

The Effectiveness of Ergonomic Gymnastics Against Changes in Uric Acid Levels

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Abstract

Background: Uric acid is the end product of purine metabolism, where purines are one of the components of nucleic acids found in the nucleus of body cells. Gout attacks the joints of the body and generally attacks the joints of the fingers, heels, toes, elbows, knees, and wrists. One of the treatments for high uric acid levels in the body is ergonomic exercise.

Objectives: The purpose of this study was to analyze the effectiveness of ergonomic exercise on changes in uric acid levels in the community.

Methods: The type of research used is Pre-Experimental with One Group Pre-Post Test Design. Sampling using the Non Probability Sampling method with the Consecutive Sampling technique with a sample of 30 respondents. This study provides an intervention for patients with gout arthritis in the form of ergonomic exercise. The implementation of the intervention begins with a Pre-Test (measurement of uric acid levels), then giving an ergonomic exercise intervention for 4 weeks (1x a week with a duration of 30 minutes), then a Post-Test (measurement of uric acid levels) is carried out. The instrument used is a multi-check uric acid measuring instrument, SOP for the implementation of ergonomic exercises, and implementation observation sheets.

Results: The results of the study were that the majority of the majority age was in the late adult category (36-45 years), the majority sex was in the female sex category of 19 respondents (63.3%), and uric acid levels before being given ergonomic exercise intervention were the majority in the high category. by 28 respondents (93.3%). while the uric acid levels after the ergonomic exercise intervention were mostly in the normal category of 25 respondents (83.3%). The results of the Wilcoxon test analysis were obtained ($p = 0.000 = 0.05$) where ergonomic exercise was effective in reducing uric acid levels.

Conclusion: The results of this study indicate that there is a significant effect of ergonomic exercise on reducing people's uric acid levels, so the researchers recommend to the community, especially gout arthritis sufferers, to make ergonomic exercise interventions one of the intervention options that can be done independently, practically and efficiently in reducing levels. gout and the need for attention to the regulation of a healthy lifestyle to prevent more severe complications in the future.

Keywords: gout, ergonomic gymnastics

Introduction

At the time of Hippocrates, it was widely known a disease called gout arthritis which in ancient times was often referred to as a disease of kings and kings of disease because at that time this disease often occurred in groups of people with high socioeconomic abilities due to the tendency to consume meat but nowadays found in almost all human races around the world. Gout arthritis disease often occurs in the elderly with an average increase caused by a degenerative process that causes a decrease in the functional ability of the system both at the cellular and organ levels.¹ In both industrialized and developing countries, high uric acid levels are becoming increasingly common, especially among men aged 40 and 50 years and over. Based on data from the World Health Organization (2017)² the prevalence of gouty arthritis in the world is 34.2%. Gout arthritis often occurs in developed countries such as America. The prevalence of gout arthritis in the United States is 26.3% of the total population. The increase in the incidence of gout arthritis is not only in developed countries but also in developing countries, one of which is Indonesia.³ The data for Riset Kesehatan Dasar (Riskesdas) in 2018 the prevalence of gout arthritis based on the diagnosis of health workers in Indonesia was 11.9% and based on diagnosis or symptoms 24.7%. In terms of age characteristics, the highest prevalence is at age 75 years (54.8%) while in terms of gender characteristics, the highest prevalence is female (8.46%) while the male (6.13%). The prevalence of gouty arthritis in Indonesia is estimated at 12%-34% of the 18.3 million Indonesian population.⁴

