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Regular Walking Exercise Activities towards Uric Acid Levels in the Elderly People with Hyperuricemia

Handoyo[1], Hartati[2]

[1,2] Poltekkes Kemenkes Semarang

Abstract

Background: Hyperuricemia (HUA) is a condition of increased uric acid levels in the blood beyond normal. This condition can progress towards joint disorders called gouty arthritis. Gouty arthritis is a non-communicable disease that occurs due to deposits of monosodium urate crystals in the blood. Regular walking exercise is a physical exercise that is done regularly by walking, both outdoors and indoors.

Objective: The aim of this study is to determine the effect of regular walking exercise on uric acid levels in the elderly who experience hyperuricemia.

Methods: This type of research is quasi-experimental pre-post-test with control group design. The population in this study was elderly people with hyperuricemia in the Purwokerto Timur I health center working area. Sampling was done using a simple random sampling technique, and 68 respondents were obtained. In addition, from 68 respondents, random allocation was done, and 34 treatment groups and 34 control groups were. The treatment group was given treatment by doing regular walking exercise as far as 2 kilometers during 12 weeks, while the control group did activities as usual. The instrument used to measure uric acid levels is a digital uric acid test kit. The data analysis used was the t-test.

Results: The results of this study show that there is an effect of regular walking exercise on uric acid levels in older people with hyperuricemia ($p = 0.000 < \alpha = 0.05$).

Conclusion: regular walking exercise can reduce uric acid levels in older people with hyperuricemia.

Keywords: Hyperuricemia (HUA), serum uric acid (SUA), regular walking exercise.

Introduction

The increase in the number of elderly people at this time affects the pattern of disease incidence that occurs. At this time, there has been a change in the pattern of disease and death, which was originally dominated by infectious diseases, turning to non-infectious diseases (non-communicable diseases) (1). This is reinforced by Kurniasih et al. (2), which says that changes in disease patterns are also influenced by demographic conditions such as education, age, gender, socioeconomics (income), socio-culture and lifestyle changes. Meanwhile, according to RJ et al. (3), changes in people's lifestyles have encouraged the occurrence of various diseases that affect the body's metabolism. This affects the increase in cases of non-communicable diseases that are commonly found in the elderly in Indonesia, namely gouty arthritis or uric acid disease caused by hyperuricemia for a long time and uncontrolled.

Uric acid is the end product of purine metabolism. The amount of uric acid in the blood is influenced by foods high in purines and or disruption of uric acid excretion through the kidneys (4). Gout is one of the metabolic diseases (metabolic syndrome) associated with a diet high in purines and alcoholic beverages. Gout is also a progressive disease of monosodium urate (MSU) crystalline deposits in the joints, kidneys and other soft tissues as a result of chronic hyperuricemia. This situation can be the main trigger for inflammation or inflammation, which, if it continues, will cause severe pain. This disease disrupts the quality of life of sufferers (5). According to Huang et al. (4), hyperuricemia is one of the first signs that the body is attacked by acute joint inflammation. Hyperuricemia is an increase in uric acid levels above normal. A person is diagnosed with hyperuricemia if blood uric acid levels are >7 mg/dL in men and >6 mg/dL in women(6). Joint pain with a history of hyperuricemia will be a serious problem because its manifestations are not only limited to the joints but also cause impaired kidney, heart, and eye function.

Some appropriate daily lifestyles can maintain uric acid levels in the blood (SUA), such as daily activities and dietary patterns. Appropriate light physical exercise can be given to the elderly with asymptomatic hyperuricemia to control uric acid levels in the blood. This is because asymptomatic hyperuricemia usually does not require treatment, but simply by exercising lightly can reduce uric acid symptoms. Light physical exercise that has often been done by the elderly with hyperuricemia is doing regular light walks and light gymnastics. The results of research on light activities, such as research by Lamina (7) on the effect of ergonomic gymnastics on the level of uric acid levels in the elderly, show a significant effect with a p-value = 0.000 is < (α = 0.05). Research by Trapé et al. (8) shows a substantial effect of elderly fitness exercises on uric acid levels in hypertensive patients, namely a decrease in average uric acid levels by 1.56 mg/dl with a p-value = 0.00 is < (α = 0.05)

