of large amounts of fructose or xylitol can produce lactic acidosis (Leutenegger et al, 1977; Ladefoged et al, 1982; Danahoe & Powers, 1970). In our series, as Ladefoged et al (1982) have reported, ketoacidosis did not appear during GFX infusion. It has been reported that infusion of these solutions can elicit an elevation in serum bilirubin (Danahoe & Powers, 1970).

However, our results, in agreement with those of other authors (Leutenegger et al, 1977; Ladefoged et al, 1982), show that the infusion of glucose alone or in combination with fructose and xylitol has no influence on bilirubin. Liver enzymes increased in the course of both treatments in a similar way. The major risk associated with the use of nonglucose carbohydrates is the occurrence of life-threatening metabolic complications in hereditary fructose intolerance when this sugar is administered. If this disease is suspected, fructose solutions should not be used.

Pharmacoeconomic issues must also be taken into con- sideration. The combined sugar solutions are more expen- sive than glucose alone. In our center, the cost of glucose is 0.138 Euros per 100 g and GFX 0.243 Euros per 100 g of 2 : 1 : 1 mixture.

In conclusion, insulin requirements are similar with TPN based on GFX or G alone in diabetic patients. No major

adverse events have been associated with their use in our patients. GFX mixtures could be beneficial to attain gly- cemic control in nonseptic diabetic patients, although in our series its use in a small sample of septic patients was very disappointing. In consequence, additional studies specifically focused on the potential benefits of alternative carbo- hydrates in diabetic patients with and without sepsis are required. Glucose is still more widely accepted and cheaper as the carbohydrate substrate in TPN and it should be the first choice until further studies are performed.

References

American College of Chest Physicians=Society of Critical Care Medicine Consensus Conference (1992): Definitions for sepsis and organ failure and guidelines for the use of innovate therapies in sepsis. Chest 101,1644 – 1655.

Ardawi MS (1992): Effects of xylitol and=or glutamine supplemented parenteral nutrition on septic rats. Clin. Sci. 82, 419 – 427.

Askanazi J, Weissman C, Rosenbaum SH et al (1982): Nutrition and the respiratory system. Crit. Care Med. 10, 163 – 173.

ASPEN Board of Directors (1993): Guidelines for the use of parenteral and enteral nutrition in adults and pediatric patients. J. Parent. Enter. Nutr.17(Suppl 1), 1SA – 52SA.

Danahoe JF & Powers RJ (1970): Biochemical abnormalities with xylitol.New Engl. J. Med. 282, 690.

Drews D et al (1992): Effect of excess xylitol on nitrogen and glucose metabolism in the parenterally fed rats. J. Parent. Enter. Nutr. 16, 521 – 524.

Elwyn DH (1987): The unique role of glucose in artificial nutrition: impact of injury and malnutrition. Clin. Nutr. 7, 195 – 202.

Evans GW, Philip G, Mukherjee TM, Snow MR & Lawrence JR (1973): Identification of crystals deposited in brain and kidney after xylitol administration by biochemical, histochemical and electron diffraction methods. J. Clin. Pathol. 26, 32 – 36.

Fö erster H, Meyer E & Ziege M (1972): Hepatische glykogensynthese in abbaengigket von der blut glucosekozentration bein narkotisierten ratten. Klin. Wochensschr. 50, 478 – 480.

Franz MJ, Horton ESS, Bantle JP et al (1994): Nutrition principles for the management of diabetes and related complications. (Technical review.) Diabetes Care 17, 490 – 518.

Freeman JB, Fairfull-Smith R, Rodman GH et al (1983): Safety and efficacy of a new peripheral intravenously administered amino acid solution containing glycerol and electrolytes. Surg. Gynecol. Obstet. 156, 625 – 631.

Fried RC, Mullen JL, Blackburn GL et al (1990): Effects of nonglucose substrates (xylitol, medium-chain triglycerides, long-chain triglycer- ides) and carnitine on nitrogen metabolism in stressed rats. J. Parent. Enter. Nutr. 14, 134 – 138.

García de Lorenzo A, Culebras JM, Zarazaga A & Rodriguez Montes JA (1996): Hidratos de carbono — no glucosa — en nutrició n parenteral. Concepto periclitado? Nutr. Hosp. 1, 17 – 28.

Georgieff M, Maldawer LL, Bristian BR et al (1984): Xylitol, an energy source for intravenous nutrition after trauma. J. Parent. Enter. Nutr. 9,199 – 209.

Hessov I (1985): Which carbohydrates should we recommend for intra-venous nutrition? Acta Anaesthesiol. Scand. 29, 30 – 31.

Heye J et al (1991): Oxalate induced encephalitis after infusions of sugar surrogates. Intensive Care Med. 17, 432 – 434.

Ladefoged K, Berthelsen P, Brockner-Nielsen J, Jarnum S & Larsen V (1982): Fructose, xylitol and glucose in total parenteral nutrition. Intensive Care Med. 8, 19 – 23.

Leutenegger AF et al (1977): Comparison between glucose and a combi- nation of glucose, fructose and xylitol as carbohydrates for total parenteral nutrition of surgical intensive care patients. Am. J. Surg. 133, 199 – 205.

Lev-Ran A, Johnson M, Hwang DL, Askanazi J, Weissman C & Gersovith M (1987): Double-blind study of glycerol vs glucose in parenteral nutrition of postsurgical insulin-treated diabetic patients. J. Parent. Enter. Nutr. 11, 271 – 274.

Marin KA, McMullen JJ, Butler DP et al (1975): Dietary glycerol-induced fat accumulation in rat livers. Nutr. Int. 12, 209 – 211.

McMahon M, Nanjo N, Driscoll DF & Bristian BR (1989): Parenteral nutrition in patients with diabetes mellitus: theoretical and practical considerations. J. Parent. Enter. Nutr. 13, 545 – 553.

Michael SR & Sabo CE (1989): Management of the diabetic patients receiving nutritional support. Nutr. Clin. Pract. 4, 179 – 183.

Ohyanagi H (1994): Carbohydrate metabolism in parenteral nutrition. Nutrition 10(Suppl 5), 517 – 518.

Oken DE, Arie ML & Wilson DR (1966): Glycerol-induced hemoglobi- nuric acute renal failure in the rat: micropuncture study of the devel-opment of oliguria. J. Clin. Invest. 45, 724 – 735.

Quigley EMM, Marsh MN, Shaffer JL & Markin RS (1993): Hepatobiliary complications of total parenteral nutrition. Gastroenterology 104, 286 – 301.

Schutz Y, Thiebaud D, Acheson KJ, Felber JP, Defronzo RA & Jequier E (1983): Thermogenesis infusions in healthy young men. Clin. Nutr. 2,93 – 96.

