

Rudat Sasambo (RUSA) Diabetes Mellitus Exercise According to FITT, Reduce Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Based on observations of the implementation of Diabetes Mellitus exercise carried out in several Mataram City communities, the problems that arise are the low participation of diabetics in the gymnastics program, the exercises carried out are not in accordance with good FITT such as frequency, intensity, tempo and type, in the observations of researchers at Persadia Mataram members. and members of the *prolanis* at the Community Health Center whose frequency is only once a week and some are once a month, not given a good intensity of training because the maximum pulse rate is not measured, the time given is 1 hour and the type of exercise is diabetes mellitus exercise which it is quite tiring, and counseling about the benefits of diabetes exercise has never been done, especially biometric parameters that will change if physical exercise such as blood glucose and uric acid is carried out, in the preliminary research conducted there was a decrease in blood glucose levels and blood pressure. uric acid in people with diabetes mellitus but there is an increase again because it is only done once a week or a month. This study aims to prove that Rudat Sasambo (RUSA) diabetes mellitus exercise according to FITT lowers blood glucose levels and uric acid levels compared to conventional diabetes mellitus exercise. The research design used in this study was a quasi-experimental, with a randomized control group pretest - posttest design. The sampling used was probability sampling with a simple random sampling approach. In this study, six measurements were taken where measurements were made before treatment and measurements after treatment which were then analyzed using an independent t-test and paired t-test. The results showed that there was an effect of RUSA diabetes mellitus exercise according to FITT on reducing blood glucose and uric acid, but there was no significant difference between diabetes mellitus exercise according to FITT and conventional diabetes mellitus exercise.

Keywords: diabetes miltitus; exercise; blood glucose level; urid acid level

INTRODUCTION

Gout has long been a major public health problem. Uric acid is the final substance of purine metabolism in the body. Excessive uric acid will not be accommodated and completely metabolized in the body which results in increased levels of uric acid in the blood which is also called hyperuricemia Gout is related to food intake patterns, so one way to prevent it is to control food intake patterns. If you don't control your intake pattern, uric acid levels in the blood will be excessive and cause a buildup of uric acid crystals which, when formed in joint fluid, will cause gout . Pre-diabetes are subjects who have increased plasma glucose levels but the increase has not reached the minimum value for the criteria for diagnosing DM. Previous studies reported 5-14.0% per year TGT will become diabetes mellitus, in addition there are also those who report ± 30% become DM after 5-6 years, 30% become normal and the remaining 30% remain TGT. ^(1,2)

Increased uric acid in pre-diabetes is thought to occur due to resistance and impaired insulin secretion. Hyperinsulinemia that occurs in pre-diabetes results in increased reabsorption of uric acid in the proximal renal tubule. Therefore, early detection of hyperuricemia is a simple test as a prodiagnostic marker for pre-diabetes. ⁽³⁻⁵⁾

The International Diabetes Federation in 2012 stated that currently there are about 371 million diabetic patients. In Indonesia 12-23% of the population aged over 15 years suffer from diabetes mellitus. Type 2 diabetes mellitus occurs because of insulin resistance, causing hyperglycemia (blood glucose> 126 mg/dl), and usually occurs at body weight that is more than normal. There are three pillars of diabetes mellitus treatment, namely medication, diet and physical exercise. Health exercise in diabetes mellitus causes better glucose tolerance, this is because insulin receptors in cells become more sensitive and reduced glycogen levels in muscle and liver cells cause these cells to be more able to take up glucose molecules from body fluids. The exercise dose given must be able to stimulate organ function, the body will always respond to each load and adjusted to FITT (Frequency, Intensity, Tempo and Type), frequency 3x a week, aerobic intensity 60% -70% DNM, tempo 20-40 minutes, type walking, jogging, running etc. ^(6,7)

Based on observations of the implementation of Diabetes Mellitus exercise carried out in several urban communities, the problems that arise are the low participation of diabetics in the gymnastics program, the exercises carried out are not in accordance with good FITT such as frequency, intensity, tempo and type, in the observations of researchers on members of Persadia Mataram exercise given the frequency only once a week, not given a good intensity of training because the maximum pulse rate was not measured, the tempo given was 1 hour and the type of exercise in the form of diabetes mellitus exercise which was considered quite tiring, as well as counseling about the benefits of diabetes exercise had never been done in particular. biometric parameters that will change if physical exercise is carried out such as blood glucose levels and uric acid levels. Based on the above problems, researchers are interested in conducting research to prove Rudat Sasambo (RUSA) Diabetes Mellitus exercise according to FITT lowers blood glucose levels and uric acid levels compared to conventional Diabetes Mellitus exercise at the Mataram City community health center in 2019.⁽⁸⁾

The purpose of the research to prove that RUSA Diabetes Mellitus exercise according to FITT lowers blood glucose levels and uric acid levels compared to conventional Diabetes Mellitus exercise.