Another study by Mulyani (9) obtained the results that ergonomic gymnastics affects reducing blood uric acid levels in the elderly with gouty arthritis with a p-value of = 0.008 is < (α = 0.05). This is also reinforced by Farinatti et al. (10), which states that there is a significant effect of gymnastics on reducing uric acid levels in the elderly with a p-value of = 0.007 is < (α = 0.05). For this reason, in this study. researchers focused on examining regular working exercise on uric acid levels in the elderly with hyperuricemia.

Materials and Methods

This study uses a quasi-experimental design with a pre-post test design approach with control groups. The purpose of this study was to determine the effect of regular walking exercise on uric acid levels in the elderly with asymptomatic hyperuricemia. Sampling was carried out using a simple random sampling technique, and 68 respondents were obtained; then, from 68 respondents, random allocation was carried out, and obtained 34 treatment groups and 34 control groups. Measurement of uric acid levels was carried out both in the treatment group and control group using peripheral blood. Measurement of uric acid levels was carried out with a digital uric acid measuring, then the treatment was carried out for the treatment group by doing regular walking exercise for 2 km 7 times a week for 12 weeks, while the treatment group did ordinary activities such as daily activities. Finally, uric acid levels were measured in week 13 in the treatment group and control group. The results of normal values for adult male uric acid levels = 2.5 - 7 mg/dL and women 1.5 - 6 mg/dL, hyperuricemia in men >7 mg/dL and women >6. Furthermore, the data analysis test was carried out using the t-test.

Results

The results of this study are as follows:

1. Characteristics of respondents by age and gender.

Table 1. Characteristics of respondents based on age and gender

Variables	Treatment Group		Control Group		
	Mean± SD (%)	N	Mean± SD (%)	n	*p-value*
Age >60 years old	62.18± 1.50		61.35± 1.36		0,34
Gender Male Female	 47,0 % 52,9 %	 16 18	 52,9 % 47,0 %	 18 16	0,80

Based on the table above, the homogeneity test results show a significance value for the characteristics based on age (p = 0.34) and gender (p = 0.80), which shows that both groups are homogenous.

2. Effect of regular walking exercise towards uric acid levels

Table 2. Effect of regular walking exercise towards uric acid levels

Groups	Pre test		Post test		
	Mean	SD	Mean	SD	*p-value*
Treatment	7.24 mg/dl	0,55	5.56 mg/dl	1,16	0,00
Control	7.25 mg/dl	0,56	7.26 mg/dl	0,56	0,61

Based on table above, it shows that the average value of uric acid levels of respondents in the treatment group in the pre-test was 7.24 mg/dl, and the control group was 7.25 mg/dl, while the average post-test measurement showed 5.56 mg/dl in the treatment group and 7.26 mg/dl in the control group. Based on statistical tests, the p value = 0.000 in the treatment group and p = 0.619 in the control group.

2. Differences in uric acid levels before and after intervention in the treatment group and control group

Table 3. Mean difference in uric acid levels

Groups	n	Mean	t	df	*p*-value	α
Treatment	34	-1.67 mg/dl	-9,48	66	0,000	0,05
Control	34	0.008 mg/dl				

Based on the table above, it shows that there is a significant difference between the mean value of uric acid levels in the treatment group, namely (-1.67 mg/dl) and in the control group (0.008mg/dl). Based on statistical tests, the p value = 0.000 is < α = 0.05 so that the hypothesis is accepted, meaning that there is a significant effect of regular walking exercise on uric acid levels in the elderly with hyperuricemia.