Sestoft L (1985): An evaluation of biochemical aspects of intravenous fructose, sorbitol and xylitol administration in man. Acta Anaesthesiol. Scand. 29, 19 – 29.

Singer P, Burzstein S, Kirvelä A et al (1992): Hypercaloric glycerol in injured patients. Surgery 112, 509 – 511.

Tao RC, Kelley RE, Toshimura NN et al (1983): Glycerol: its metabolism and use as intravenous energy source. J. Parent. Enter. Nutr. 7, 479 –488.

Tighe AP, Allison DB, Kral JG & Heymsfield SB (1993): Nutritional support of obese patients. In: Clinical Nutrition: Parenteral Nutrition, 2nd edn, ed. JL Rombeau & MD Caldwell, pp 716 – 736. Philadelphia, PA: WB Saunders.

Valero MA, Alegre E, Gomis P, Moreno JM, Miguelez S & Leó n-Sanz M (1996): Clinical management of hyperglycaemic patients receiving total parenteral nutrition. Clin. Nutr. 15, 11 – 15.

Van Eys (1986): Nonglucose carbohydrates in parenteral nutrition. In: Clinical Nutrition: Parenteral Nutrition, 1st edn, ed. JL Rombeau & M Caldwell, pp 198 – 209. Philadelphia, PA: WB Saunders.

Ziegler TM & Smith RJ (1993): Parenteral nutrition in patients with diabetes mellitus. In: Clinical Nutrition. Parenteral Nutrition, 2nd edn, ed. JL Rombeau & M Caldwell, pp 649 – 666. Philadelphia, PA: WB Saunders.

DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT IN TYPE 2 DIABETES: A JOINT POSITION STATEMENT OF THE AMERICAN DIABETES ASSOCIATION, THE AMERICAN ASSOCIATION OF DIABETES EDUCATORS, AND THE ACADEMY OF NUTRITION AND DIETETICS

Ceu An Binti Ahmad[1] Joan Bardsley,[2] Marjorie Cypress,[3] Paulina Duker,[4] Martha M. Funnell,[5] Amy Hess Fischl,[6] Melinda D. Maryniuk,[7] Linda Siminerio,[8]

[1]Mahsa University of Malaysia, [2]MedStar Health Research Institute and MedStar Nursing, Hyattsville, MD, [3]ABQ Health Partners, Albuquerque, NM, [4]Lifescan, a Johnson & Johnson Diabetes Solutions Company, Dubai, United Arab Emirates, [5]University of Michigan Medical School, Ann Arbor, MI, [6]University of Chicago, Chicago, IL, [7]Joslin Diabetes Center, Boston, MA, [8]School of Medicine, University of Pittsburgh, Pittsburgh, PA

Diabetes is a chronic disease that requires a person with diabetes to make a multitude of daily self-management decisions and to perform complex care activities**.** Diabetes selfmanagement education resources and a systematic referral process to ensure that patients with type 2 diabetes receive both DSME and DSMS in a consistent manner. The initial DSME is typically provided by a health professional, whereas ongoing support can be provided by personnel within a practice and a variety of community-based resources. DSME/S programs are designed to address the patient's health beliefs, cultural needs, current knowledge, physical limitations, emotional concerns, family support, financial status, medical history, health literacy, and support (DSME/S) provides the foundation to help people with diabetes to navigate these decisions and activities and has been shown to improve health outcomes (1–7). Diabetes self-management education (DSME) is the process of facilitating the knowledge, skill, and ability necessary for diabetes self-care.

Diabetes self-management support (DSMS) refers to the support that is required for implementing and sustaining coping skills and behaviors needed to self-manage on an ongoing basis. (See further definitions in Table 1.) Although different members of the health care team and community can contribute to this process, it is important for health care providers and their practice settings to have the DSME/S at diagnosis and as needed thereafter (8). This position statement focuses on the particular needs of individuals with type 2 diabetes. The needs will be similar to those of people with other types of diabetes (type 1 diabetes, prediabetes, and gestational diabetes mellitus); however, the research and examples

referred to in this article focus on type 2 diabetes. The goals of the position statement are ultimately to improve the patient experience of care and education, to improve the health of individuals and populations, and to reduce diabetes associated per capita health care costs (9). The use of the diabetes education algorithm presented in this position statement defines when, what, and how DSME/S should be provided for adults with type 2 diabetes.

Benefits Associated with DSME/S

DSME/S has been shown to be cost-effective by reducing hospital admissions and readmissions (10–12), as well as estimated lifetime health care costs related to a lower risk for complications (13). Given that the cost of diabetes in the U.S. in 2012 was reported to be $245 billion (14), DSME/S offers an opportunity to de- crease these costs (11,12). It has been projected that one in three individuals will develop type 2 diabetes by 2050, clinical, psychosocial, and behavioral aspects of diabetes. DSME/S is (15). The U.S. health care system will be unable to afford the costs of care unless incidence rates and diabetes- related complications are reduced.

DSME/S improves hemoglobin A_{1c} (HbA_{1c}) by as much as 1% in people with type 2 diabetes (3,7,16–20). Besides this important reduction, DSME has a positive effect on other reported to reduce the onset and/or advancement of diabetes complications (21,22), to improve quality of life (19,23–26) and lifestyle behaviors such as having a more healthful eating pattern and engaging in regular physical activity (27), to enhance self-efficacy and empowerment (28), to increase healthy coping (29), and to decrease the presence of diabetes related distress (16,30) and depression (31,32). These improvements clearly reaffirm the importance and value-added benefit of DSME. In addition, better outcomes have been shown to be associated with the amount of time spent with a diabetes educator (3,4,7,11).

TABLE 1. Key Definitions

DSME (35)
- The ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self-care.
- This process incorporates the needs, goals, and life experiences of the person with diabetes or prediabetes and is guided by evidence-based research.
- The overall objectives of DSME are to support informed decision making, self-care behaviors, problem solving, and active collaboration with the health care team and to improve clinical outcomes, health status, and quality of life.

Note: CMS uses the term "training" instead of "education" when defining the reimbursable benefit (DSMT); the authors of this position statement use the term "education" (DSME) as reflected in the National Standards. In the context of this article, the terms have the same meaning.

Ongoing DSMS (35)
- Activities that assist the person with diabetes in implementing and sustaining the behaviors needed to manage his or her condition on an ongoing basis.
- The type of support provided can be behavioral, educational, psychosocial, or clinical.

Patient-centered care (69)
- Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.

Shared decision making
- Eliciting patient perspectives and priorities and presenting options and information so patients can participate more actively in care. Shared decision making is a key component of patient-centered care (43,77) and has been shown to improve clinical, psychosocial, and behavioral outcomes (78).