METHODS

The research to be carried out was a quasi-experimental study with a randomized pretest and posttest group design. The experimental unit in this study can be said to be a unit that is subject to a single treatment in a replication of the basic experiment, namely patients with Diabetes Mellitus Type 2. The sample in this study is in accordance with the inclusion criteria patients with Type 2 Diabetes Mellitus at the Mataram City Public Health Center, West Nusa Tenggara, aged 40-65 years, willing to sign an informed consent in this study. While the exclusion criteria in this study are obtained contraindications (heart failure), to do physical exercise, there are physical injuries such as post fractures in people with diabetes mellitus.

In this study, we used 2 health centers and 30 patients for each health center, so we used 60 patients. The sampling technique was simple random sampling. Pre-test was one way to determine the initial condition of blood glucose and uric acid levels in type 2 DM patients at the Mataram City Health Center, both in the control group before being given conventional exercise and in the intervention group before being given an intervention in the form of RUSA Diabetes Mellitus exercise according to FITT.

Researchers were assisted by research assistants to fill out informed consent sheets, questionnaires and check lists. The criteria for research assistants are able to communicate effectively, have a minimum D3 nursing education, and be physically and mentally healthy. The intervention group was given treatment in the form of RUSA Diabetes Mellitus exercise according to FITT which was carried out 3 times a week for 6 weeks and the control group was treated with conventional exercise 1 time a week for 6 weeks. Post test activities were carried out to determine differences in blood glucose and uric acid levels in type 2 DM patients after being given several interventions in the form of RUSA Diabetes Mellitus exercise according to FITT and conventional exercise in the control group. After the intervention group finished, they were given treatment several times for 6 weeks. Then at the end of the research activity, the researcher conducted a post test. The post test was given to both groups, namely the intervention group and the control group, using the same instrument. Measurement of the results of RUSA Diabetes Mellitus exercise according to FITT in the intervention group and conventional exercise in the group on changes in blood glucose and uric acid levels of type 2 DM patients was carried out repeatedly for several repetitions with the aim of researchers being able to see trends in changes in blood glucose and uric acid levels in patients.

In this study, the analysis used to determine the frequency of respondents' characteristics and the proportion of variables. This comparative analysis was conducted to determine the differences in the decrease in blood glucose levels and uric acid levels before and after the intervention and to determine the differences in the reduction in blood glucose and uric acid levels in RUSA Diabetes Mellitus exercise according to FITT and conventional diabetes mellitus exercise. As for the data analysis used in this study, the dependent t-test or paired t-test, if the results of the normality test show that the data distribution is normal. Meanwhile, if the results of the normality test show that the data distribution is not normal, then use the alternative statistical test Wilcoxon signed test. Statistical test to see differences in the treatment/intervention group and the control group using the independent t-test, if the results of the normality test show that the data distribution is normal. Meanwhile, if the results of the normality test show that the data distribution is not normal, then use the Mann-Whitney U test.

RESULTS

Table 1. Blood glucose and uric acid levels in RUSA Diabetes Mellitus exercise according to FITT

No	Blood glucose (before)	Blood glucose (after)	Urid acid (before)	Uric acid (after)
1	254	94	5.6	5.2
2	175	140	5.1	4.2
3	141	97	3.6	3.5
4	332	140	5.2	4.7
5	296	185	5	4.3
6	243	120	10.1	5.4
7	407	276	11.2	6.5
8	150	133	6.9	5.3
9	253	241	5.3	5.1
10	106	93	6.5	4.9
11	293	149	8.4	7.1
12	156	112	6.1	5.7
13	326	171	6.8	5.1
14	144	120	9.2	7.7
15	496	142	9.1	6.1
16	202	172	8.8	7.2
17	116	101	6.3	5.4
18	334	254	5.8	5
19	209	177	3.6	3.4
20	147	110	4.7	3.8
21	313	175	6.5	4.1
22	241	201	3.4	3.1
23	170	155	4.6	4.3
24	319	153	5.2	3.7
24	165	155	8.1	4.2
26	214	107	5.4	4.4
27	272	213	6.1	4.9
28	417	242	8.6	5.6
29	318	269	11.7	6.1
30	482	158	6.8	4.7
Mean	256.37	161.83	6.66	5.02
SD	104.87	53.32	2.17	1.14

