**THE INFLUENCE OF NUTRITION AND SPORTS CONSTRUCTION COMBINATION OF "PATTERN 45" ON BLOOD GLUCOSE LEVEL OF DIABETES MELLITUS (DM) PATIENTS IN PALANGKA RAYA CITY**

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**ABSTRACT**

**Introduction:** Counseling activities are one of the strategies for managing diabetes mellitus which aims portion and diet of DM patients (ADA, 2008). Diet regulation is important in DM management. In the absence of an adequate dietary arrangement, DM patients have a high chance of experiencing various diabetic complications both macroangiopathy, microangiopathy, and neuropathy (Price, 2005). Not only the consumption of sugar, consumption of other nutrients such as fat, fiber, antioxidants, etc. are very influential on the progression of DM (Mangou, 2012). Meanwhile, sports activities affect the physical fitness of DM patients, namely to improve the cardiovascular freshness of the heart, blood vessels, breathing, and blood circulation, and can control the risk of DM.

**Objective**: This study aims to determine the effect of the combination of nutritional and sports counseling "pattern 45" on blood glucose levels in patients with diabetes mellitus (DM) in the city of Palangka Raya.

**Methods**: The study was conducted with a *quasi-experimental design* by taking location in the working area of ​​RSUD dr. Doris Sylvanus, Pahandut Health Center, Bukit Hindu Health Center, Kayon Health Center, and Panarung Health Center, Palangka Raya City. The population in this study were all overweight DM patients who examined the working area of ​​RSUD dr. Doris Sylvanus, Pahandut Health Center, Bukit Hindu Health Center, Kayon Health Center, and Panarung Health Center, Palangka Raya City. Data collection included age, occupation, weight, height, postprandial blood glucose levels, sports activities. Blood glucose levels were measured using an enzymatic method using a photometer device performed by health analysts. Samples were measured twice during the study at the beginning and end of the study. Data analysis was carried out by univariate, bivariate.

**Results**: Subject fasting blood glucose levels at the beginning of this study were between 100 mg/dl to 327 mg/dl, with an average blood glucose level of 175.47 mg/dl. After being given the intervention, the lowest blood glucose level was 104 mg/dl and the highest blood glucose level was 273 mg/dl, the average blood glucose level of the subjects after an intervention was 152.07 mg/dl. On the average sample the decrease in blood glucose levels reached 23.4 mg/dl between the first and second blood glucose levels., Based on the results of statistical tests there was a significant decrease in glucose levels after the sample received nutritional counseling and exercise (*p*= 0.0001)

**Conclusion**: The combination of nutritional counseling and sports (foot exercises) '45' pattern affects the blood sugar of DM patients (*p = 0.0001*).

**Keywords**: Nutrition Counseling, Sports, People with Diabetes Mellitus.

**INTRODUCTION**

At present in developing countries, there has been a major shift in the cause of death, namely from infectious diseases to non-communicable diseases, and more and more emerging degenerative diseases, one of which is diabetes mellitus (DM). This trend of change is influenced by an increasing population, urbanization that changes traditional lifestyles into modern lifestyles, the prevalence of obesity is increasing, and physical activity is lacking. DM is a disease of chronic metabolic disorders characterized by an increase in blood glucose caused by an imbalance between insulin supply and needs.

Various epidemiological studies have shown a trend towards an increase in incidence and prevalence of type II DM in various parts of the world. Globally, the *World Health Organization* (WHO) estimates that in 2000 the number of DM sufferers over the age of 20 amounted to 150 million people and doubled to 300 million in 2025. In 2000, DM patients in Indonesia were 8, 4 million people and ranks fourth after India, China and the United States (Soegondo et al., 2005). Meanwhile, the International Diabetes Federation (IDF) (2014), estimates that in 2013 there were 382 million people living with diabetes in the world, 175 million of which have not been diagnosed so that they are threatened to progressively become unconscious complications and without prevention. By 2035 it is estimated that this number will increase to 592 million people.

Based on data from the Indonesian Statistics Agency (2003) it is estimated that Indonesia's population of over 20 years is 133 million. With the prevalence of DM in urban areas by 14.7% and rural areas by 7.2%, it is estimated that in 2003 there were DM patients as much as 8.2 million in urban areas and 5.5 million in rural areas. Based on the pattern of population growth, it is estimated that by 2030 there will be 194 million people aged over 20 years and assuming DM prevalence in urban (14.7%) and rural (7.2%), there are an estimated 12 million DM sufferers in urban areas and 8.1 million in rural areas (Perkeni, 2006).

According to the Basic Health Research (Riskesdas) in 2013, in Indonesia, there were 0.6% of the population aged 15 years and over or about 1 million people who felt the symptoms of DM in the past month but have not been ascertained/examined whether they suffer from DM or not. Meanwhile, the proportion of the population aged ≥15 years in Central Kalimantan who had been diagnosed with diabetes by doctors was 1.2% and the population aged ≥15 years who had never been diagnosed with diabetes by a doctor but in the last 1 month had symptoms of frequent hunger, often thirst, frequent urination with large amounts, and weight loss of 0.4% with a population of ≥14 years aged 1,608,217 people (Ministry of Health, 2015). Diabetes mellitus can have an impact on the quality of human resources and an increase in health costs that are quite large, for that, all parties, both the community and the government should participate in DM prevention efforts, especially prevention efforts (Perkeni, 2006).

