The Effectiveness of Food and Physical Activity Patterns on The Reduction of Blood Sugar Levels in The Prediabetes Group

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Abstract
Background research was every year 4-9% of people with glucose intolerance will become diabetic. The diagnosis of glucose intolerance is made when blood glucose tests show blood glucose 2 hours after glucose loading (TTGO) between 145-179 mg / dL. The purpose research was to looked the effectiveness of food and physical activity patterns on reducing blood sugar levels in the prediabetes group. Method research was quantitative with quasi-experimental research design, prediabetes group research samples as many as 15 people with accidental sampling technique, data from the research was obtained by using questionnaires and blood sugar levels, data were analyzed using t-dependent test. The results obtained by the average value of blood sugar levels (kgd) before the intervention 161.40 mg / dl decreased to 116.60 mg / dl, and obtained a significant P value (0.001 <0.05), meaning that diet and physical activity are able to reduce blood sugar levels in the prediabetes group. The conclusion of the study was that diet and physical activity were effective in reducing blood sugar levels in the prediabetes group.
Keywords: Prediabetes, Diet, Physical Activity

I.   Introduction

Glucose intolerance is a condition that precedes diabetes. The incidence of glucose intolerance is reported to continue to increase. The term was first introduced in 2002 by the Department of Health and Human Services (DHHS) and The American Diabetes Association (ADA). Previously the term to describe the state of glucose intolerance was TGT and GDPT. The TGT fasting value is at a value (100-126 mg / dl), the TGT is at (140-200). Every year 4-9% of people with glucose intolerance will become diabetic. [1–6]

According to the International Diabetes Federation (IDF) in 2014 in the world there were 387 million people living with diabetes 46.3% of whom were undiagnosed (prediabetes), with a prevalence of 3.8%. The prevalence of prediabetes in 2017 increased to 7.3%. In 2035 the world is estimated to increase to 592 million with an estimated 2014 prevalence of 8.3% of people living with prediabetes. Every seven minutes it is found that one dies of diabetes. In the world, diabetes deaths reached 4.9 million in 2014, in 2018 it was almost 5 million. [7–9]

Basic Health Research in 2018 obtained the proportion of TGT 30.8% increased from 2013. Based prevalance report in Indonesia (2013) of result interviews diagnosed by doctors was 1.5%. DM was diagnosed by a doctor or symptoms by 2.1 percent. The prevalence report of diagnose doctor or symptoms diabetes on 2013 interviews was 2.1%, this figure is higher than in 2007 (1.1%). Total prevalance report of 31 provinces looked a significant increase DM (93.9%). In the province of Aceh in 2014 there were an estimated 25 million prediabetes cases.West Aceh Province prevalence in 2016 (1.65%), increased in 2017 (1.96%), and increased again in 2018 (1.98%), while for prediabetes cases it is estimated to double the number of diabetes cases each the year.[10]

Based on data from Cut Nyak Dhien Meulaboh Hospital there was an increase in diabetes mellitus cases each year with the following details in 2013 there were 249 cases, in 2014 there were 295 cases, in 2015 there were 783 cases, in 2016 there were 785 cases, in 2017 there were 790 cases, and in 2018 there were 795 cases. In West Aceh district, it is known that prediabetes cases are often found in urban areas, especially in the district of Johan Hero, cases of prediabetes due to problems

with poor lifestyle so that it is at blood sugar levels 140-199 mg / dl, this is in accordance with the results of research [11] in Kampung Belakang Village proved that good eating patterns and regular exercise able to reduce blood sugar levels in the prediabetes group so as to prevent a person from suffering from DM (P Value: 0.001), so based on the above problems it is necessary to look further on the Effectiveness of Diet and Exercise Against Decreased Blood Sugar Levels in the Prediabetes Group.

II.   Literature Review

2.1 Introduction

Various theories have shown that lifestyle (diet and exercise) has an influence on the reduction or control of blood sugar levels. It is important for us to know the definition, the factors that cause prediabetes, prevention of prediabetes.

