



The Correlation between Regular Sports and Diet with Blood Glucose Values of Diabetes Mellitus in Puskesmas Mangasa Area, Makassar

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Abstract

Diabetes Mellitus is abnormality of glucose metabolism that occurred when the body gets resistance with relative insulin deficiency, so that it was occurred increasing blood glucose above normality. The management was used to reduce blood glucose are four ways. They are diet, sports, medicines, and education. Sports (physical exercises) is a management of diabetes mellitus that was less attention for the patients. Both diet and sports got response in insulin work, but it was different work. Diet aimed at balancing input of glucose with availability insulin. and sports aimed at increasing stimulate of insulin work, during the activities of muscle, however, it was not revealed that the affectivities between sports and diet to reduce blood glucose for the diabetes mellitus patients. This study aimed at finding out to reveal the affectivities of regular sports and reduction of blood glucose and the affectivities of regular diet and reduction of blood glucose. This study used observational method, with cross-sectional design. Total respondents are 20 persons, consisted of 2 groups, they were 10 persons were regular sports and 10 persons were not regular sports. The criteria of the patients of the two groups had the same characters. The result of this study indicated that the patients of Diabetic Mellitus (DM) who are regular sports can reduce blood glucose 100% respondents with the average reduction 29.70mg/dl, whereas the patients of diabetes mellitus who are not regular sports can reduce only 20% respondents with the average increase 10.5mg/dl. Therefore, there is a significant correlation between regular sports and reduction of blood glucose of diabetes mellitus. Chi-square test of the regular sports and not regular sports with p value is 0.007 ($\alpha:0.05$).

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The regular diet but they are not regular sports was not effective to reduce blood glucose, if they are not regular diet but they are regular sports, it is effective to reduce blood glucose. There is not a significant correlation between regular diet and reduction of blood glucose for patients of diabetes mellitus. Chi-square test was: $p.065$ ($\alpha:0.05$). The patients of regular sports and diet are effective to reduce blood glucose, with average of reduction 30mg/dl. The conclusions of this study are: regular sports were effective to reduce blood glucose, and regular diet was not effective to reduce blood glucose. If regular sports and diet are conducted together, they are very effective to reduce blood glucose for the patients of diabetes mellitus.

Keywords: blood glucose; regular sport; diabetes mellitus.

1. Introduction

Diabetes Mellitus is abnormality of glucose metabolism that occurred when the body resistance with relative insulin deficiency. American Diabetic Association [1]. This disease is chronic, so the patients need treatment and care independently in the lifetime [2]. World Health Organization had predicted that 177 million world population contract diabetics. The number of disease increase up to 300 million in 2025 year. Diabetes Mellitus is the fourth level in the world [3]. Directorate General of Disease Control and Environmental Health [4]. Indonesia, in 2030, prevalence of diabetes mellitus will reach 21,3 million people. The result of basic health (Riskesda) is required proportion cause of death from diabetes mellitus in the group of 45-55 years old in the city area are in the second level, and in the rural area are in the sixth level. Generally, about 80% of prevalence of diabetes mellitus type II. It means that, unhealthy life style is triggers. Profile of public health of Makassar, diabetes mellitus from year to year increase. In 2013 diabetes mellitus was in the fourth level from the tenth main disease in Makassar, with the number of disease 43.547 cases. In 2014, diabetes mellitus increased with total number 46.939 cases [3]. Reference [5] Patient of Diabetes Mellitus needed high cost, International Diabetes Federation (IDF) reported the cost of treatment reached 1500 – 9000 US \$/per patient/ each year in modern countries (2012). In developing countries approximately 50 – 2000 US\$/per patient of diabetes mellitus/per year. PT Askes reported that in evaluation 100 patients of diabetes mellitus in 2011 – 2012 RSCM hospital, was needed 5149 US\$ per patient / per year. If the patients got kidney failure, they were needed high cost. In this study, there are 674 patients of diabetes mellitus of type II, they have blood glucose 37.4%. Reference [6] the result of 13 patients of diabetes mellitus indicated that there were not respondents who did arrangement of food, based on the number of calories, types of food and recommended feeding schedule are less than 50%. Regular means obey the rules (Indonesian Dictionary). The Regular diet and sports of diabetes mellitus patients are the patients who obey the rules of diet and sports program based on treatment standard. The data of Diabetic Mellitus patients in Puskesmas Mangasa on June, 2016, there were 54 patients registered and they came to do treatment program in Puskesmas routinely. In this research, approximately 50% of the patients registered. Every week, they do sports routinely, so It needed to conduct the research from that group about the effectiveness of regular sports with the value of blood glucose.

