



Foot Exercises in Controlling Blood Sugar Levels in Elderly People with DM at the Baraka Community Health Center, Enrekang Regency, South Sulawesi

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Abstract

The aging process in the elderly is followed by a decrease in the function of various organs or tissues in the body, including pancreatic beta cells, the effect of which is causing insulin production to decrease, causing blood sugar levels to increase. Diabetes mellitus occurs due to decreased sensitivity to insulin (insulin resistance) or due to a decrease in the amount of insulin produced. To prevent this, one of the pillars of diabetes management is physical exercise or exercise, namely foot exercises. This research method uses a quasi-experimental design with a one group pretest post test design. The aim of this research was to determine the effect of leg exercises on blood sugar levels in elderly people with diabetes mellitus at the Baraka Community Health Center. The sampling technique was carried out using simple random sampling with a sample size of 13 people. The results of the research using the paired t-test showed that the $p\text{-value} = 0.000 < \alpha = 0.05$. This research shows the influence of leg exercises on blood sugar levels in elderly people with diabetes mellitus at the Baraka Community Health Center. The conclusion is that elderly people with diabetes mellitus who carry out foot exercises according to indications and pay attention to contraindications with a frequency of 3 times a week for 30 minutes will have their blood sugar levels under control.

Keywords: Foot Exercises, Controlling Blood Sugar Levels, Elderly, DM Sufferers, Baraka Health Center

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1. Introduction

The aging process in the elderly is followed by a decrease in the function of various organs or tissues in the body, including pancreatic beta cells, the effect of which is causing insulin production to decrease, causing blood sugar levels to increase. The condition of the elderly is identical to diabetes mellitus/DM, namely a metabolic disorder (Ministry of Health of the Republic of Indonesia, 2014).

Diabetes mellitus is a chronic disease characterized by the body's inability to metabolize carbohydrates, fats and proteins, resulting in hyperglycemia (Tarwoto, 2012).

Prevalence data from the World Health Organization/WHO shows that 14 million people suffer from diabetes mellitus in Indonesia and it is estimated that by 2030 this will increase to around 21.3 million people (WHO, 2012).

Apart from that, the Central Statistics Agency stated that the number of diabetes mellitus sufferers in Indonesia has reached 13.7 million people and by 2030 it is estimated that this will increase to 20.1 million people (BPS, 2016). Even though the two data are different, this gives an idea that there has been a 2-fold increase in diabetes mellitus compared to before and is estimated to increase by 1.5 % per year.

The increase in the incidence of diabetes mellitus is accompanied by an increase in complications that arise acutely and chronically. Acute complications of diabetes mellitus due to a short-term imbalance in blood glucose are that the patient will experience hypoglycemia, causing the sufferer to suddenly become unconscious or diabetic coma, diabetic ketoacidosis (DKA), and non-ketotic hyperglycemic hyperosmolar syndrome. Chronic complications of diabetes mellitus occur 10-15 years after diagnosis. Chronic complications can arise from macrovascular disorders (large blood vessel disease), microvascular disorders (small blood vessel disease), and neuropathy. Macrovascular disorders can occur in the coronary circulation, peripheral vasculature and cerebral vasculature. Microvascular disorders can include abnormalities in the kidneys (nephropathy) and eyes (retinopathy) and can lead to problems such as impotence and foot ulcers (Anani, 2012).





The phenomenon described above is because diabetes mellitus sufferers experience inadequate insulin production, resulting in increased blood sugar levels. This condition can cause damage to the nerves, blood vessels and other internal structures so that the blood supply to the legs becomes increasingly obstructed, the effect being that DM sufferers experience impaired blood circulation in the legs. Elderly people with high blood sugar levels will create high blood viscosity, thereby inhibiting blood circulation and nerves, especially in the peripheral areas or ends of the feet which function as the main support of the body. This increase in blood viscosity results in an increase in the ability of bacteria to damage body cells, so that if an injury occurs, the healing process will be more difficult or take longer (Setiawan, 2011).

