

# DM EXERCISE AS A STRATEGY TO MAINTAIN BLOOD SUGAR LEVELS IN TYPE II DM PATIENTS

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# DM EXERCISE AS A STRATEGY TO MAINTAIN BLOOD SUGAR LEVELS IN TYPE II DM PATIENTS

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Diabetes Mellitus, Exercise, Blood Sugar

## ABSTRACT

Diabetes Mellitus is a chronic disease characterized by an increase in blood sugar levels caused by damage to the pancreas gland as a producer of the hormone insulin, resulting in impaired metabolism of carbohydrates, fats, and proteins. The aim is to analyze the application of diabetes exercise in clients who have diabetes mellitus. The research design is descriptive research, using case study method. Participants consisted of 2 clients who had type II diabetes mellitus, and were taking medication. The results of the implementation of diabetes mellitus exercise showed changes in blood sugar levels in the first client, namely a decrease of 30% and in the second subject, namely 60%. Recommendation: the application of diabetes exercise in DM subjects must be followed by providing information beforehand, being consistent in doing exercises, motivation to accelerate the healing process and the need for support by the family.



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## 1. Introduction

The epidemiological shift from infectious diseases which tend to decline to non-communicable diseases is increasing globally in the world, and nationally has occupied the top ten diseases that cause death and the most cases of which are Diabetes Mellitus (DM). (Depkes, 2008 cited in Unnes Journal of Public Health 15). [17] reports research in 2014 by the Ministry of Health of the Republic of Indonesia stating that Diabetes Mellitus (DM) is a chronic disease characterized by blood glucose (blood sugar) levels exceeding normal, namely when blood sugar levels are equal to or more than 200 mg/dl, and fasting blood sugar levels above or equal to 126 mg/dl. DM is known as the silent killer because it is often not realized by the sufferer and when it is known that complications have occurred.

Jamalul & Nova (2014), stated that diabetes mellitus, which was previously only known as a disease of urban people, has now spread to various remote villages. In terms of the number of sufferers, from year to year the numbers are increasingly surprising and alarming. The spread of diabetes to rural areas is very threatening to the health conditions of the people in the village. This is because the knowledge of the village community about diabetes mellitus both in terms of causes and signs for sufferers is very minimal.

Indonesia is ranked 7th in the world with 10 million people with DM in 2015 and is predicted to increase to 16.2 million by 2040, with this data Indonesia is ranked 6th in the world after China, India, America, Brazil, and Mexico. (IDF, 2015). According to Riskesdas (2018), the prevalence of diabetes mellitus in Indonesia based on a doctor's diagnosis at the age of >15 years is 2.0%, all ages by province are 1.5%. The prevalence of Diabetes Mellitus in urban areas is 1.9% and in rural areas 1.0%. Male patients are 1.2% and 1.8% female. The prevalence of Diabetes Mellitus in DKI Jakarta in 2018 was 3.4% of the population aged >15 years.

Early intervention and prevention of the development of DM will provide significant benefits for patients by increasing life expectancy and quality of life and for the country by helping to maintain economic stability (IDF, 2015). One of the Ministry of Health's programs in the promotion and prevention of non-communicable diseases (PTM), especially DM is to develop an integrated development post program (Posbindu) for PTM. Policies in DM control are accelerating early detection of PTM risk factors through PTM Posbindu, strengthening PTM risk behavior modification through PTM Posbindu, accelerating early detection of DM potential cases to First Level Health Facilities (FKTP), strengthening DM management according to standards in First Level Health Facilities (FKTP), increased monitoring of successful DM treatment with HbA1C [12].

Integrated activities in controlling PTM-(POSBINDU PTM) are early detection of Non-Communicable Disease Risk Factors (FR-PTM), monitoring of Non-Communicable Disease Risk Factors (FR-PTM), counseling and referrals, counseling, gymnastics, cycling, etc. (Kemenkes RI, 2017). The program is a community activity in recognizing and maintaining their own health problems, especially PTM risk factors such as excess body weight, lack of physical activity, unhealthy diet and smoking.