2. Materials and Methods

This research was descriptive analytic with Cross Sectional Design, to reveal the correlation between regular

sports and diet with reduction of blood glucose for diabetes mellitus of patients. This study used purposive sampling technique with 20 patients of diabetes mellitus who have been diagnosed and got the same treatment from Puskesmas. The Sample was divided into two groups, They are regular sports (A) and not regular sports (B). The sample criteria from group A are: they always did sports regularly during six months and group B, did not do sports regularly. Firstly, both groups have been checked their blood glucose before and after six weeks. The value of blood glucose of the two groups were analyzed to know correlation between the effect of sports and diet with the reduction of blood glucose.

3. Results

The 20 respondents were 11 persons (55%) under 50 years old, and 9 persons (45%) over 50 years old, the female were 16 persons (80%) more than male only 4 persons (20%) got diabetes mellitus. It indicated that, female (80%) more than male (20%) consumed medicines (100%) according to the patients

3.1 The correlation between regular sports and the values of blood glucose

The value of respondents' blood glucose who were regular sports reduce 100% with average 29.70mg/dl, whereas who were not regular sports increase blood glucose 8 (80%) with average 10.5 mg/dl (see table 1.) The Chi-square test showed that the correlation between regular sport and values of blood glucose was $p:0.007$ ($\alpha:0.05$). There are significant correlation between regular sports and blood glucose values. So,if patients were regular sports, they can get blood glucose in tolerance value.

Table 1: The Frequency distribution of patients who sport regular and not regular with blood glucose value

Group of devout sports				Group of not devout sports						
No. Resp	Glucose (mg/dl)		Glucose Change I and II (reduction/not)	Change average of glucose (mg/dl)	No. resp	Glucose (mg/dl)		Comparison between Glucose I & II (reduction/not)		Change average of glucose (mg/dl)
	I	II	Reduction			I	II	Reduction		
1	300	275	Yes	25	11	215	236		No	21
2	340	227	Yes	27	12	160	183		No	23
3	128	116	Yes	12	13	220	215	yes		-5
4	295	249	Yes	46	14	149	219		No	30
5	133	109	Yes	24	15	168	189		No	9
6	151	111	Yes	40	16	170	210		No	30
7	196	184	Yes	12	17	157	160		No	33
8	225	170	Yes	55	18	210	135	yes		-25
9	175	143	Yes	32	19	260	280		No	20
10	157	133	Yes	24	20	200	226		No	20M
			10 (100)	29.70mg/dl				2 (20%)	8(80%)	10.5mg/dl

3.2 The correlation between regular diet and blood glucose values

There were 11 respondents, 7 (35%) decrease blood glucose. There were 9 (25%) respondents who were not regular 5 (25%) decrease blood glucose (See, Table 2)

Chi-square test showed that the correlation between regular diet and glucose values was $p.0.65$.

So if the patients of diabetes mellitus who were regular diet, they could not reduce blood glucose effectively.