2.2 Definition

Prediabetes is a characteristic condition of a person with a blood glucose level (140-200 mg / dl) and a fasting blood sugar level (100-126 mg / dl) which is classified as abnormal but not included in the diabetes category. [1–6,8,9,12,13]

2.3 Factors and Prevention of Prediabetes

Factors that cause prediabetes from various literature states that lifestyle (diet and exercise), stress management, lack of rest, lack of control of the lipid profile, lack of control of blood pressure, and lack of knowledge.

Continuous prevention efforts in managing prediabetes need to be done, namely controlling diet (consuming foods high in fiber such as fruits, vegetables, and reducing consumption of foods high in trans fat), stress management, rest management, controlling lipid profile, blood pressure, and need carried out ongoing promotion in order to increase prediabetes prevention knowledge. [1,2,14,3–6,8,9,12,13]

III.   Methodology/Materials

The research methodology is a quantitative methodology with a Quasi-Experimental research design which is an experiment that controls a research situation using a specific design to get one of the various levels of research factors. This study aims to evaluate the effectiveness of interventions for health promotion strategies in decreasing cases of diabetes mellitus. The planned design is one group before and after intervention design, or one group pre and post test design. The determination of the research sample was carried out using a consecutive sampling technique. The sample in this study amounted to 15 people in the prediabetes group. The study was conducted for 3 (three) months by intervening in diet and exercise, the effectiveness of the intervention was seen by measuring the blood glucose level before and after the intervention. [15]

IV.   Results and Findings

The initial data collection results are as follows:

### 4.1 Characteristics of respondents

Characteristics of respondents obtained by directly stating to the respondent, the following results are obtained:

Tabel 1. Characteristics of Respondents

No	Initial	old(year)	sex	address
1.	GH	40	female	Desa Pangung, Kec. Johan Pahlawan
2.	EI	40	female	Desa Kampung Belakang, Kec Johan Pahlawan
3.	HH	40	female	Desa Pasi Mesjid, Kecamatan Meureubo
4.	ES	40	female	Desa Kuta Padang, Kec. Johan Pahlawan

5.	SB	40	male	Desa Kuta Padang, Kec. Johan Pahlawan
6.	SI	31	male	Desa Kampung Belakang, Kec. Johan Pahlawan
7.	AI	40	female	Desa Kampung Belakang, Kec. Johan Pahlawan
8.	TS	32	male	Desa Kampung Belakang, Kec. Johan Pahlawan
9.	MS	30	female	Desa Kampung Belakang, Kec. Johan Pahlawan
10.	TA	32	female	Desa Kampung Belakang, Kec. Johan Pahlawan
11.	RI	37	male	Desa Kampung Belakang, Kec. Johan Pahlawan
12.	SI	35	female	Desa Kampung Belakang, Kec. Johan Pahlawan
13.	KN	40	male	Desa Kampung Belakang, Kec. Johan Pahlawan
14.	LM	39	female	Desa Kampung Belakang, Kec. Johan Pahlawan
15.	YI	40	female	Desa Gunong Kleng, Kec. Meureubo

Based on the figure 1. in the pai diagram below we can see that the highest frequency distribution of the age of the respondents aged 40 years is 53%, based on the theory and the results of the study the age is the age that is very at risk of DM. Based on The Figure 2. in The Pai Diagram below we can see that the frequency distribution of sex is the highest frequency distribution of women by 60%.