[13], stated that uncontrolled Diabetes Mellitus can cause acute complications such as hypoglycemia, hyperglycemia, diabetic ketoacidosis, non-ketotic hyperosmolar coma, lacto acidosis coma. And can also cause chronic complications such as an increased risk of stroke, heart attack, blurred vision (retinopathy), kidney problems (nephropathy).

Nurses are well positioned to be involved in various aspects of the health care provided to clients. The nurse is a member of the Discharge Planner, which is the process of preparing patients to receive continuity of care, both in the healing process and in maintaining their health status. Discharge Planning can reduce the client's hospitalization days, prevent recurrence, improve the development of health conditions and reduce the burden of care on the family. (Setiawan, 2015). The role of the educator is carried out by increasing knowledge about DM, symptoms of DM and actions given to families such as diabetes gymnastics after health promotion is expected to change behavior in the family. The role of nurses in providing nursing care is carried out by providing diabetes exercises to clients who have diabetes mellitus and it is hoped that after the action the client does not experience the same complaints [7].

The independent nursing action that was carried out was Diabetes Gymnastics. Diabetes Gymnastics is carried out 3 times a week with a duration of 30-45 minutes in 1 visit, the meetings are held 6 times in 2 weeks. The results of [1], blood sugar levels before doing Diabetes Exercise on the first day were 208 mg/dl and the results of blood sugar levels after doing Diabetes Exercise on the third day was 188 mg/dl. Diabetes exercise can lower blood sugar levels 15-25 mg/dl. The results of Andri et al's research (2016), obtained the average blood sugar level before doing Diabetes Gymnastics 164.50 mg/dl and after doing Diabetes Gymnastics 145.13 mg/dl.

The role of the family is no less important than the role of the nurse. The results of Susanti, et al (2013) research in [10], the role of the family in DM management at home is as a coordinator in the regulation of DM diet and blood sugar monitoring, as a motivator in regulating physical exercise and regulating the consumption of anti-diabetic drugs, as a companion at times. perform physical activity and when checking blood sugar levels, as a supervisor during physical exercise, as an active supervisor in early detection of signs and symptoms of complications of DM, as a passive supervisor in finding complications of DM, as a contributor to the DM diet setting.

## 2. Method

### 2.1 Application of DM Gymnastics on family members who have Type II DM

The application of Diabetes Gymnastics to Type II Diabetes Mellitus participants who have problems with blood glucose and peripheral tissue perfusion. Prior to the implementation of the action, participants were given an explanation of the objectives, the implementation process up to the evaluation, and the implementation time. Both participants were given informed consent as a form of approval for the implementation of the action. After the informed consent was signed, proceed with the action. Prior to diabetes exercise, each participant's blood sugar levels were measured. At the beginning of the action, participants were first taught diabetes gymnastics movements. Participants were also given movement pictures in posters, booklets and video recordings so that they could do it without the nurse at home.

### 2.2 Subject

Participants in this case study were two clients who had Type II DM. Both participants experienced complaints of frequent drinking and urination at night, when their sugar levels were high they felt weak and tired, their hands felt numb/numb, and had headaches. GDS results for the first subject: 187 mg/dL, the second subject: 197 mg/dL. The application of DM exercise for 2 weeks. Evaluation of blood sugar levels and complaints was carried out one day after the Diabetes Gymnastics was carried out.

### 2.3 Research design

The research design is a descriptive study with a case study method using two subjects with Type II Diabetes Mellitus. The case study lasted for 2 weeks.