Diabetes-related distress (29,61)
- This refers to the negative emotional responses (overwhelmed, hopeless, and helpless) and perceived burden related to diabetes.

CDE (79)
- A health professional who has completed a minimum number of hours in clinical diabetes practice, passed the Certification Examination for Diabetes Educators (administered by the National Certification Board for Diabetes Educators [NCBDE]), and has responsibilities that include the direct provision of diabetes education.

BC-ADM (80)
- A health care professional who has completed a minimum number of hours in advanced diabetes management, holds a graduate degree, passed the BC-ADM certification exam (administered by the NCBDE), and has responsibilities of an increased complexity of decision making related to diabetes management and education.

This position statement arms health care teams with the information required to better understand the educational process and expectations for DSME and DSMS and their integration into routine care. The ultimate goal of the process is a more engaged and informed patient (33). It is recommended that all health care providers and/or systems develop processes to guarantee that all patients with type 2 diabetes receive DSME/S services and ensure that adequate resources are available in their respective communities to support these services.

Providing Diabetes Education and Support

Historically, DSME/S has been provided through a formal program where patients and family members participate in an outpatient service conducted at a hospital/health facility. In keeping with evolving health care delivery systems and in meeting the needs of primary care, DSME/S is now being incorporated into of- fice practices, medical homes, and accountable care organizations. Receiving DSME/S in alternative and convenient settings, such as community health centers and pharmacies, and through technology-based pro- grams is becoming more available and affords increased access.

Regardless of the setting, communicating the information and supporting skills that are necessary to promote effective coping and selfmanagement required for day to day living with diabetes necessitate a personalized and comprehensive approach. Effective delivery involves experts in educational, clinical, psychosocial, and behavioral diabetes care (34,35). Clear communication and effective collaboration among the health care team that includes a provider, an educator, and a person with diabetes are critical to ensure that goals are clear, that progress toward goals is being made, and that appropriate interventions (edu- cationa l, psychosocia l, medica l, and/or behavioral) are being used. A patient-centered approach to DSME/S at diagnosis provides the foundation for current and future needs. Ongoing DSME/S can help the person to overcome barriers and to cope with the ongoing demands in order to facilitate changes during the course of treatment and life transitions.

Reimbursement, National Standards, and Referral

Reimbursement for DSME/S is available from the Centers for Medicare and Medicaid Services (CMS) and many private payers. Additional dis- cipline-specific counseling, such as medical nutrition therapy (MNT) provided by a

registered dietitian nu- tritionist, medication therapy man- agement delivered by pharmacists, and psychosocial counseling offered by mental health professionals, is also reimbursed through CMS and/or third-party payers (35,36).

TABLE 2. National Standards for DSME/S: 10 Standards

1. **Internal structure.** The organizational structure or system that supports self-management education; necessary for sustainability and ongoing self-management education and support.
2. **External input.** Ensures that providers of DSME will seek input from external stakeholders and experts to promote program quality.
3. **Access.** A system of assuring periodic reassessment of the population or community receiving self-management education to ensure that identified barriers to education are addressed.
4. **Program coordination.** The designation of an individual with responsibility for coordinating all aspects of self-management education (even if that person is the solo instructor).
5. **Instructional staff.** Identifies who can participate in the delivery of self-management education, recognizing the unique skill set of all potential providers of self-management education.
6. **Curriculum.** A set of written guidelines, including topics, methods, and tools to facilitate education for all people with diabetes; exactly what is taught will be based on patient's needs, preferences, and readiness.
7. **Individualization.** Instructor(s) will assess the patient to determine an individualized education and support plan focused on behavior change.
8. **Ongoing support.** A follow-up plan for ongoing support will be developed by the patient and instructor; communication among the team regarding goals, outcomes, and ongoing needs is essential.
9. **Participant progress.** Ongoing measurement of patient self-efficacy and success in self-management and achievement of goals; designed to continually assess needed support.
10. **Quality improvement.** Incorporation of systems to continuously look for ways to evaluate DSME/S effectiveness and to identify areas for improvement.

Adapted with permission from Haas et al. (35).

In order to be eligible for DSME/S reimbursement, DSME/S programs must be recognized or accredited by a CMS designated nationa l accreditation organization (NAO). Current NAOs are the ADA and the American Association of Diabetes Educators (A A DE). Both bodies assess the quality of programs using criteria established by the National Standards for DSME/S (Table 2) (35). Currently, CMS reimburses for 10 program hours of initial diabetes education and 2 hours in each subsequent year. Referrals for DSME/S must be made by a health care provider and include specified indicators, such as diabetes type, treatment plan, and reason for referral. Sample refer- ral forms with information needed for reimbursement are available on the ADA Website (http://professional.diabetes.org/Recognition.aspx? typ =15&cid=93574) and the AADE Web site (http://w w w.diabeteseducator.org/export/sites/aade/_resources/pdf/general/Diabetes_Services_Order_ Form_v4.pdf).

According to the National Standards for DSME/S, at least one instructor responsible for designing and planning DSME/S must be a nurse, dietitian, pharmacist, or other trained or credentialed health profes- sional (a certified diabetes educator [CDE] or health care professional with Board Certified Advanced Diabetes Management [BC-ADM] certification) (Table 1) who

meets specific competency and continuing education requirements (35). This person is considered the primary instructor. Others can contribute to DSME and provide support with appropriate training and supervision. Trained community health workers, practice-based care managers, peers, and other support persons (e.g., family members, social workers, and mental health counselors) have a role in helping to sustain the benefits gained from DSME (37– 41). Such staff/resources can be especially helpful in areas with diverse populations and serve as cultural navigators in health care systems and as liaisons to the community.

As an alternative to a referral to a formal DSME/S program, office-based health care teams can explore partnerships with educators within their community or assume responsibility for providing and/or coordinating some or all of the patient's diabetes education and support needs. Although this approach requires knowledge, time, and resources to effectively provide education, it offers a unique opportunity to reach patients at the point of care. This position statement and the National Standards for DSME/S are designed to serve as a resource for the health care team. Although reimbursement for education services is somewhat limited, financial benefits can be realized when an office-based program contributes to improved practice processes and patients' achievement of outcomes that can influence mandated quality measures.