Figure 1. Distribution Frequency old (year) Respondents

Picture 2. Distribution Frequency sex Respondents
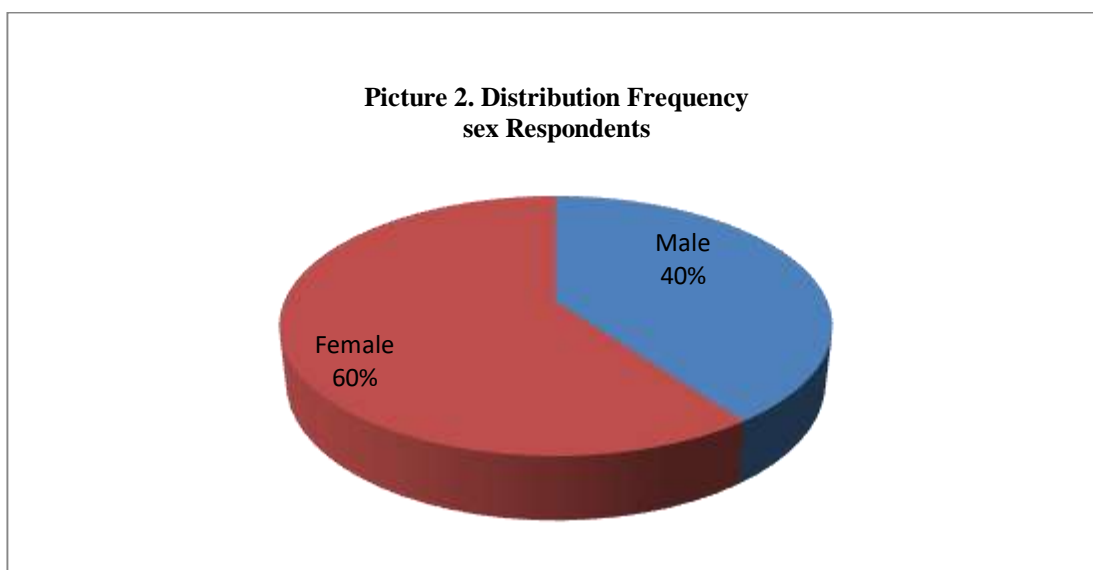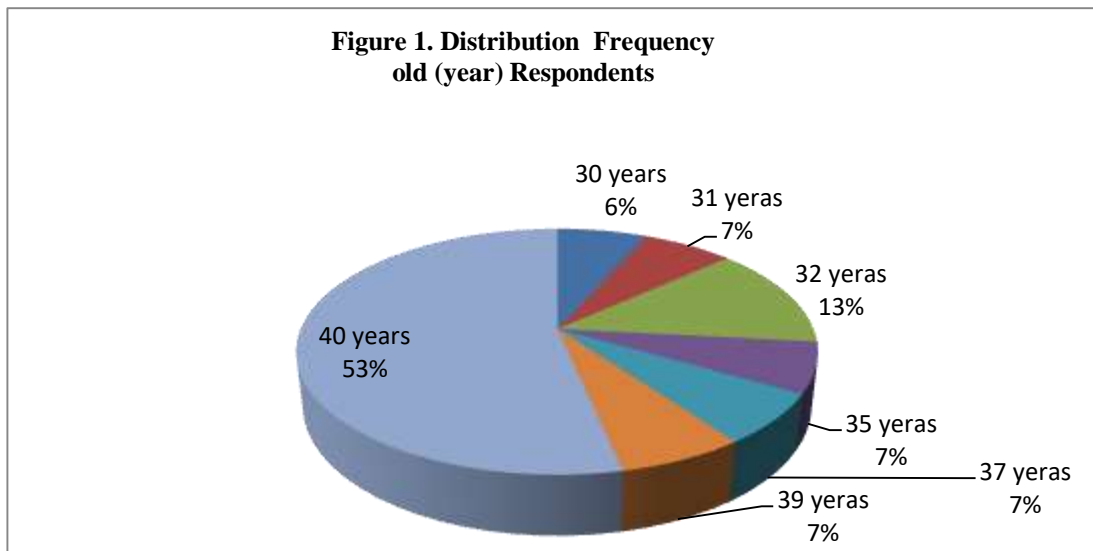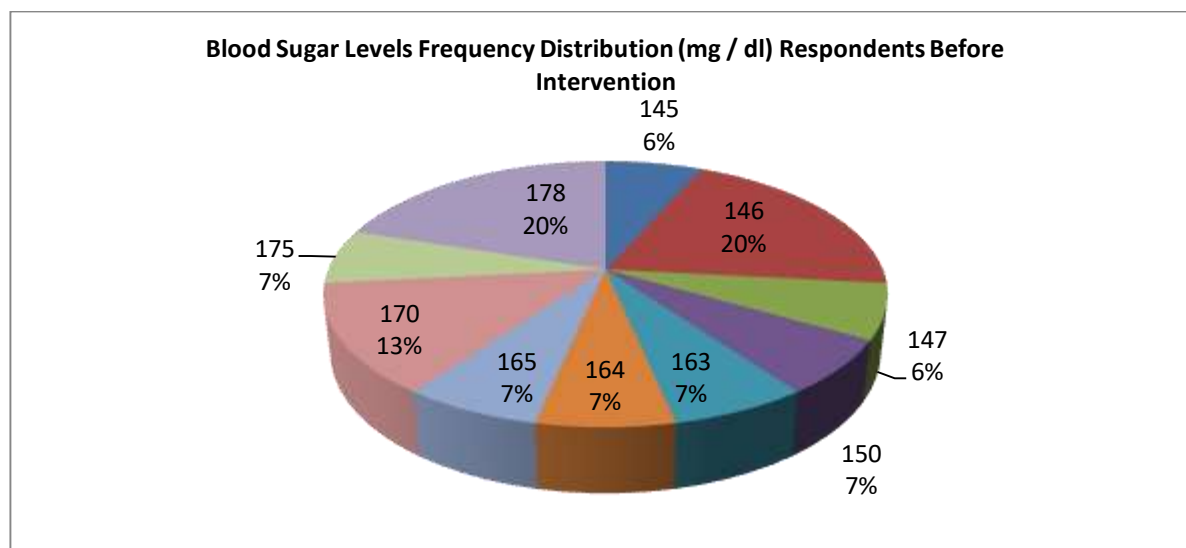
4.1 Blood sugar levels
a. Blood sugar levels before intervention