Table 2: Frequency distribution of patients who were regular diet and not with blood glucose values

Group of devout sports				Group of not devout sports					
No. Resp	Glucose (mg/dl)		Glucose Change I and II (reduction/not)	Change average of glucose (mg/dl)	No. resp	Glucose (mg/dl)		Comparison between Glucose I & II (reduction/not)	Change average of glucose (mg/dl)
	I	II	Reduction			I	II	Reduction	
3	128	116	Yes			300	275	Yes	
5	133	109	Yes			340	227	Yes	
8	225	170	Yes			295	249	Yes	
9	175	143	Yes			151	111	Yes	
10	157	133	Yes			196	184	Yes	
12	160	183		No		215	236		No
13	220	215	Yes			149	219		No
15	168	189		No		170	210		No
17	157	160		No		200	226		No
18	210	135	Yes						
19	260	280		No					
	Total		7 (35%)	4 (20%)		Total		5 (25%)	4(20%)

3.3 Regular sports and diet with blood glucose values

There were 20 respondents: They were 5 respondents who were regular sports and diet decrease blood glucose with average 30 mg/dl (See table 3). This indicated that to reduce blood glucose effectively, the patients should do sports and diet together.

Table 3: The Respondents distribution of regular sports and diet

No. Respondent	Glucose values (mg/dl)		Reduction(mg/dl)
	I	II	
3	128	116	12
5	133	109	24
8	225	170	55
9	175	143	32
10	157	133	24

*The average of reduction: 30mg/dl

4. Discussion

The patients of diabetes mellitus were more under 50 years old. This fact indicated that diabetes mellitus, nowadays, occurred at a relatively young age (productive) and threat in the work quality. Female was 16 (80%) more got diabetes mellitus than male. This was related with life style unhealthy such as: dietary habit, sports, and stress. The dietary habit and less sports tend to increase weight for the female.

The cause of Diabetes Mellitus is said more heredity and the other hand, the data indicated that lifestyle such as dietary habit, and the activities are not balanced, so that insulin resistance was not also balanced (Prevalence of diabetes mellitus: 80 – 90 % are type II). Dietary habit and metabolism of glucose disturbed as the cause diabetes mellitus.

The perception of society said that heredity factor dominated of diabetes mellitus, so that generally, they understand if one of their family get diabetes mellitus, it will be occurred in their selves. This idea is not accurate and uneducated.

The knowledge about the types of diabetes mellitus, generally they did not know and misperception. The knowledge of respondents about the types of diabetes mellitus are wet and dry diabetes. The wet diabetes is related with injures and dry is not injures. This idea is not accurate because the types of diabetes can occur injures. (micropaty).

This knowledge made the society was less carefully to prevent injures complication in diabetes mellitus.

The knowledge of diabetes mellitus complication was very less. So that they were less to anticipate injures and care in diabetes mellitus. Blood glucose increased in long time period tend to disturb vascularization and easy to get injures. Diabetes Injures needed long care and very difficult for cure and sometimes needed amputation and high cost, so that it was part of individual, family and government.

4.1 The correlation between sports and reduction of blood glucose values

Diabetes Mellitus is abnormality of glucose metabolism that occurred when the body resistance with relative insulin deficiency. Increasing blood glucose occurred, because sensitivities and resistance of insulin to decrease glucose. One of the act to control blood glucose was physical exercises. Individual who is less activities has reduced metabolism, so that, work of insulin reduce and hamper metabolism of glucose. Sports can increase body metabolism, so that it can stimulate the activities of insulin. Light sport regularly can stimulate insulin well, so that it impacted for metabolism process effectively in the whole body. The less activity will hamper metabolism process, and decrease insulin. The reduction of metabolism hamper blood glucose and insulin activities, so that, insulin activities and glucose metabolism as a circle unconnected. The sports cause contraction of muscle, so per mentalities of membrane connected directly with recovery glucose. The muscle contraction in sports causes resistance of insulin reduced and take glucose in the blood increase. This research indicated that all of the patients were regular sports get reduction of blood glucose compare with the patients were not regular sports with average values 29,70mg/dl/patient. The correlation between regular sports and blood glucose values found $p:0.007$ (<0.05), indicated that there are significant correlation between regular sports and reduction of blood glucose values. So that it can be said that regular sports is effective to reduce blood glucose for the patients of diabetes mellitus. Sports has more benefits for diabetes mellitus. Some studies concluded that sports regularly has more benefit to restore function of glucose metabolism that was damaged because of diabetes mellitus type II. The other hands, sports has benefits in reducing complication risks of diabetes. Canadian Diabetes Association [4] the benefit of physical activities for diabetes patient is to improve the function of cardio respiratory, control blood glucose, reduction of resistance of insulin, reduction of fat, maintain the reduction of body weight. Paramita G.M., [7] sports can cause reduction of insulin resistance and taking glucose in the blood increase. This can reduce glucose so that it can control blood glucose. During the sports, the receptor of insulin in the muscle is active, so that it is occurred the reduction of insulin resistance and makes glucose easily enter into the cell, physical exercises can keep fit and reduce body weight, and increase insulin sensitively. Ndraha [8] during the sports, the receptor of insulin in the muscle is active, so that it is occurred the reduction of insulin resistance and makes glucose easily enter into the cell. Lubis, M.I, (2012) Sports prevent, control and help therapy of diabetes, reduce insulin resistance. After doing exercises regularly, the body response for insulin and take glucose from blood are very well. Sports can also help to reduce the risk of cardiovascular disease, cholesterol in the body, reduce the body weight and increase insulin sensitivities [9-10]