The results of a preliminary study conducted by researchers at the Baraka Community Health Center showed that on average, the highest number of diabetes mellitus sufferers were in the adult to elderly age group. Based on the results of interviews with 10 diabetes mellitus sufferers, the results showed that 4 respondents said they participated in diabetes exercise but not regularly and 6 people said they did not know about the complications of diabetes that can cause foot ulcers and did not know about foot exercises. The conditions above are the basis for the elderly to receive management to prevent complications by controlling their blood sugar levels.

The principles of managing diabetes mellitus include four pillars consisting of 1). education or counseling; 2). medical nutrition therapy or meal planning; 3). physical exercise or exercise; and 4). pharmacological interventions or OHO drugs (Perkeni, 2016). Synergy with the Healthy Elderly with Diabetes Mellitus/ LANSET DM program as an intervention strategy for professional nurses with the support of family, groups and cadres to control blood sugar levels in the elderly which has been carried out previously in the form of empowerment by changing the behavior of elderly with diabetes mellitus in the form of health education sessions, training , and health care management with a DM diet, foot care, foot exercises, DM exercises, complementary herbal therapy of red betel leaves, “DM-FREE” relaxation modalities, and acupressure (Ratnawati, 2015). Therefore,





one step to overcome obstructed blood circulation is to do sports or leg exercises (Rusli, 2015).

Foot exercises are given to people with diabetes mellitus, both type 1, type 2 and other types, and are highly recommended as an early preventive measure from the first time the patient is diagnosed as suffering from diabetes mellitus. Foot exercises are classified as a light and easy sport or activity because they can be done indoors or outdoors, especially at home with a chair and newspaper and do not require a long time, only around 20-30 minutes, which is useful for avoiding injuries and helping improve blood circulation in the legs. (Sumosardjuno, 2012).

Based on this explanation, researchers carried out foot exercise therapy and then measured blood sugar levels during pre and post foot exercise in elderly people with diabetes mellitus at the Baraka Community Health Center. This study aims to determine the effect of leg exercises on blood sugar levels.

2. Research Methods

This research design uses a quasi-experimental method without a comparison or control group, with a One Group Pre-Test Post Test design without a comparison or control group. Previously, this research carried out the first observation (pre test) on the group and was followed by experimental intervention with a frequency of 3 times a week for 30 minutes over a period of 3 months, then a post test was carried out on the group. Samples were taken using simple random sampling with a minimum sample of 13 people.

The inclusion criteria are the characteristics of the sample that can be included or are suitable for research with the criteria of elderly people who are conscious, elderly people with diabetes mellitus problems at Posbindu Anyelir, and elderly people who have a blood sugar test of ≥ 150 mg/dl.

The exclusion criteria in this study were elderly with cardiovascular disorders and dyspnea, elderly with complaints of chest pain, elderly with depression, and elderly with diabetic wounds.

3. Results and Discussion





a) Age Characteristics Respondent

Table 1.
 Distribution Frequency Respondent Based on Age in Elderly
 Diabetes Melitus at the Baraka Community Health Center

Age	N	%
<i>Middle Age</i> (45-59 year)	11	84.6
<i>Elderly</i> (60-74 year)	2	15.4
Total	13	100

Results analysis from table 1 in on about distribution frequency age respondents in Baraka Community Health Center, 13 respondents were studied can be known majority respondents including middle or *middle age* (45-59 year) as much 11 person respondents (84.6%). Apart from that, as many as 2 respondents (15.4%) included carry on age or *Elderly* (60-74 years). Age is long life respondents which calculated based on last birthday (Supriadi, 2014).

Study about effectiveness therapy exercise foot with newspaper discuss suitability age respondents sufferer DM with an increased risk of diabetes mellitus, usually on range age more from 40 year, because on age the beginning happen enhancement intolerance glucose (Endryanto, 2012). Moment process aging takes place resulting in the cell's ability β pancreas reduce in produce insulin. Proven on results study This was found more frequently in respondents aged > 40 years, as many as 11 respondents, because diabetes mellitus usually occurs after the age of 30 years and occurs more frequently after the age of 40 years. When elderly people will experience glucose tolerance problems with a risk of 50-92% (Sudoyo, 2010).

