Model of Physical Activity (*Gambo Rasa*) on Type-2 Diabetes Mellitus Glucose Level in Working Area of *Bolo* Health Center

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Abstract

Introduction: The principle of managing diabetes mellitus consists in setting management goals, modifying diet and exercise, medication, monitoring blood glucose levels, monitoring complications regularly, and evaluating laboratories. In addition to these principles, four main pillars of diabetes mellitus management were more concise to understand, which include education, diet, exercise, and medicine. Exercise was considered important for diabetes mellitus management because it can cause physiological effects such as lowering blood glucose levels; lowering fat levels the body, decreases blood lipid levels, lowers blood pressure, and improves fitness. Methods: The research design used was "one group pretest-posttest design", researchers examined changes that occur after an intervention. Data were analyzed using paired sample t-test. Results: The results showed that there was an influence of the physical activity model (*Gambo Rasa*) on blood glucose levels of type-2 diabetes mellitus.

Keywords: *Model of Physical Activity, Gambo Rasa; Type-2 Diabetes Mellitus; Blood Glucose.*

Introduction

The lifestyle of the 21st century makes people more distant from active lifestyles. The lifestyle of consuming instant food and fast food that was not controlled and fewer activity results in higher rates of overweight that were closely related to the chance of developing diabetes mellitus especially type 2. The results of the data show that 80-90% of people with type 2 diabetes were obese or overweight [1]. In addition to obesity, several other factors that trigger the occurrence of type 2 diabetes mellitus were age over 45 years, racial differences, hypertension, and heredity [1].

Seeing the high incidence of diabetes mellitus above, this problem was increasingly important to overcome, because diabetes mellitus also has a high rate of illness or complications. The rates of diabetes mellitus in the United States are 68% having heart problems, 16% having strokes, 67% hypertension with blood pressure more than 140/90 mmHg, 28.5% having retinopathy, 44% having kidney disorders, 60% having amputations lower limbs, and 60-70% experience nervous system disorders [2].

The high number of diabetes mellitus morbidity above was also followed by high expenditure for morbidity treatment. Diabetes mellitus was an expensive disease, because the more severe the level of complications or pain experienced, the costs to control complications were also greater [3].

According to data from the American Diabetes Association [4], the cost of medical care per year for diabetes increases from 2007 amounting to 174 billion dollars to 245 billion dollars in 2012 if it was converted to around 1.740 trillion rupiahs to 2.450 trillion, 18% of the cost was to treat complications or morbidity from diabetes which was around 44.1 billion dollars in 2012 [2].

Based on the incidence rate, morbidity rate, and the amount of diabetes mellitus treatment costs, so it was necessary to prevent and manage or manage diabetes mellitus to minimize the incidence and morbidity or complications of diabetes mellitus. The principle of managing diabetes mellitus consists of setting management goals, modifying diet and exercise,

medication, monitoring blood glucose levels, monitoring complications regularly, and laboratory assessments. In addition to these principles, four main pillars of diabetes mellitus management were more concise to understand which include education, diet, exercise, and medicine [5]. Exercise was considered important for diabetes mellitus management because it can cause physiological effects such as lowering blood glucose levels, lowering body fat levels, lowering blood lipid levels, lowering blood pressure, and increasing fitness.

The above effects can be obtained if the exercise or sport that was done was appropriate or appropriate. Proper exercise or exercise was an exercise that fulfills one of the two conditions: first was continuous, rhythmic, interval, progressive, endurance (CRIPE). Continuous means exercise must be continuous and carried out continuously, rhythmic means exercise that was carried out rhythmically so that the muscles will contract and relax regularly, intervals means that the exercise was alternated between fast and slow movements, progressive means the exercise was carried out in stages according to the ability of mild to moderate intensity, and endurance means endurance exercises to improve the ability of the heart and lungs.

CRIPE for diabetes was a continuous 30 minutes of exercise, rhythmic such as walking, jogging, cycling, swimming, intervals such as exercise movements combined quickly and there were slow, progressive exercises such as for beginners exercising from mild intensities first and increasing with increasing ability, and endurance such as during training breath regulation was also regulated [6].

The second requirement was that exercise can be aerobic and or strength, aerobic exercise and strength training have been proven to be beneficial in reducing blood glucose levels for people with diabetes mellitus. The second chronic effect of exercise was that it can increase insulin action, and fat oxidation [7].