4.2 The correlation between regular diet and reduction of blood glucose values

Glucose is needed by all people, either the patients do not get diabetes mellitus or get diabetes mellitus. Blood glucose is sometimes under normally or high limit. The main objective of diet does not reduce but lower blood glucose in limited tolerance. Resistance or insulin deficiency that was occurred in patients of diabetes mellitus is inability insulin for blood glucose. Suggesting diet is one of the therapies which is suggested to reduce blood glucose for patients of diabetes mellitus., however, the act is not effective, because diet therapy does not respond directly to the insulin activities for taking glucose in the blood. Diabetes mellitus type II was occurred because it is not balance of insulin, so the ability of insulin for glucose metabolism decrease. By diet program, it is not

enough to give respond well for insulin resistance, so that it is not occurred metabolism glucose well. This research found at the patients of regular diet but not regular sports and it does not give respond for reducing glucose, otherwise, the patients are not regular diet but they are regular sports, give respond to reduce blood glucose. The correlation between regular diet and blood glucose value for the patients of diabetes mellitus, *Chi-square test* $p.0.65 (>0.05)$ indicated that there is not significant different between regular diet and blood glucose value. So that, in this research, diet was not effective to reduce blood glucose [11], The patients of diabetes mellitus who were regular diet, are not effective to reduce blood glucose. Regular diet was not correlation with reducing blood glucose for patients of diabetes mellitus [12-16].

4.3 Regular sports and diet

This research found at the patients of diabetes mellitus who were regular sports and diet, can reduce blood glucose with average 30mg/dl per patient. It indicated that both regular sports and diet are effective to reduce blood glucose. Diabetes Mellitus type II, was occurred because reduction of production or unbalance insulin and metabolism of glucose need. The unbalance was occurred because it took blood glucose into cell. Regular sports can reduce insulin resistance, so it was occurred increasing metabolism and taking glucose in the blood. So that, if only regular diet without regular sports, it is not effective to reduce blood glucose. American Diabetes Association [1] explained that diabetes mellitus type II was called insulin non-dependent Diabetes Mellitus (NIDDM) occurred hyperinsulinemia but insulin can not bring glucose in the body tissue because there was insulin resistance which cause decreased ability to stimulate glucose by prefer tissue and hamper the process of glucose in the lever. Therefore, the insulin resistance has not been active because high glucose content will impact deficiency of insulin. It can cause reduction of insulin secretion. Therefore, it needed to stimulate insulin, so it can work effectively for metabolism of glucose into blood. One of the factors can make insulin actively is regular sports [16-19].

5. Conclusion

1. There is significant correlation between regular sports and reduction of blood glucose. Average of the decrease was 29,70mg/dl
2. Regular diet was not effective to reduce blood glucose without regular sports
3. Regular sports and diet can reduce blood glucose, but regular sports is effective to reduce blood glucose than regular diet. If regular sports and diet is done together, it will be decrease blood glucose effectively.

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