## 3. Result

**Table 1.1** Demographic data

No	Name	Age	Gender	BMI	Treatment	Complaint
1.	Subject 1	50 years	Man	22,06 (Normal)	Metformin Oral	Frequent drinking and urination at night, complaining of feeling weak and tired when high sugar, numb/numb hands, headache
2.	Subject 2	50 years	Man	36,7 (Obesity II)	Metformin Oral	weakness and fatigue when blood sugar

						rises, tingling and headaches
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DM Gymnastics activities are carried out for 30-45 minutes. Before taking the action, a GDS examination was carried out, and one day after the action, a sugar measurement was carried out to evaluate the results of the application of the action. In addition to monitoring blood sugar, the complaints felt by the two participants were also evaluated for their development.

**Table 1.2** Monitoring of Blood Sugar Levels, participant complaints.

Visit	Indicator	Participant					
		Subject 1			Subject 2		
		Pre-Activity	Post (one day after activity)	Complaints	Pre-activity	Post (one day after activity)	Complaints
1	Decreased blood sugar levels and reduced complaints	476 mg/dl	176 mg/dl	weak and tired, their hands felt numb/numb, and had headaches	456 mg/dl	149 mg/dl	weak and tired, their hands felt numb/numb, and had headaches
2		431 mg/dl	175 mg/dl	Tired, hands felt numb	324 mg/dl	250 mg/dl	Hands felt numb
3		485 mg/dl	156 mg/dl	No tired, decreased hands felt number	363 mg/dl	213 mg/dl	Decrease Hands felt numb
4		428 mg/dl	211 mg/dl		364 mg/dl	280 mg/dl	
5		497 mg/dl	148 mg/dl		314 mg/dl	152 mg/dl	
6		233 mg/dl	115 mg/dl		186 mg/dl	174 mg/dl	

#### 4. Discussion

The application of diabetes exercise to both participants with ineffective peripheral tissue perfusion problems obtained results, after the diabetes exercise was carried out there was a decrease in blood sugar levels. The symptom indicators that were felt in both subjects were reduced, such as the fingers were not often numb, rarely felt tired, and did more independent exercise at home.

Symptoms experienced by the two subjects were headache, frequent drinking and urination at night, numb hands, feeling dizzy when sugar was high. In diabetes mellitus clients often drink and urinate because of glucosuria which causes an increase in urine volume, thirst is stimulated and the patient will drink large amounts of water (polydipsi) because glucose is lost with urine, there is a loss of calories and cellular starvation, appetite and people become frequent meals (polypagi) (Kartika, 2013).

The cause of diabetes in both subjects is not known for sure. Subject I suddenly felt weak, urinated frequently, wanted to eat too much. After being checked at the Puskesmas, he was exposed to DM. In this second subject, since subject II had an accident and when he checked the blood, it turned out that subject II was suffering from DM.

One possible cause is the pattern of nutrition. The nutritional pattern of subject I was in accordance with the portion of food and types of food that were recommended to be consumed following the rules given by the puskesmas. Before subject II knew that he had diabetes, subject II's diet was normal, only subject II often consumed canned drinks. In subject II, nutrition was in accordance with the recommended portion and type of food, and followed the rules given by the puskesmas, only subject II still liked to consume 1-2 cans of canned drinks a day.

Aluminum is a metal that has several advantages, namely lighter than steel, easy to shape, odorless. But the use of pure aluminum as packaging also has a weakness, namely the strength is not good. Canned drinks or soft drinks contain very high sugar and calories, if low physical activity makes the sugar and calories eventually stored and accumulate in the body. So the body is more difficult to manage blood sugar [4].

In pharmacological management, both subjects took the same drug, namely Metformin 500mg 3x1 tab. Both subjects have never done non-pharmacological management. In this case, the author applies non-pharmacological measures, namely diabetes exercise. This diabetes exercise is very effective because it can be done independently, anytime, easy to do, and can lower blood sugar levels. Diabetes gymnastics is an aerobic physical exercise for diabetics with a series of movements that are chosen intentionally by following the rhythm of the music so that it gives birth to rhythmic provisions, continuity and a certain duration to achieve certain goals [7].