In line with research at the Cengkareng District Health Center, West Jakarta in 2013, it was shown that the increased risk of diabetes mellitus was accompanied by age, especially at age > 40 years, because the aging process reduced the ability of pancreatic beta cells to produce insulin (Trisnawati, 2012). So older individuals





experience a 35% decrease in mitochondrial activity in muscle cells, this is associated with a 30% increase in fat levels in the muscles and encourages insulin resistance.

b) Overview of Gender Characteristics

Table 2.
 Frequency Distribution of Respondents Based on Gender in the Elderly
 with Diabetes Mellitus at the Baraka Community Health Center

Type Sex	N	%
Man – Man	3	23.1
Woman	10	76.9
Total	13	100

Table 2 above regarding the gender frequency distribution at the Baraka Community Health Center shows that the majority of respondents are female with 10 respondents (76.9%) and 3 respondents (23.1%) male. Gender is an identity for respondents that can be used to differentiate between men and women, which can be seen from the values, behavior and physical appearance of the respondent (WHO, 2012).

The results of this study are in accordance with research in 2012, the incidence of diabetes mellitus is higher in women than men, especially in type 2 DM because it is caused by a decrease in the hormone estrogen due to menopause. Estrogen basically functions to maintain balanced blood sugar levels and increase fat storage and progesterone which functions to normalize blood sugar levels and helps use fat as energy.

Women are more at risk of developing diabetes mellitus because physically women have a greater chance of increasing body mass index, monthly cycle syndrome (premenstrual syndrome), post-menopause it becomes easier for the distribution of body fat to accumulate due to this hormonal process, making the risk of suffering from diabetes mellitus greater for women (Irawan, 2010).

c) Average Distribution of Blood Sugar Levels Before and After Doing Leg Exercises





Table 3.

Average Distribution of Respondents Based on Sugar Levels Blood Before and After Doing Foot Exercises Diabetes Mellitus Elderly at Baraka Community Health Center

Variable	n	Mean	elemen tary school	Min	Max
Pretest Sugar Blood	13	233.23	57,911	152	315
Posttest Sugar Blood	13	184.38	43,697	140	285

The results of the analysis in table 3 above regarding the frequency distribution of the average blood sugar levels before and after doing leg exercises at the Baraka Community Health Center can be seen that the results of the average blood sugar levels of respondents before doing leg exercises with a mean value of 233.23 with a standard deviation of 57.911 and levels The lowest blood sugar was 152 mg/dL and the highest was 315 mg/dL. The average results of blood sugar levels after doing leg exercises were a mean value of 184.38 with a standard deviation of 43,697 and the lowest blood sugar level was 140 mg/dL and the highest was 285 mg/dL.

The average value of blood sugar levels before the respondents' leg exercises was included in the bad category, namely blood sugar levels when 120-150 were classified as good, blood sugar levels when 151-199 were classified as moderate and blood sugar levels when >200 were classified as bad (Perkeni, 2015).

4. Conclusion

The conclusion of this study is that the characteristics of the majority of respondents are in the middle age category (45-59 years) and the gender in this study is dominated by female respondents. Description of blood sugar levels before and after doing leg exercises in respondents at the Baraka Community Health Center, the majority of blood sugar levels before the intervention were ≥ 200 mg/dL and blood sugar levels after leg exercises $<150 - 199$ mg/dL. The average blood sugar level in elderly people





with diabetes mellitus before doing leg exercises is $233.23 \pm 57,911$ and the average blood sugar level in elderly people with diabetes mellitus after doing foot exercises is $184.38 \pm 43,697$ with an average decrease in blood sugar levels before and after leg exercises is 48.85. So it can be concluded, there is an influence before and after the implementation of foot exercises on controlling blood sugar levels in the elderly with diabetes mellitus in the elderly with diabetes mellitus at the Baraka Community Health Center with a p-value of 0.000 ($p < 0.05$) and a confidence level of 95%.

5. Compliance with ethical standards

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Disclosure of conflict of interest

This research collaboration is a positive thing for all researchers so that conflicts, problems and others are absolutely no problem for all writers.

Statement of informed consent

Every action we take as authors is a mutual agreement or consent.

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