Discussion

The results of the study show that the majority of respondents are >60 years old. This is in accordance with the results of research conducted Ayyildiz (11) that the age range at risk of developing gouty arthritis is age > 40 years, because it is known that the metabolic system at that age has begun to be disrupted or has decreased function, but does not rule out the possibility that productive age groups can also be affected. This is also in accordance with research Mulyani (9) that the older a person is, the risk of having higher blood uric acid levels because the aging process causes a disturbance in the formation of enzymes due to a decrease in the quality of hormones. One of the consequences of aging is the deficiency of the enzyme Hypoxantine Guanine Phosphoribosyl Transferase (HGRT). This enzyme plays a role in converting purines into purine nucleotides. If this enzyme is deficient, the purines present in the body may increase. Purines that are not metabolized by the HGRT enzyme will be metabolized by the xanthine oxidase enzyme into uric acid. In the end, the uric acid content in the body increases or hyperuricemia occurs.

In this study also found that the majority of respondents were women in the treatment group, however, for the control group, the number of respondents was predominantly male. This is in accordance with the opinion of Fidayanti (12) about gouty arthritis and hyperurecemia and its development that normal urate levels tend to differ between male and female sexes, someone who is male is more likely to suffer from hyperuricemia than women. Men have higher serum uric acid levels than women, which increases their risk of developing gouty arthritis. The development of gouty arthritis before the age of 30 years is more common in men than women. This is because the high risk of hyperuricemia in women is found after menopause and is influenced by a decrease in the hormone estrogen. Whereas in men, the high risk of hyperuricemia can occur at any time without being influenced by the hormone progesterone. Furthermore, Yong et al. (13) also stated that the biological difference between the lifestyle patterns of men and women. Due to renal clearance of uric acid and low uric acid reabsorption in renal tubule that results from high estrogen levels in women, men who have comparatively low estrogen levels are more prone to developing hyperuricemia.

This is also in accordance with the theory of hyperuricemia according to Kuzuya (14) Stamp (15) hyperuricemia tends to be experienced by men because men do not have the estrogen hormone that women have. Furthermore, this estrogen hormone helps the disposal of gout through urine. So, as long as a woman has estrogen, then the disposal of gout is controlled. But when they no longer have estrogen such as during menopause, then women are more at risk of developing gout. If the increase in gout levels exceeds the normal threshold, problems will arise in the kidneys, joints, and urinary tract

This study also shows that the implementation of regular walking exercise affects the decrease in uric acid levels in the elderly with hiperurecemia. It can be explained that by changing their lives, HUA patients can lower SUA. According to studies, a healthy lifestyle that includes controlling one's food, abstaining from alcohol and tobacco, exercising frequently, and maintaining a healthy weight can lower SUA levels by 10%-18%, or 70-90 mol/L(16). Furthermore, in the study of the association between physical activity and

hyperuricemia Yuan (17) stated that the risk of elevated uric acid levels is reduced by 12% in low and moderate intensity physical activity and reduced by 29% in high-intensity physical activity participation. Decreasing serum urate after regular walking exercise can also be mentioned by some studies, Hellsten et al (18), show that metabolically challenged human skeletal muscle has higher levels of allantoin, which is strongly suggestive of urate being converted to allantoin by the tissue's production of free radicals. Similar research Hendrayadi & Mimiyati (19) shows that the average uric acid level in the elderly before doing gymnastics is 6.292 mg/dl. Moreover, the average uric acid level in the elderly after doing gymnastics is 5.442 mg/dl with a p value = 0.009. Gout gymnastics aims to restore or correct the position and flexibility of the nervous system and blood flow, maximize oxygen supply to the brain, sweat system, body heating system, uric acid burning system. In addition, exercise has the effect of warming the body and strengthening blood circulation in the body, thereby reducing pain and preventing the deposition of uric acid at the cold ends of the body due to lack of blood supply(20), (21).

Conclusion

This study contributes to our ability to optimize physical exercise to maintain the level of uric acid for the elderly who have indications of hyperuricemia. This research shows that applying optimal walking exercise in a regular situation could decrease the number of daily uric acid levels for elderly people suffering from hyperuricemia.

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