[1] reported in 2007 by I<sup>10</sup> stating that physical exercise will cause an increase in blood flow, so that more capillaries<sup>19</sup> open and more insulin receptors are available, and the receptors become more active which will affect the decrease in blood glucose in patients with diabetes mellitus.

In calculating the Body Mass Index (BMI) subject I was categorized as normal weight while subject II was categorized as overweight. After the implementation of diabetes exercise, both subjects experienced a different decrease in blood sugar levels between subject I and subject II. In this case, it shows that diet and body mass index affect blood sugar levels after the implementation of diabetes exercise. According to Kariadi (2009) in Fathmi (2012), obesity can make cells insensitive to insulin (insulin resistance). The more fat tissue in the body, the more resistant the body is to insulin action, especially when body fat accumulates in the central or abdominal area.

<sup>24</sup> Based on the results of research conducted by Farida, S (2009), the relationship between diabetes mellitus and obesity results in obesity being at risk of developing diabetes mellitus 2.26 times higher than non-obese, so that the incidence of diabetes mellitus increases with obesity.

Diabetics should consume enough fat and carbohydrates and increase fiber consumption. Intake of micronutrients<sup>2</sup> such as vitamin C found in natural food sources that act as antioxidants will reduce insulin<sup>2</sup> resistance. Obesity is caused by excessive intake of nutrients continuously causing excessive fat stores in the form of chemical compounds in the form of triacylglycerol contained in adiposity cells. Free fatty acids can circulate in the blood vessels throughout the body and cause lipotoxicity. A number of free fatty acids released by triacylglycerol in an effort to compensate for the destruction of excessive fat stores affect adipose and non-adipose tissue (Sudoyo, 2009).

Both participants<sup>16</sup> were given the same action, namely diabetes exercise every 2 days (6 visits) for 2 weeks, monitoring blood sugar<sup>16</sup> levels before and after giving diabetes exercise. In giving diabetes exercise which is done every 2 days there is a significant decrease in blood sugar levels for both participants. The results

showed the effect of diabetes exercise on reducing blood sugar levels in both subjects. The average blood sugar level before doing diabetes exercise was 476 mg/dl and after 6 visits it was 174 mg/dl. This is in accordance with the study of the effect of diabetes exercise on reducing blood glucose levels in patients with diabetes mellitus at the KTK Public Health Center, Solok City. The average blood glucose level after doing diabetes exercise on the third day was 188 mg/dl.

The results of monitoring the measurement of blood sugar levels obtained the final result, namely a decrease in blood sugar levels that occurred in both subjects, namely in subject II tended to experience a decrease in blood sugar levels more than subject I. The first subject experienced a decrease of 30% while the second subject as much as 60%. The main factors that influence the difference in blood sugar reduction that occurs are that the client pays attention to the intake of food that must be consumed and which must be reduced, and often do DM exercises. Based on the theory, physical exercise will cause an increase in blood flow, more open capillaries so that more insulin receptors are available and receptors become more active which will affect the decrease in blood glucose in patients with diabetes mellitus.

In addition to these factors, the second subject always fasted 2 hours before the examination.

## 5. Conclusion

The application of diabetes exercise on subjects with Type II diabetes mellitus with ineffective peripheral tissue perfusion problems can be concluded that both subjects have the same complaint, namely frequent drinking and urination at night, numb hands, feeling dizzy when high sugar levels, GDS value 476 mg/dl and in subject II with a GDS value of 456 mg/dl.

The application of this diabetes exercise for 6 visits resulted in the effectiveness of treatment provided, namely the symptoms experienced by the two subjects were rarely experienced and there was a decrease in blood sugar levels after treatment in subject I to 115 mg/dl and subject II to 174 mg/dl. Therapy will be effective if the gymnastic movements are in accordance with the movements taught, consistent in doing diabetes gymnastics. This therapy can lower blood sugar levels and relieve symptoms experienced by people with diabetes mellitus.

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