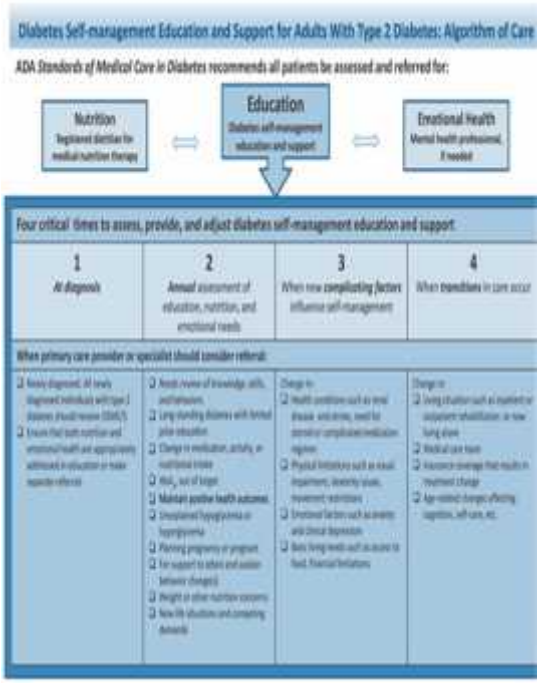

Figure 1. DSME and DSMS algorithm of care.

Figure 2. Content for DSME and DSMS at four critical time points.

Diabetes Education Algorithm

The diabetes education algorithm provides an evidence-based visual de- piction of when to identify and refer individuals with type 2 diabetes to DSME/S (Figs. 1 and 2) (figures are also available as a slide set at professional.diabetes.org/dsmeslides). The algorithm defines four critical time points for delivery and key informa tion on the self-management skills that are necessary at each of these critical periods. The diabetes educa- tion algorithm can be used by health care systems, staff, or teams, as well as individuals with diabetes, to guide when and how to refer to and deliver/ receive diabetes education.

Guiding Principles and Patient-Centered Care

The algorithm relies on five guid- ing principles and represents how DSME/S should be provided through patient engagement, information sharing, psychosocial and behavioral support, integration with other therapies, and coordinated care (Table 3). Associated with each principle are key elements that offer specific sugges- tions regarding interactions with the patient and topics to address at dia- betes-related clinical and educational encounters (Table 3).

Helping people with diabetes to learn and apply knowledge, skills, and behavioral, problemsolving, and coping strategies requires a delicate balance of many factors. There is an interplay between the individual and the context in which he or she lives, such as clinical status, culture, values, family, and social and community environment. The behaviors involved in DSME/S are dynamic and multidimensional (42). In a patient-centered approach, collaboration and effective communication are considered the route to patient engagement (43–45).

This approach includes eliciting emotions, perceptions, and knowledge through active and reflective listening; asking open-ended questions; explor ing the desire to learn or change; and supporting self-efficacy (44). Through this approach, patients are better able to explore options, choose their own course of action, and feel empowered to make informed self-management decisions (45,46). Table 4 provides a list of patient-centered assessment questions that can be used at diagnosis and at other encounters to guide the education and ongoing support process.

TABLE 4. Sample Questions to Guide a Patient-Centered Assessment (82)

- How is diabetes affecting your daily life and that of your family?
- What questions do you have?
- What is the hardest part right now about your diabetes, causing you the most concern or most worrisome to you about your diabetes?
- How can we best help you?
- What is one thing you are doing or can do to better manage your diabetes?

TABLE 3. Guiding Principles and Key Elements of Initial and Ongoing DSME/S (45,50,51)

Engagement. Provide DSME/S and care that reflects persons' life, preferences, priorities, culture, resources, and capacity

- Solicit and respond to questions
- Focus on decisions, reasons for the decisions, and results
- Ask about strengths and challenges
- Use shared decision making and principles of person-centered care to guide each visit
- Engage the patient in a dialogue about current self-management successes, concerns, and struggles
- Engage the patient in a dialogue about therapy and changes in treatment
- Remain "curious, neutral" and support patient identifying solution(s)
- Provide support and education to patient's family and caregiver

Information sharing. Determine what the patient needs to make decisions about daily self-management

- Discuss that DSME/S is an important and essential part of diabetes management
- Describe that DSME/S is needed throughout the life cycle and is on a continuum from prediabetes, newly diagnosed diabetes, health maintenance/follow-up, early to late diabetes complications, and transitions in care related to changes in health status and developmental or life changes
- Avoid being didactic
- Provide "need-to-know" information and avoid providing the encyclopedia on diabetes
- Review that diabetes treatment will change over time
- Provide information to the patient using the above engagement key elements
- Take advantage of "teachable moments" to provide information specific to the patient's care and treatment
- Assess DSME/S patient (family) needs for the behavioral and psychosocial aspects of informed decision making

Psychosocial and behavioral support. Address the psychosocial and behavioral aspects of diabetes

- Assess and address emotional and psychosocial concerns, such as diabetes-related distress and depression
- Present that diabetes-related distress and a range of emotions are common and that stress can raise blood glucose and blood pressure levels
- Discuss that diabetes self-management is challenging but worth the effort
- Support self-efficacy and self-confidence in self-management decisions and abilities
- Support action by the patient to identify self-management problems and develop strategies to solve those problems, including self-selected behavioral goal setting
- Note that it takes about 2–3 months to change a habit/learn/apply behavior
- Address the whole person
- Include family members and/or support systems in the educational and ongoing support process
- Refer to community, online, and other resources

Integration with other therapies. Ensure integration and referrals with and for other therapies

- Ensure access to ongoing DSME/S
- Recommend additional referrals as needed for behavioral therapy, medication management, physical therapy, etc.
- Address factors that limit the application of diabetes self-management activities
- Advocate for easy access to social services programs that address basic life needs and financial resources
- Identify resources and services that support the implementation of therapies in health care and community settings

Coordination of care across specialty care, facility-based care, and community organizations. Ensure collaborative care and coordination with treatment goals

- Understand primary care provider and specialist's treatment targets
- Provide overview of DSME/S to referring providers
- Follow medication adjustment protocols or make necessary recommendations to primary care provider
- Correspond with referring provider about education plan, progress toward treatment goals, and needs to coordinate education and support from entire clinical team; ensure documentation in the health record
- Ensure provision of culturally appropriate care
- Use evidence-based decision support
- Use performance data to identify opportunities for improvement

Critical Times to Provide Diabetes Education and Support

There are four critical times to assess, provide, and adjust DSME/S (47): 1) with a new diagnosis of type 2 diabetes, 2) annually for health maintenance and prevention of complications, 3) when new complicating factors in- fluence self-management, and 4) when transitions in care occur (Figs. 1 and 2). Although four distinct time-related opportunities are listed, it is import- ant to recognize that type 2 diabetes is a chronic condition and situations can arise at any time that require additional attention to self-management needs. Whereas patient's needs are continuous (Fig. 1), these four critical times demand assessment and, if needed, intensified reeducation and self-management planning and support.