Collecting data on blood sugar levels prior to the intervention by conducting a blood sugar level test, the following results are obtained:

Table 2. Blood Sugar Levels (mg / dl) of Respondents Before Intervention

No	Inisial	Old (year)	sex	Blood sugar level (mg/dl)
1.	GH	40	female	163
2.	EI	40	female	164
3.	HH	40	female	170
4.	ES	40	female	147
5.	SB	40	male	165
6.	SI	31	male	146
7.	AI	40	female	178
8.	TS	32	male	178
9.	MS	30	female	178
10.	TA	32	female	145
11.	RI	37	male	175
12.	SI	35	female	146
13.	KN	40	male	150
14.	LM	39	female	146
15.	YI	40	female	170

Based on the figure 3. in the pai diagram below we can see that the frequency distribution of blood sugar levels before the highest intervention is 146 mg / dl and 178 mg / dl by 20%, at blood glucose levels 178 mg / dl are at blood sugar levels that are very risky towards diabetes mellitus, and the range of at-risk blood sugar levels is 145-179 mg / dl.

Blood Sugar Levels Frequency Distribution (mg / dl) Respondents Before Intervention

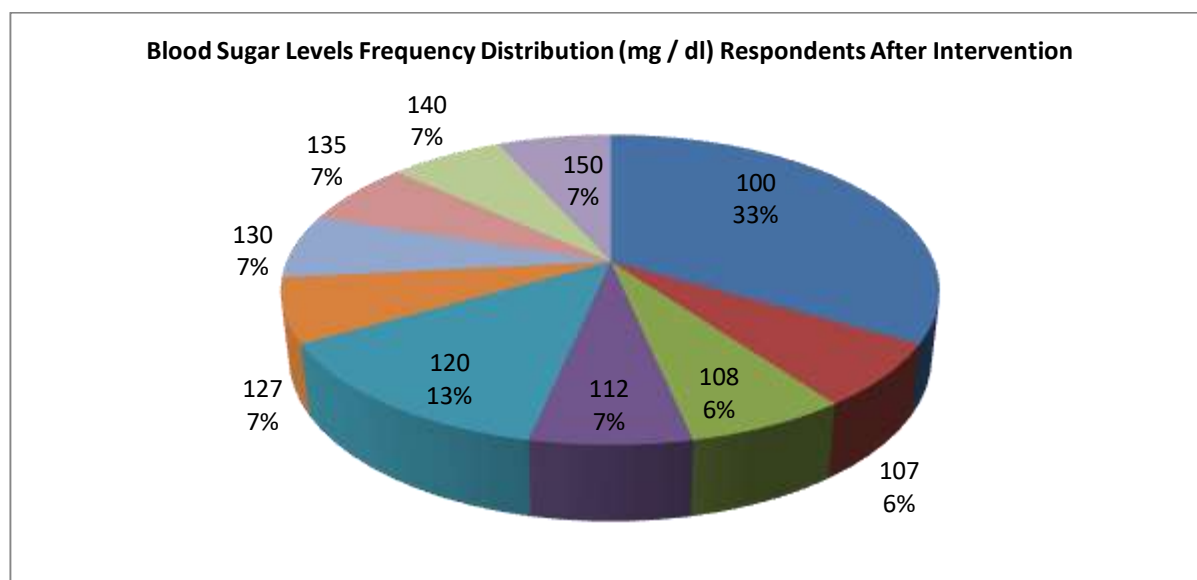**a. Blood sugar levels after intervention**