Table 2. Blood glucose and uric acid levels in conventional diabetes mellitus exercise

No	Blood glucose (before)	Blood glucose (after)	Urid acid (before)	Uric acid (after)
1	197	177	4.5	4.4
2	286	200	5.5	5.2
3	284	297	4.7	4.5
4	280	256	7.4	7.2
5	431	234	3.9	3.4
6	323	241	4.3	4.2
7	168	139	10.9	9.4
8	213	140	6.5	5.7
9	313	321	5.9	5.5
10	340	379	7.1	6.4
11	187	150	6.7	5.2
12	147	140	9.2	8.8
13	154	109	7.5	6.8
14	192	148	10.4	7.4
15	162	117	7.6	5.2
16	485	325	11.3	9.9
17	147	141	6.5	6.5
18	487	394	5.6	5.1
19	220	347	5.3	5.1
20	137	117	6.7	6.5
21	105	104	3.7	3.2
22	233	225	6.6	5.9
23	272	210	6.7	5.6
24	150	122	9.5	6.3
24	529	249	6.1	5.1
26	215	172	5.8	5.5
27	360	293	6.2	5.4
28	210	191	8.1	4.3
29	316	310	5.4	5.1
30	520	263	8.2	7.9
Mean	268.77	217.03	6.79	5.89
SD	121.24	85.99	1.97	1.60

Table 3. Comparison of blood glucose and uric acid levels in RUSA Diabetes Mellitus exercise according to FITT and conventional diabetes mellitus exercise

Number of Respondent	Blood Glucose (FITT)	Blood Glucose (Conventional)	Urid Acid (FITT)	Urid Acid (Conventional)
1	94	177	5.2	4.4
2	140	200	4.2	5.2
3	97	297	3.5	4.5
4	140	256	4.7	7.2
5	185	234	4.3	3.4
6	120	241	5.4	4.2
7	276	139	6.5	9.4
8	133	140	5.3	5.7
9	241	321	5.1	5.5
10	93	379	4.9	6.4
11	149	150	7.1	5.2
12	112	140	5.7	8.8
13	171	109	5.1	6.8
14	120	148	7.7	7.4
15	142	117	6.1	5.2
16	172	325	7.2	9.9
17	101	141	5.4	6.5
18	254	394	5	5.1
19	177	347	3.4	5.1
20	110	117	3.8	6.5
21	175	104	4.1	3.2
22	201	225	3.1	5.9
23	155	210	4.3	5.6
24	153	122	3.7	6.3
24	155	249	4.2	5.1
26	107	172	4.4	5.5
27	213	293	4.9	5.4
28	242	191	5.6	4.3
29	269	310	6.1	5.1
30	158	263	4.7	7.9
Mean	161.83	217.03	5.02	5.89
SD	53.32	85.99	1.14	1.60

Table 4. Decrease in blood glucose levels in RUSA Diabetes Mellitus exercise according to FITT

	Mean	Standard Deviation	Delta	t-test	p-value
Pre-test	256.37	104.87	94.54	5.856	0.000
Pos-test	161.83	53.32			

Based on table 4, the results obtained that t-value = 5.856, p = 0.000, means that there was a significant difference in the decrease in blood glucose before and after the implementation of RUSA diabetes mellitus exercise according to FITT.

Table 5. Reduction of uric acid levels in RUSA Diabetes Mellitus exercise according to FITT

	Mean	Standard Deviation	Delta	t-test	p-value
Pre-test	6.66	2.17	1.63	6.095	0.000
Pos-test	5.02	1.14			

Based on table 5 the results obtained that the t-value = 6.095, p = 0.000, means that there was a significant difference in the decrease in uric acid levels before and after the implementation of RUSA diabetes mellitus exercise according to FITT which is carried out 3 times a week for 6 weeks.

DISCUSSION

Based on the results, there is a significant difference in the decrease in blood glucose before and after the implementation of RUSA diabetes mellitus exercise according to FITT which is carried out 3 times a week for 6 weeks. Blood glucose levels after being given exercise are also in accordance with previous research conducted by Erlina (2008) which states that, "the existence of structured physical exercise for diabetes mellitus for 3-5 times a week with a duration of 20-60 minutes can reduce blood glucose levels in diabetes mellitus. diabetic patients". After exercise is done will cause metabolic changes. During exercise the body requires energy, so that previously inactive muscles become active, due to an increase in glucose demand.