The A ADE7 Self-Care Behaviors provide a framework for identifying topics to include at each time: healthy eating, being active, monitoring, taking medication, problem solving, reducing risks, and healthy coping. The educational content listed in each box in Fig. 2 is not intended to be all-inclusive, as specific needs will depend on the patient.

However, these topics can guide the educational assessment and plan. Mastery of skills and behaviors takes practice and experience. Often a series of ongoing education and support visits are necessary to provide the time for a patient to practice new skills and behaviors and to form habits that support self-management goals.

1. New Diagnosis of Diabetes

The diagnosis of diabetes is often overwhelming (48). The emotional response to the diagnosis can be a significant barrier for education and self-management. Education at diag- nosis should focus on safety concerns (some refer to this as survival-level education) and "what do I need to do once I leave the doctor's office or hospital." To begin the process of coping with the diagnosis and incorporating self-management into daily life, a diabetes educator or someone on the care team should work closely with the individual and his or her family members to answer immediate questions, to address initial concerns, and to provide support and referrals to needed resources.

At diagnosis, important messages should be communicated that include acknowledgment that all types of diabetes need to be taken seriously, complications are not inevitable, and a range of emotional responses is common. Educators shou ld also emphasize the importance of involving family members and/or significant others and of ongoing education and support. The patient should understand that treatment will change over time as type 2 diabetes progresses and that changes in therapy do not mean that the patient has failed. Finally, type 2 diabetes is largely self-managed and DSME and DSMS involve trial and error. The task of self-management is not easy, yet worth the effort (49).

Other diabetes education topics that are typically covered during the visits at the time of diagnosis are treatment targets, psychosocial concerns, behavior change strategies (e.g., self-directed goal setting), taking medications, purchasing food, planning meals, identifying portion sizes, physical activity, checking blood glucose, and using results for pattern management.

At diagnosis of type 2 diabetes, education needs to be tailored to the individual and his or her treatment plan. At a minimum, plans for nutrition therapy and physical activity need to be addressed. Based on the patient's medication and mon- itoring recommendations, themes such as hypoglycemia identification and treatment, interpreting glucose results, risk reduction, etc. may need to be considered. Patients are supported when personalized edu- cation and self-management plans are developed in collaboration with the patients and their primary care provider. Depending on the quali- fications of the diabetes educator or staff member facilitating these steps, additional referrals to a registered dietitian nutritionist for MNT, mental health provider, or other specialist may be needed.

Individua ls requiring insulin should receive additional education so that the insulin regimen can be coordinated with the patient's eating pattern and physical activity habits (50,51). Patients presenting at the time of diagnosis with diabetes-related complications or other health issues may need additional or reprioritized education to meet specific needs.

2. Annual Assessment of Education, Nutrition, and Emotional Needs

The health care team and others can help to promote the adoption and maintenance of new diabetes manage- ment tasks (52), yet sustaining these behaviors is frequently difficult. Thus, annual assessments of knowledge, skills, and behaviors are necessary for those who do meet the goals as well as for those who do not.

Annual visits for diabetes education are recommended to assess all areas of self-management, to review behavior change and coping strategies and problem solving skills, of living with diabetes, and to make adjustments in therapy (35,52). The primary care provider or clinical team can conduct this review and refer to a DSME/S program as indicated. More frequent DSME/S visits may be needed when the patient is starting a new diabetes medication or experiencing unexplained hypoglycemia or hyperglycemia, goals and targets are not being met, clinical indicators are worsening, and there is a need to provide preconception planning. Importantly, the educator is charged with communicating the revised plan to the referring provider.

Family members are an underuti- lized resource for ongoing support and often struggle with how to best provide this help (53,54). Including family members in the DSME/S process on at least an annual basis can help to facilitate their positive involvement (55–57).

Since the patient has now expe- rienced living with diabetes, it is important to begin each maintenance visit by asking the patient about suc- cesses he or she has had and any concerns, struggles, and questions. The focus of each session should be on patient decisions and issues what choices has the patient made, why has the patient made those choices, and if those decisions are helping the patient to attain his or her goals not on perceived adherence to recommendations. Instead, it is important for the patient/family members to deter- mine their clinical, psychosocial, and behavioral goals and to create realistic action plans to

achieve those goals. Through shared decision making, the plan is adjusted as needed in collaboration with the patient. To help to reinforce plans made at the visit and support ongoing self-management, the patient should be asked at the close of a visit to "teach-back" what was discussed during the session and to identify one specific behavior to target or prioritize (58)

3. Diabetes-Related Complications and Other Factors Influencing Self-management

The identification of diabetes complications or other patient factors that may influence self-management should be considered a critical in- dicator for diabetes education that requires immediate attention and adequate resources. During routine medical care, the provider may iden- tify factors that influence treatment and the associated self-management plan. These factors may include the patient's ability to manage and cope with diabetes complications, other health conditions, medications, phys- ical limitations, emotional needs, and basic living needs. These factors may be identified at the initial diabetes encounter or may arise at any time. Such patient factors influence the clinical, psychosocial, and behavioral aspects of diabetes care.

The diagnosis of additional health conditions and the potential need for additional medications can compli- cate self-management for the patient. Diabetes education can address the integration of multiple medical con- ditions into overall care with a focus on maintaining or appropriately adjusting medication, eating plan, and physical activity levels to max- imize outcomes and quality of life. In addition to the introduction of new self-care skills, effective coping, defined as a positive attitude toward diabetes and self-management, pos- itive relationships with others, and quality of life, can be addressed in DSME/S (29). Additional and focused emotional support may be needed for anxiety, stress, and diabe- tes-related distress and/or depression.

Diabetes-related health conditions can cause physical limitations, such as visual impairment, dexterity issues, and physical activity restrictions. Diabetes educators can help patients to manage limitations through education and various support resources. For example, educators can help patients to access large-print or talking glucose meters that benefit those with visual impairments and specialized aids for insulin users that can help those with visual and/or dexterity limitations.

Psychosocial and emotional factors have many contributors and include diabetes-

related distress, life stresses, anxiety, and depression. In fact, these factors are often considered complica- tions of diabetes and result in poorer diabetes outcomes (59,60).

Diabetes related distress (see definition in Table 1) is particularly common, with prev- alence rates of 18% to 35% and an 18- month incidence of 38% to 48% (61). It has a greater impact on behav- ioral and metabolic outcomes than does depression (61). Diabetes-related distress is responsive to intervention, including DSME/S and focused attention (30). Although the National Standards for DSME/S include the development of strategies to address psychosocial issues and concerns (35), additional mental health resources are generally required to address severe diabetes-related distress, clinical depression, and anxiety.