DM management is carried out through two approaches, namely a drugless approach and a drug approach. Counseling activities are one of the strategies for managing diabetes mellitus which aims to change the portion and diet of DM patients (ADA, 2008). Diet regulation is important in DM management. In the absence of an adequate dietary arrangement, DM patients have a high chance of experiencing various diabetic complications both macroangiopathy, microangiopathy, and neuropathy (Price, 2005). Not only the consumption of sugar, consumption of other nutrients such as fat, fiber, antioxidants, etc. are very influential on the progression of DM (Mangou, 2012). Meanwhile, sports activities affect the physical fitness of DM patients, namely to improve the cardiovascular freshness of the heart, blood vessels, breathing, and blood circulation, and can control the risk of DM.

**MATERIALS AND METHODS**

This study was a quasi-experimental study with the design of *one group pre-post-test.* The study subjects were examined twice for blood glucose levels before the experiment (pre-test) and after the experiment (post-test). In the group of study, subjects were given interventions namely nutritional counseling four times a month and exercise five times a week for one month. In this case, it is seen the difference in achievement between before the experiment and the achievement after the experiment.

The sample in this study were patients with diabetes mellitus in the City of Palangka Raya based on inclusion and exclusion criteria totaling 15 people. The independent variable in this study is nutrition counseling and sports "45" pattern. Whereas the dependent variable is blood glucose levels in diabetics in Palangka Raya City. Primary data collected include anthropometric data (body weight and height), laboratory results, types of drugs used, illness complications and sports activity data recorded in the *logbook*.

Data analysis was carried out in univariate and bivariate ways. Univariate data analysis, that is, describes the frequency distribution obtained. While the bivariate data analysis is analyzing the data statistically using a paired t-test to determine the significant differences between the difference in pre-post-test scores in the experimental group.

**RESULTS AND DISCUSSION**

**Distribution of samples based on age**

The highest sample age used in this research ranged from 56 to 60 years, amounting to 5 people out of 15 total sample (334%) (Figure 1). Age is one of the factors that influence the prevalence of DM. The results of research from the University of North Sumatra, there is an increase in the prevalence of DM according to age, especially at the age of> 40 years, but at the age of ≥ 65 years tends to decrease. Some experts argue that increasing age, glucose intolerance also increases (Retno, 2012)

**Figure 1 Distribution of samples based on age**

**Distribution of samples based on sex**

Sample of this research were dominated by female (67%). In this study, it turns out that the more affected by Type 2 diabetes is female. The prevalence of DM sufferers tends to increase in women compared to men. Women with age close to menopause, the risk of developing Type 2 DM increases. This is caused by hormonal factors.

In premenopausal women tend to be sensitive due to changes in the shape of the body pattern and decreased estrogen. If it is associated with the process of the occurrence of Type 2 DM, in men have more muscle mass and activity so that burning energy is also greater. While women, on the contrary, make it easier to gain weight than men with the same energy intake (Yunir, 2006).

**Sample Distribution Based on Sports Activities (Foot Gymnastics)**

The distribution of samples based on sports activities (foot exercises) can be seen in the following table.

**Table. 1 Sample Distribution Based on Sports Activities (Foot Gymnastics)**

|  |  |  |
| --- | --- | --- |
| **Sports Activities (Foot Gymnastics)** | **Total** | **Percentage (%)** |
| < 20 times/month | 9 | 60 |
| ≥ 20 times/month | 6 | 40 |
| **Total** | **15** | **100** |

It can be seen from table 1 that the sample with the highest frequency of exercise (foot exercise) is with a frequency of <20 times/month as many as 9 people (60%). This is because the sample has difficulty preparing newspapers as a medium to do foot exercises. Gymnastics is a physical exercise as an effort to prevent and control DM and is one of the pillars of DM management in addition to education, nutritional therapy, and pharmacological inventions. Foot exercises function to improve blood circulation and strengthen the small muscles of the legs and prevent foot deformities (Atun, 2010).

**Univariate**

Based on Table 2, it is known that the variable weight before giving a combination of nutritional counseling and sports (foot exercise) obtained a mean value of 69.86 kg, a median value of 72.0 kg, a standard deviation value of 8.37 kg, a minimum value of 54.5 kg, and the maximum value is 84.6 kg. After giving the counseling and foot exercises, the mean value is 69.74 kg, the median value is 72.0 kg, the standard deviation value is 8.77 kg, the minimum value is 52.6 kg, and the maximum value is 83.3 kg.

BMI before giving a combination of nutritional counseling and sports (foot exercise) obtained a mean value of 29.48 kg/m2, a median value of 29.2 kg/m2, a standard deviation value of 4.78 kg/m2, a minimum value of 22.4 kg/m2, and the maximum value is 40.5 kg/m2. After giving counseling and foot exercises, the mean value is 29.38 kg/m2, the median value is 72.0 kg/m2, the standard deviation value is 8.77 kg/m2, the minimum value is 22.4 kg/m2, and the value the maximum is 39.6 kg/m2.