Based on the results, there is a significant difference in the decrease in uric acid levels before and after the implementation of RUSA diabetes mellitus exercise according to FITT which is carried out 3 times a week for 6 weeks. , this is because the exercise according to FITT diabetes mellitus exercise Rudat Sasambo (RUSA) is very effective for reducing uric acid levels in patients with type 2 diabetes mellitus because the exercise distance and frequency of patient exercise are very good for people with diabetes mellitus. As stated by Sustrani, et al (2006) exercise has many benefits for the body and mind, one of which is to prevent and treat gout. joint strength and flexibility and reduce the risk of joint damage due to arthritis. ⁽⁹⁾

There is an effect or there is a significant difference in a decrease in blood glucose levels before and after the implementation of conventional diabetes mellitus exercise which is carried out once a week for 6 weeks. This is because the results of RUSA diabetes mellitus exercise and conventional diabetes mellitus exercise are very effective for lowering glucose levels. The decrease in glucose levels was caused by the rudat sasambo (RUSA) exercise which had simple movements. Shows that physical exercise causes an increase in blood flow causing more available insulin receptors to become active so that there is an increase in glucose for active muscles, so there is a decrease in blood glucose levels , they are located on the beach and many tourist attractions are known to help reduce blood glucose levels in Diabetes Mellitus patients because they can suppress the release of hormones that can increase blood glucose levels, namely epinephrine, cortisol, glucagon, adrenocorticotropic hormone (ACTH), corticosteroids, and thyroid. ⁽¹⁰⁾

There is no effect or uric acid levels before and after exercise, this is because the exercise is according to the conventional does not meet the rules of FITT for diabetes mellitus. Regular exercise will improve blood circulation and overcome blockages in blood vessels. This condition will have a positive effect on the body. Because by exercising the mind will become relaxed so that stress can be reduced and controlled and the metabolic system will run smoothly so that the distribution and absorption of nutrients in the body becomes more effective and efficient. A metabolic system that runs smoothly will reduce the risk of uric acid accumulation in the body. ⁽¹¹⁾

Anxiety levels also often occur in people with diabetes mellitus, it can be caused by the disease, food restrictions and the new environment, both the gymnastic environment and passive actions when taking blood, this will cause Epinephrine to act on the liver increasing the conversion of glycogen into glucose. While cortisol has the effect of increasing glucose metabolism so that amino acids, lactate, and pyruvate are converted in the liver into glucose (gluconeogenesis) ultimately increasing blood glucose levels. Glucagon increases blood glucose levels by converting glycogen in the liver into glucose. ACTH and glucocorticoids in the adrenal cortex can increase blood glucose levels by increasing the formation of new glucose by the liver. High glucose levels in the blood result in impaired glucose regulation in the blood, this results in an increase in glucose levels in the body, causing all systems in the body. ⁽¹²⁾

According to Henrich (2003), physical activity greatly affects the formation of bone mass. Some research results show that physical activity such as walking, riding a bicycle basically has the effect of protecting bones and reducing bone demineralization due to age. The results showed that diabetes mellitus exercise in accordance with FITT rudat sasambo (RUSA) and conventional diabetes mellitus exercise rudat sasambo (RUSA) was very effective in reducing uric acid levels. The decrease in uric acid levels is due to the Rudat Sasambo (RUSA) exercise which has simple movements. According to Farizati (2002) that physical activity is any movement that requires energy to do it, such as walking, dancing, raising grandchildren and so on. Physical activity that is planned and structured, which involves repetitive body movements and is intended to improve physical fitness is called sports. Physical activity that is beneficial for the elderly should meet the FITT criteria (frequency, intensity, time, type). Frequency is how often the activity is done, how many days in a week. Intensity is how hard an activity is done, usually classified into low, medium and high intensity. Time refers to the duration, how long an activity is carried out in one meeting. Types of physical activity in the elderly according to Kathy (2002), include aerobic exercise, muscle strengthening, flexibility, and balance. Other research also shows that regular exercise is one of the things to prevent osteoporosis. ^(13,14)

CONCLUSION

Rudat Sasambo (RUSA) diabetes mellitus exercise according to FITT, reduce blood glucose levels in patients with type 2 diabetes mellitus at the Mataram City Public Health Center. Rudat Sasambo (RUSA) diabetes mellitus exercise according to FITT reduces uric acid levels in people with type 2 diabetes mellitus at the Mataram City Public Health Center.

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