Social factors, including difficulty paying for food, medications, mon- itoring and other supplies, medical care, housing, or utilities, negatively affect metabolic control and increase resource use (62). When basic living needs are not met, diabetes self-management becomes increasingly difficult. Basic living needs include food security, adequate housing, safe environment, and access to medica- tions and health care. Education staff can address such issues, provide infor- mation about available resources, and collaborate with the patient to create a self- management plan that reflects these challenges.

If complicating factors are present during initial education or a maintenance session, the DSME/S educators can either directly address these factors or arrange for additional resources. However, complicating fac- tors may arise at any time; providers should be prepared to promptly refer patients who develop complications and ongoing support.

4. Transitional Care and Changes in Health Status

Throughout the life span, changes in age, health status, living situation, or health insurance coverage may require a reevaluation of the diabetes care goals and self-management needs. Critical transition periods include transitioning into adulthood, hospitalization, and moving into an assisted living facility, skilled nursing facility, correctional facility, or rehabilitation center.

DSME/S affords important benefits to patients during a life transition. Providing input into the development of practical and realistic self-management and treatment plans can be an effective asset for successful navigation of changing situations. A written plan prepared in collaboration with diabetes educators, the

patient, family members, and caregivers to identify deficits, concerns, resources, and strengths can help to promote a successful transition. The plan should include personalized diabetes treatment targets; a medical, educational, and psychosocial history; hypo and hyperglycemia risk factors; nutritional needs; resources for additional support; and emotional considerations (63,64).

The health care provider can make a referral to a diabetes educator to develop or provide input to the transition plan, provide education, and support successful transitions. The goal is to minimize disruptions in therapy during the transition, while addressing clinical, psychosocial, and behavioral needs.

MNT as an Adjunct to DSME/S Programs

The National Standards for DSME/S list "incorporating nutritional management into lifestyle" as one of nine core topics in a comprehensive pro- gram (35). Some DSME/S programs include MNT services delivered by a registered dietitian nutritionist, whereas other programs provide basic nutrition guidance and rely on referrals for MNT. DSME/S referral forms often include referral for MNT to help to coordinate care (ADA and AADE referral forms). The ADA publishes nutrition recommendations that detail nutrition therapy goals and nutrition and eating pattern recommendations (65). All members of the health care team should be versed in the basic principles of diabetes nutrition therapy so that they can facilitate basic meal planning, clarify misconceptions, and/or provide reinforcement of the nutrition plan developed collaboratively by the registered dietitian nutritionist and the patient (Table 5).

Overcoming Barriers That Limit Access and Receipt of DSME/S

The number of people with type 2 diabetes who receive DSME/S, despite its proven benefits, is low. For example, only 6.8% of individuals with newly diagnosed type 2 diabetes with private health insurance participated in DSME/S within 12 months of diagnosis (66). Furthermore, only 4% of Medicare participants received DSME/S and/or MNT (4). To increase the number of individuals with diabetes who receive DSME/S services described in this position statement, it is necessary to consider the barriers that currently limit provision. Barriers are associated with a number of fac tors including the health system, the individual health care professional, community resources, and the individual with diabetes. Barriers can include a

misunderstanding of the ne- cessity and effectiveness of DSME/S, confusion regarding when and how to make referrals, lack of access to DSME/S services, and patient psy- chosocial and behavioral factors (67). Provider misconceptions that can limit access to DSME/S include a misunderstanding of reimbursement issues and the misconception that one or a few initial education visits are adequate to provide patients with the skills needed for lifelong self-management. Lack of or poor reimbursement for DSME/S also can hamper patients' participation. Even when DSME/S programs are operating at peak service, they of- ten struggle to cover costs making it easy to eliminate programs despite their wider influence on reducing costs and improving health outcomes (13).

Although people with diabe tes report wanting to be actively engaged in their health care, most indicate that they are not actively engaged by their providers and that education and psychological services are not readily available (68). In order to enhance patient and family engagement in DSME/S, provider communication about the necessity of self-management to achieve treatment and quality-of-life goals and the essential nature of both DSME and ongoing support throughout a life- time of diabetes is essential (Table 3).

Removing barriers to access and increasing quality care can be achieved by using data to coordinate care and build workforce capacity (69). The U.S. health care paradigm is changing with increased attention on primary care practices, technol- ogy, and quality measures (70). Studies have shown that imple- menting DSME programs that directly connect with primary care and rely on technology is effective in improving clinical, psychosocial, and behavioral outcomes (16,71–74). Patients receiv ing care in these practice settings report more confidence in provider communication and satisfaction with direct access to an educator for infor- mation and ongoing support (16).

Despite the proven value and effectiveness of diabetes education and support services, one of the big- gest looming threats to their success is low utilization, which has recently forced many such programs to close. The current reimbursement model and mandate for provider referrals will continue to be limiting factors for access to and participation in DSME/S. The health care community needs processes that support referrals and reimbursement prac- tices, otherwise it will be increasingly more difficult to sustain DSME/S services. Attention to these challenges needs to be met

to provide access particularly for areas such as rural and underserved communities.

Conclusion

Diabetes is a complex and burden- some disease that requires the person with diabetes to make numerous daily decisions regarding food, physical activity, and medications. It also necessitates that the person be proficient in a number of self-management skills (35,75,76). In order for people to learn the skills necessary to be effective self-managers, DSME is critical in laying the foundation with ongoing support to maintain gains made during education. Despite proven benefits and general acceptance, the numbers of patients who are referred to and receive DSME/S are disap- pointingly small. This position state- ment and algorithm provide the evi- dence and strategies for the provision of education and support services to all adults living with type 2 diabetes. It is imperative that the health care community, responsible for deliver- ing quality care, mobilizes efforts to address the barriers and explores re- sources for DSME/S in order to meet the needs of adults living with and managing type 2 diabetes.

Acknowledgments

The authors gratefully acknowledge the commitment and support of the collaborating organizations the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics; their colleagues, including members of the Executive Committee of the National Diabetes Education Program, who participated in discussions and reviews about this inaugural position statement; and patients who teach and inspire them. The authors also thank Erika Gebel Berg (American Diabetes Association) for her invaluable editorial contribution.

Duality of Interest

No potential conflicts of interest relevant to this article were reported.