**Table 2. Univariate Data Analysis Before and After Intervention**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variabel** | **Mean** | **Median** | **SD** | **Min** | **Max** |
| BB beforeBB after | 69.8669.74 | 72.072.0 | 8.378.77 | 54.552.6 | 84.683.3 |
| IMT before IMT after  | 29.4829.38 | 29.2028.57 | 4.784.82 | 22.422.4 | 40.539.6 |
| Glukosa Puasa beforeGlukosa Puasa after  | 175.47152.07 | 143.0136.0 | 71.3850.69 | 100104 | 327273 |
| Glukosa 2 JPP beforeGlukosa 2 JPP after  | 178.53187.53 | 146.0154.0 | 117.00102.66 | 8074 | 509402 |

Fasting Glucose levels before the combination of nutritional counseling and sports (foot exercises) obtained a mean value of 175.47 mg/dl, a median value of 143.0 mg/dl, a standard deviation value of 71.38 mg/dl, a minimum value of 100 mg/dl, and the maximum value is 327 mg/dl. After giving counseling and foot exercises, the mean value is 152.07 mg/dl, the median value is 136.0 mg/dl, the standard deviation value is 50.69 mg/dl, the minimum value is 104 mg/dl, and the maximum value is 273 mg/dl.

Glucose levels of 2 hours PP before the combination of nutritional counseling and sports (foot exercise) obtained a mean value of 178.53 mg/dl, the median value of 146.0 mg/dl, the standard deviation value of 117.00 mg/dl, the value minimum of 80 mg/dl, and the maximum value is 509 mg/dl. After giving counseling and foot exercises, the mean value was 187.53 mg/dl, the median value was 154.00 mg/dl, the standard deviation value was 102.66 mg/dl, the minimum value was 74 mg/dl and the maximum value was 402 mg/dl.

**The Influence of Combined Nutrition and Sports Counseling (foot exercises)**

Based on Table 3, it can be seen that a combination of nutritional counseling and sports (foot exercises) '45' pattern affects the blood sugar of DM patients (p = 0.0001). Consultation is a process of giving assistance made by counselors in face-to-face situations. The goal of a Diabetes Mellitus patient to do nutritional consultations is so that sufferers easily obtain clear information about Diabetes Mellitus both regarding treatment and medication, as well as about the recommended foods that can be consumed and their restrictions. The process of providing counseling during the research shows that the sample in the first week has not seen any changes related to the 3 J principle (*Jenis*/Type, *Jumlah*/Amount and *Jadwal/*Schedule).

**Table 3. Bivariate Data Analysis Before and After Intervention**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variabel** | **Mean** | **SD** | **95% CI** | ***p value*** |
| Glukosa Puasa beforeGlukosa Puasa afterGlukosa 2 Jam PP beforeGlukosa 2 Jam PP after | 173.25176.34 | 71.22116.78 | 133.81 – 212.69111.66 – 241.02 | 0.0000.000 |

The average results of the sample counseling record are excessive food consumption, 3 times the diet pattern with or without interruption, but the sample meal schedule is in accordance with the rules. This is due to feeling difficult to change the previous behavior so that it results in an increase in blood sugar 2 hours PP sample with a maximum value of 509 mg/dl. This means that the function of the pancreas or insulin released by the pancreas to neutralize blood sugar is not able to work optimally. Significant changes were seen in the third week of counseling, where almost all samples began to comply with the 3 J principle, which resulted in a decrease in sample blood sugar levels in the fourth week to 402 mg/dl. The results of this study are consistent with the results of Mulyani's study, there is a significant effect between nutritional consultation on blood sugar levels of Type II Diabetes Mellitus patients.

In addition, a decrease in blood sugar levels is also influenced by foot exercise activities carried out by the sample. Samples with foot exercises that are carried out more than 20 times per month decrease blood glucose faster. The results of this study are in accordance with the results of research conducted by Randi, diabetic foot exercises affect the blood sugar levels of DM patients. DM patients have a higher risk of experiencing foot problems due to impaired blood vessels, causing leg blood circulation from the legs to decrease, nerve disorders causing the foot's ability to feel reduced, and reduced body resistance to infection.

**CONCLUSIONS AND SUGGESTIONS**

The combination of nutritional counseling and sports (foot exercises) '45' pattern affects the blood sugar of DM patients (p = 0.0001). In this population, nutrition counseling and sports (foot exercises) '45' patterngiven was proven to improve diet and exercise adherence in DM management so that interventions can influence decreasing blood glucose levels.

Based on the results of the study found, the suggestions that can be given are:

1. Providing nutritional counseling and sports advice pattern "45" in overweight DM patients
2. Providing nutritional counseling books and sports tutorials on research samples
3. For other researchers who are interested in continuing this research, some the following: approach to the patient to be ready as a sample, it should be tried to apply to patients with DM with complications, it is necessary to recall the food intake after counseling.

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