Therefore, researchers want to examine how the effects of physical exercise by modifying *Bima* cultural dance on blood glucose levels in people with type 2 diabetes mellitus in the *Bolo* Health Center area of *Bima* Regency. Based on observations for one month in the field about blood glucose levels in people with

diabetes mellitus can be known as follows: (1) blood glucose levels of some type 2 diabetes mellitus patients in the *Bolo* Health Center of *Bima* Regency were quite high, (2) some patients with type 2 diabetes mellitus *Bolo* Health Center of *Bima* Regency was overweight, (3) some type 2 diabetes mellitus sufferers in *Bolo* Health Center has hypertension, (4) so far, sports carried out by people with diabetes mellitus in *Bolo* Health Center were just gymnastics.

The recommended duration of physical activity for healthy people aged 18-64 according to the World Health Organization [3] was 150 minutes per week. Diabetes patients can use these guidelines in making exercise plans, for example, 3 times a week with duration of 50 minutes per day or 5 times a week with a duration of 30 minutes per day. To begin the exercise, the diabetes mellitus patient should start exercising within 10 minutes per session. Gradually, the patient can increase the amount of exercise time per session by 30 minutes.

This will help patients adjust their body condition to the exercise they were doing Physical exercise model was useful to maintain the stability of blood glucose levels because blood glucose levels was exceeds normal limits can cause a serious threat to health that can cause serious damage to the tissue produced by damage to large and small vessels [8].

Also, many people with diabetes mellitus in the *Bolo* Health Center do not yet know the benefits of physical activity on the management and prevention of complications so that ergo cycle training was needed to manage blood glucose levels to remain within normal limits. Therefore, this study was conducted to examine the physical activity model (*Gambo Rasa*) on blood glucose levels of type-2 diabetes mellitus in the working area of *Bolo* Health Center, *Bima* Regency, Indonesia"

Methods

This research was carried out in the working area of the *Bolo* Health Center, *Bima* Regency in 2019. This research was a experimental study using "one group pretest-posttest design". The sample of this research were people with type-2 diabetes mellitus who live in the working area of *Bolo* Health Center, *Bima* Regency, selected by simple

random sampling technique, with a sample size of 40 patients. The researchers examined changes that occur after an intervention, namely physical activity model (*Gambo Rasa*). The measured change was the blood glucose level of these sufferers. The measurement of blood glucose was carried out three times, the first was before the physical activity program of "*Gambo Rasa*" (pre test), the second was in the middle of the physical activity program (post test I) / first week evaluation, and the third was at the end of the physical activity program (post test II) / second week evaluation. Categorical data are presented in terms of frequency and percentage [9].

Furthermore, the difference in blood glucose levels was tested between the pre-test and post-test I phases, as well as the difference in blood glucose levels between the post-test I and post-test II phases. The analysis was carried out using paired sample t-tests.

Results

Based on the Table 1, 52.5% of respondents aged >60 years, 55% of respondents were female, 65% of respondents worked as farmers, 60% had high school education and 62.5% of respondents had >1 year suffer from diabetes mellitus.

Table 1: Distribution of respondent characteristics

Characteristics	Frequency	Percentage
Age		
• < 40 years	3	7.5
• 50 - 60 years	16	40
• > 60 years	21	52.5
Gender		
• Male	18	45
• Female	22	55
Job		
• Farmer	26	65
• Private	5	12.5
• Government Employees	2	5
• Retired	7	17.5
Education		
• Elementary	1	2.5
• Middle	4	10
• High Scshool	24	60
• Diploma/Bachelor	12	30
Long Suffered from DM		
• 0 – 1 Years	15	37.5
• > 1 Years	25	62.5

Table 2: The blood glucose levels

Blood glucose level	Pre-test		Post-test I		Post-test II	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
≥ 100 mg/dl	0	0	12	30	23	**57.5**
110-199 mg/dl	14	35	20	**50**	15	37.5
≤ 200 mg/dl	26	**65**	8	20	2	5
Total	40	100	40	100	40	100