Collecting data on blood sugar levels after an intervention by testing blood sugar levels, the following results are obtained:

Table 3. Blood Sugar Levels (mg / dl) of Respondents Before Intervention

No	Inisial	old (year)	sex	bgl (mg/dl)
1.	GH	40	female	112

2.	EI	40	female	100
3.	HH	40	female	150
4.	ES	40	female	120
5.	SB	40	male	130
6.	SI	31	male	107
7.	AI	40	female	120
8.	TS	32	male	108
9.	MS	30	female	127
10.	TA	32	female	100
11.	RI	37	male	140
12.	SI	35	female	100
13.	KN	40	male	100
14.	LM	39	female	100
15.	YI	40	female	135

Based on the figure 4. in the pai diagram below we can see that the frequency distribution of blood sugar levels after the highest intervention 100 mg / dl by 33% has been out of the range of risky blood sugar levels is 145-179 mg / dl.

Blood Sugar Levels Frequency Distribution (mg / dl) Respondents After Intervention

4.1 Blood Sugar Levels (BSL) Before and After Intervention

The description of blood sugar levels before and after the intervention for three months can be read in the table below:

Table 4. BSL values before and after the intervention

Inisial	BSL (mg/dl) before	BSL (mg/dl) after
GH	163	112

EI	164	100
HH	170	150
ES	147	120
SB	165	130
SI	146	107
AI	178	120
TS	178	108
MS	178	127
TA	145	100
RI	175	140
SI	146	100
KN	150	100
LM	146	100
YI	170	135

Significant differences from the blood sugar levels results before and after we can see using the Wilcoxon test the following results are obtained:

Table 5. Differences in mean BSL before and after the intervention

Variabel	N	*Mean*	*Standar Deviasi*	*P Value*
BSL before	15	161,40	13,362	0,001
BSL after	15	116,60	16,642	

Based on the table, a significant P value (0.001 <0.05) is obtained, thus it is concluded that there are significant kgd differences between before and after dietary and exercise intervention. A decrease in the value of blood sugar levels after an intervention for three months from the previous risk of having blood sugar levels even though with varying numbers but no longer at risk kgd.

This means that dietary and exercise regulation can reduce the value of kgd at risk to the value of not at risk, therefore it is necessary to seriously and sustainably handle the risk groups so as not to increase the number of cases of DM patients.

Management of diet and exercise is in line with research [16–18] states the management of prediabetes even when healthy can reduce the number of cases of diabetes. According to research[19] states that consumption of unhealthy foods such as fried spring rolls has greater effect on blood sugar levels than wet spring rolls, because of dietary patterns (stews such as vegetables, fruits, low cakes) sugar and calories) lower risk of an increase in blood sugar levels, and also supported by research [20–23].

Exercise also has an influence on reducing blood sugar levels accompanied by diet, this is in line with research [24–27], exercise that supports a decrease in blood sugar levels is a sport that is well managed.

V.   Conclusion

The implementation of diet and exercise by prediabetes groups to reduce DM cases that have been carried out by researchers in effective risk groups (prediabetes), so that it has a positive effect on controlling blood sugar levels so as to prevent these at-risk groups from experiencing DM, so as to be able to suppress the number of DM cases with no increase in new cases.

VI.   Acknowledgement:

VII.   References

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