References

1. Brunisholz KD, Briot P, Hamilton S, et al. Diabetes self-management education improves quality of care and clinical outcomes determined by a diabetes bundle measure. J Multidiscip Healthc 2014;7:533–542
2. Weaver RG, Hemmelgarn BR, Rabi DM, et al. Association between participation in a brief diabetes education programme and glycaemic control in adults with newly diagnosed diabetes. Diabet Med 2014;31:1610–1614

3. Steinsbekk A, Rygg LO, Lisulo M, Rise MB, Fretheim A. Group based diabetes self-management education compared to routine treatment for people with type 2 diabetes mellitus. A systematic review with meta-analysis. BMC Health Serv Res 2012;12:213
4. Duncan I, Birkmeyer C, Coughlin S, Li Q, Sherr D, Boren S. Assessing the value of diabetes education. Diabetes Educ 2009;35:752–760
5. Fan L, Sidani S. Effectiveness of diabetes self-management education intervention elements: a meta-analysis. Can J Diabetes 2009;33:18–26
6. Ellis SE, Speroff T, Dittus RS, Brown A, Pichert JW, Elasy TA. Diabetes patient edu- cation: a meta-analysis and meta-regression. Patient Educ Couns 2004;52:97–105
7. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes: a meta-anal ysis of the effect on glycemic control. Diabetes Care 2002;25:1159–1171
8. American Diabetes Association. Standards of medical care in diabetes—2015. Diabetes Care 2015;38(Suppl. 1):S5–S87
9. Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood) 2008;27:759–769
10. Healy SJ, Black D, Harris C, Lorenz A, Dungan KM. Inpatient diabetes education is associated with less frequent hospital readmission among patients with poor glycemic control. Diabetes Care 2013;36:2960–2967
11. Duncan I, Ahmed T, Li QE, et al. Assessing the value of the diabetes educator. Diab Educ 2011;37:638–657
12. Robbins JM, Thatcher GE, Webb DA, Valdmanis VG. Nutritionist visits, diabetes classes, and hospitalization rates and charges: the Urban Diabetes Study. Diabetes Care 2008;31:655–660
13. Brown HS 3rd, Wilson KJ, Pagán JA, et al. Cost-effectiveness analysis of a community health worker intervention for low-income Hispanic adults with diabetes. Prev Chronic Dis 2012;9:E140
14. American Diabetes Association. Economic costs of diabetes in the U.S. in 2012. Diabetes Care 2013;36:1033–1046
15. Boyle JP, Thompson TJ, Gregg EW, Barker LE, Williamson DF.

Projection of the year 2050 burden of diabetes in the US adult population: dynamic modeling of incidence, mortality, and prediabetes prevalence. Popul Health Metr 2010;8:29

16. Siminerio L, Ruppert K, Huber K, Toledo FG. Telemedicine for Reach, Education, Access, and Treatment (TREAT): linking telemedicine with diabetes self-man- agement education to improve care in rural communities. Diabetes Educ 2014;40:797–805
17. Tshiananga JK, Kocher S, Weber C, Erny-Albrecht K, Berndt K, Neeser K. The effect of nurse-led diabetes self-management education on glycosylated hemoglobin and cardiovascular risk factors: a meta-analysis. Diabetes Educ 2012;38:108–123
18. Welch G, Zagarins SE, Feinberg RG, Garb JL. Motivational interviewing deliv- ered by diabetes educators: does it improve blood glucose control among poorly con- trolled type 2 diabetes patients? Diabetes Res Clin Pract 2011;91:54–60
19. Deakin T, McShane CE, Cade JE, Williams RD. Group based training for self-management strategies in people with diabetes mellitus. Cochrane Database Sys Rev 2005;(2):CD003417
20. Gary TL, Genkinger JM, Guallar E, Peyrot M, Brancati FL. Meta-analysis of randomized educational and behavioral interventions in type 2 diabetes. Diabetes Educ 2003;29:488–501
21. The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 1993;329:977–986
22. Stratton IM, Adler AI, Neil HA, et al. Association of glycaemia with macrovas- cular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. BMJ 2000;321:405–412
23. Cooke D, Bond R, Lawton J, et al.; U.K. NIHR DAFNE Study Group. Structured type 1 diabetes education delivered within routine care: impact on glycemic control and diabetes-specific quality of life. Diabetes Care 2013;36:270–272
24. Cochran J, Conn VS. Meta-analysis of quality of life outcomes following diabetes self-management training. Diabetes Educ 2008;34:815–823

25. Trento M, Passera P, Borgo E, et al. A 5-year randomized controlled study of learning, problem solving ability, and qual- ity of life modifications in people with type 2 diabetes managed by group care. Diabetes Care 2004;27:670–675
26. Toobert DJ, Glasgow RE, Strycker LA, et al. Biologic and quality-of-life outcomes from the Mediterranean Lifestyle Program: a randomized clinical trial. Diabetes Care 2003;26:2288–2293
27. Toobert DJ, Strycker LA, King DK, Barrera M Jr, Osuna D, Glasgow RE. Long- term outcomes from a multiple-risk-factor diabetes trial for Latinas: *¡Viva Bien!*. Transl Behav Med 2011;1:416–426
28. Tang TS, Funnell MM, Oh M. Lasting effects of a 2-year diabetes self-management support intervention: outcomes at 1-year follow-up. Prev Chronic Dis 2012;9:E109
29. Thorpe CT, Fahey LE, Johnson H, Deshpande M, Thorpe JM, Fisher EB. Facilitating healthy coping in patients with diabetes: a systematic review. Diabetes Educ 2013;39:33–52
30. Fisher L, Hessler D, Glasgow RE, et al. REDEEM: a pragmatic trial to reduce diabetes distress. Diabetes Care 2013;36:2551–2558
31. Hermanns N, Schmitt A, Gahr A, et al. The effect of a diabetes-specific cognitive behavioral treatment program (DIAMOS) for patients with diabetes and subclinical depression: results of a randomized con- trolled trial. Diabetes Care 2015;38:551–560
32. de Groot M, Doyle T, Kushnick M, et al. Can lifestyle interventions do more than reduce diabetes risk? Treating depression in adults with type 2 diabetes with exercise and cognitive behavioral therapy. Curr Diab Rep 2012;12:157–166
33. Wagner EH, Bennett SM, Austin BT, Greene SM, Schaefer JK, Vonkorff M. Finding common ground: patient-cen- teredness and evidence-based chronic illness care. J Altern Complement Med 2005;11(Suppl. 1):S7–S15
34. Bowen ME, Rothman RL. Multidisciplinary management of type 2 diabetes in children and adolescents. J Multidiscip Healthc 2010;3:113–124
35. Haas L, Maryniuk M, Beck J, et al.; 2012 Standards Revision Task Force. National Standards for