Table 2 shows that in the pre-test phase, the distribution of the highest blood glucose levels was in category of ≤ 200 mg/dl (65%). In the post test I phase, the highest distribution of blood glucose levels was in category of 110-199 mg/dl (50%). Whereas in the post test phase II the most glucose distribution was in category of ≥ 100 mg/dl (57.5%). This shows that along with the time course of the implementation of the "*Gambo Rasa*" program, blood glucose levels of type 2 diabetes mellitus sufferers were decreasing

Table 3: The results of the Wilcoxon test

Intervention	n	Mean Rank		t	p-value
		Lower	Upper		
Pre-test vs Post-Test 1	40	576	924	8.735	0.000
Post-Test 1 vs Post-Test 2	40	265	585	5.369	0.000

Based on Table 3 it can be seen that the paired sample t-test for testing the difference in blood glucose levels between the pre-test and post-test I phases yields a p-value of 0.000. The same results were obtained from the difference test between the post test I and post test II phases. Thus it can be interpreted that there were significant differences in blood glucose levels between the pre test and post test I phases, also between post I and post test II. Thus it can be concluded that the "*Gambo Rasa*" physical activity program had been successful in reducing blood glucose levels of type-2 diabetes mellitus sufferers

Discussion

Based on the results of research it has been proven that physical activity built from traditional dance from *Bima* known as "*Gambo Rasa*", which contains the element of gymnastics, has been proven effective in reducing blood glucose levels of people with type 2 diabetes mellitus in the working area of the *Bolo* health center, *Bima* Regency, Indonesia. Within one week after carrying out physical activity, there has been a significant decrease in blood glucose levels. Then after physical activity resumed for one week, blood glucose levels continue to decline, until the majority are in the normal category.

This shows that "*Gambo Rasa*" is a local potential that should be developed in improving public health, especially for controlling diabetes mellitus, with efficient resource mobilization. Based on the characteristics of respondents, it turns out that some respondents had suffered from diabetes mellitus more than 1 year ago. Patients, who suffer from diabetes mellitus for more than 1 year, have more awareness to maintain blood glucose levels.

Experience with this disease makes more careful to keep blood glucose levels remain good including doing exercises. *Bima* was one of the regions in the Province of *Nusa Tenggara Barat*, Indonesia. The majority were inhabited by ethnic *Bima* who also have unique characteristics in terms of traditional culture. One of them was dance art. Broadly speaking, the art of dance in *Bima* can be classified into two parts, namely the *Mpa'a Asi* dance or court dance and *Mpa'a Ari Mai Ba Asi* or folk dance. Each type of dance has its purpose, function, and meaning.

The diversity of dance that was owned by the *Bima* community greatly enriches the cultural diversity of the Indonesian nation itself [10]. The data analysis results showed that there was an influence of the Physical Activity model (*Gambo Rasa*) on blood glucose levels of type-2 diabetes mellitus in the working area of *Bolo* Health Center in *Bima* Regency. This study was in line with the study of Fikasari (2012), that someone who regularly performs physical activity can reduce the risk of developing type-2 diabetes mellitus by 0.442 times compared to those who do not regularly / never engage in physical activity, because physical activity can reduce weight and improve sensitivity to insulin, which can improve glucose control in the blood. The results of the study with two measurements of blood glucose levels after exercise were performed, showed an influence of the Physical Activity Model (*Gambo Rasa*) on the blood glucose levels.

There was consistent with the above theory that the Physical Activity model (*Gambo Rasa*) can reduce blood glucose levels. But this cannot absolute be a reference as a decrease in blood glucose levels for people with type-2 diabetes mellitus, because in addition to physical exercise there were also other factors to reduce blood glucose levels, namely diet and other activities such as work.

These factors are not examined by researchers so they can be a reference for research on subsequent diabetes mellitus. Based on the results of the study, it can be concluded that there is an influence of the physical activity model (*Gambo Rasa*) on the blood glucose levels of type-2 diabetes mellitus sufferers in the working area of *Bolo* Health Center, *Bima* Regency.

It was recommended for health workers in *Bolo* Health Center in *Bima* Regency and all to further socialize the physical activity model (*Gambo Rasa*), especially to reduce blood glucose levels of diabetes mellitus sufferers to the wider community so that physical activity participants can be increased as a form of non-pharmacological management by preserving local livelihoods *Bima* regional music culture and art in patients with diabetes mellitus in maintaining fitness, physical health and as a place to interact between patients with diabetes mellitus.

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