diabetes self-management education and support. Diabetes Care 2012;35:2393–2401

36. American Association of Diabetes Educators. Reimbursement tips for primary care practice [Internet], 2009. Available from http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/reimbursement_ tips_2009.pdf. Accessed 24 March 2015
37. Tang TS, Funnell M, Sinco B, et al. Comparative effectiveness of peer leaders and community health workers in diabe- tes self-management support: results of a randomized controlled trial. Diabetes Care 2014;37:1525–1534
38. Thom DH, Ghorob A, Hessler D, De Vore D, Chen E, Bodenheimer TA. Impact of peer health coaching on glycemic control in low-income patients with diabetes: a randomized controlled trial. Ann Fam Med 2013;11:137–144
39. Tang TS, Ayala GX, Cherrington A, Rana G. A review of volunteer-based peer support interventions in diabetes. Diabetes Spectrum 2011;24:85–98
40. Funnell MM. Peer-based behavioural strategies to improve chronic disease self-management and clinical outcomes: evi- dence, logistics, evaluation considerations and needs for future research. Fam Pract 2010;27(Suppl. 1):i17–i22
41. Heisler M. Overview of peer support models to improve diabetes self-manage- ment and clinical outcomes. Diabetes Spectrum 2007;20:214–221
42. Marrero DG, Ard J, Delamater AM, et al. Twenty-first century behavioral medi- cine: a context for empowering clinicians and patients with diabetes: a consensus report. Diabetes Care 2013;36:463–470
43. Inzucchi SE, Bergenstal RM, Buse JB, et al. Management of hyperglycemia in type 2 diabetes: a patient-centered approach: posi- tion statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes Care 2012;35:1364–1379
44. Miller WR, Rollnick S. Why do people change? In *Motivational Interviewing: Preparing People for Change*. 2nd ed. New York, The Guilford Press, 2002, p. 3–12
45. Funnell MM, Anderson RM. Empowerment and self-management of dia- betes. Clinical Diabetes 2004;22:123–127

46. Rollnick S, Mason P, Butler C. *Health Behavior Change: A Guide for Practitioners*. London, Churchill Livingstone, 1999
47. Weinger K, MacNeil T, Greenlaw SM. Behavioral strategies for improving self-management. In *Complete Nurse's Guide to Diabetes Care*. 3rd ed. Childs BP, Cypress
M, Spollett G, Eds. Alexandria, VA, American Diabetes Association. In press
48. Skovlund SE, Peyrot M. The Diabetes Attitudes, Wishes, and Needs (DAWN) program: a new approach to improving out- comes of diabetes care. Diabetes Spectrum 2005;18:136–142
49. Weiss MA, Funnell MM. In the begin- ning: setting the stage for effective diabetes care. Clinical Diabetes 2009;27:149–151
50. Philis-Tsimikas A, Walker C. Improved care for diabetes in underserved popula- tions. J Ambul Care Manage 2001;24:39–43
51. Karter AJ, Subramanian U, Saha C, et al. Barriers to insulin initiation: the Translating Research Into Action for Diabetes Insulin Starts Project. Diabetes Care 2010;33:733–735
52. American Association of Diabetes Educators. AADE position statement. Individualization of diabetes self-management education. Diabetes Educ 2007;33:45–49
53. Kovacs Burns K, Nicolucci A, Holt RI, et al.; DAWN2 Study Group. Diabetes Attitudes, Wishes and Needs second study (DAWN2TM): cross-national benchmark- ing indicators for family members living with people with diabetes. Diabet Med 2013;30:778–788
54. Peyrot M, Kovacs Burns K, Davies M, et al. Diabetes Attitudes Wishes and Needs 2 (DAWN2): a multinational, multi-stake- holder study of psychosocial issues and person-centered diabetes care. Diabetes Res Clin Pract 2013;99:174–184
55. Vaccaro JA, Exebio JC, Zarini GD, Huffman FG. The role of family/friend social support in diabetes self-manage- ment for minorities with type 2 diabetes. J Nutrition Health 2014;2:1–9
56. Armour TA, Norris SL, Jack L Jr, Zhang X, Fisher L. The effectiveness of family interventions in people with diabetes mellitus: a systematic

review. Diabet Med 2005;22:1295–1305

57. Gallant MP. The influence of social support on chronic illness self-management: a review and directions for research. Health Educ Behav 2003;30:170–195
58. Funnell MM, Anderson RM, Piatt GA. Empowerment, engagement, and shared decision making in the real world of clinical practice. Consultant 2014;53:358–362
59. Chew BH, Shariff-Ghazali S, Fernandez A. Psychological aspects of diabetes care: effecting behavioral change in patients. World J Diabetes 2014;5:796–808
60. Peyrot M, Rubin RR, Lauritzen T, Snoek FJ, Matthews DR, Skovlund SE. Psychosocial problems and barriers to improved diabetes management: results of the cross-national Diabetes Attitudes,Wishes and Needs (DAWN) study. Diabet Med 2005;22:1379–1385
61. Fisher L, Hessler DM, Polonsky WH, Mullan J. When is diabetes distress clini- cally meaningful? Establishing cut points for the Diabetes Distress Scale. Diabetes Care 2012;35:259–264
62. Berkowitz BA, Meigs JB, DeWalt D, et al. Materialneed insecurities, control of diabetes mellitus, and use of health care resources: results of the Measuring Economic Insecurity in Diabetes study. JAMA Intern Med 2015;175:257–265
63. American Association of Diabetes Educators. The American Association of Diabetes Educators position statement: self-monitoring of blood glucose using glucose meters in the management of type 2 diabetes [Internet], 2014. Available from http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/publications/ Self-Monitoring_of_Blood_Glucose_FinalVersion.pdf. Accessed 24 April 2015
64. Hess-Fischl A. Practical management of patient with diabetes in critical care. From a diabetes educator's perspective. Crit Care Nurs Q 2004;27:189–200
65. Evert AB, Boucher JL, Cypress M, et al. Nutrition therapy recommendations for the management of adults with diabetes. Diabetes Care 2013;36:3821–3842
66. Li R, Shrestha SS, Lipman R, Burrows NR, Kolb LE, Rutledge S. Diabetes self-management education and training among

privately insured persons with newly diagnosed diabetes—United States, 2011-2012. MMWR Morb Mortal Wkly Rep 2014;63:1045–1049

67. Peyrot M, Rubin RR, Funnell MM, Siminerio LM. Access to diabetes self-man- agement education: results of national surveys of patients, educators, and physi- cians. Diabetes Educ 2009;35:246 – 263

68. Nicolucci A, Kovacs Burns K, Holt RI, et al.; DAWN2 Study Group. Diabetes Attitudes, Wishes and Needs second study (DAWN2^{TM}): cross-national benchmarking of diabetes-related psychosocial outcomes for people with diabetes. Diabet Med 2013;30:767–777

LEMBAGA PENELITIAN DAN PENGABDIAN MASYARAKAT
STIKES WIJAYA HUSADA BOGOR