Gout arthritis is a joint disease caused by high levels of uric acid in the blood. High uric acid levels in the blood beyond normal limits can cause a buildup of uric acid in joints and other organs.⁵ The accumulation of uric acid levels that often occurs around the joints will form uric salt (monosodium urate). The results of the accumulation of monosodium urate crystals will cause local damage to the joint area that can cause pain, inflammation, and an increase in local temperature.⁶ Gout arthritis can appear suddenly and cause difficulty in moving or doing activities due to joint pain that can be felt like being stabbed by sharp objects and feeling hot in the body so that it can interfere with activities and rest as well as a person's psychological condition. Pain that is felt repeatedly will have an impact on the occurrence of stress responses, including increased anxiety, heart rate, blood pressure, and respiratory rate will also increase.⁷ Handling of gouty arthritis can be done with pharmacological and non-pharmacological therapy. Pharmacological therapy with the administration of NSAIDs, allopurinol, probenecid and sulfinpyrazone, corticosteroids, and gout drugs. These drugs work as pain relievers, protect kidney function, and can lower uric acid levels. Non-pharmacological therapy is a diet by avoids fatty foods rich in purines. Warm or cold compresses can also be used to promote the relaxation of stiff muscles.⁸ The other non-pharmacological therapy that can reduce uric acid is exercise. Regular exercise can improve the condition of joint strength and flexibility and is very useful for reducing the risk of joint damage due to arthritis.

One of the physical sports activities (non-pharmacological therapy) that can be done is ergonomic exercise. This ergonomic exercise can help restore or improve the nervous system and blood flow, and increase oxygen supply to the brain by burning uric acid, cholesterol, blood sugar, lactic acid, and oxalate crystals.⁹ Ergonomic gymnastics is gymnastics whose basic movements consist of five movements, each of which has different but interrelated benefits.¹⁰ The results of research conducted by Imelda Erman et al. (2021)¹¹ on "The Effect of Ergonomic Gymnastics on Uric Acid Levels in the Elderly in the Working Area of the Merdeka Health Center Palembang City" obtained an average difference in uric acid levels in the intervention group of 1.34 mg/dl and the control group of 0.107 mg/dl. The analysis showed the difference in the mean pre and post-uric acid level reduction between the intervention and control groups with a p-value = 0.001. This shows that ergonomic exercise can significantly reduce uric acid levels in the elderly. Iful Irdiansyah et al. (2022)¹² also support this in

this study tested the effect of ergonomic exercise on reducing uric acid levels in 30 respondents who experienced gouty arthritis at the Bone Rombo Health Center, North Buton Regency. The results of this study indicate the effect of ergonomic exercise on reducing uric acid levels with a p-value = 0.000.

The urgency of this study is that researchers are interested in doing ergonomic exercise interventions with a wider age range which is not only for gout arthritis sufferers in the elderly category but also for the adult age category because ergonomic exercise intervention is one of the most important intervention options for developed and implemented for people with gouty arthritis with the following considerations: physically the community can perform movements independently, it is very simple, easy, does not require large costs in its implementation, and this intervention can be given to all levels of society with different economic status conditions. Based on the phenomena and scientific studies that have been described, this study aims to determine the effectiveness of ergonomic exercise on changes in uric acid levels.

Methods

This research is a Pre-Experimental with One Group Pre-Post Test Design. The population in this study amounted to 100 people. Sampling in this study uses the Non Probability Sampling method with the Consecutive Sampling technique, namely the selection of samples without a formula but is carried out by selecting each individual in the population and meeting each criterion or selection feature within the specified time so that the required number of samples can be obtained. fulfilled. The sample in this study consisted of 30 respondents with inclusion criteria, namely: willing to become respondents with evidence of signing evidence of informed consent, diagnosed with gout arthritis, able to understand and follow simple verbal instructions, and able to follow ergonomic exercise interventions by predetermined procedures and times. while samples with gouty arthritis who had a history of fractures, swelling of the legs, and hearing loss would be excluded from this study. This research was conducted on 14 February – 14 March 2022 (1 month). The steps in implementing the intervention began with a Pre-Test (measurement of uric acid levels), then giving an ergonomic exercise intervention for 4 weeks (1x a week with a duration of 30 minutes of exercise), then a Post-Test (measurement of uric acid levels). The data collection tool uses a multi-check uric acid measuring instrument, SOPs for the implementation of ergonomic exercises, as well as implementation observation sheets. Univariate data analysis is presented in a frequency distribution while bivariate analysis uses the Wilcoxon test.

Results

Univariate Analysis

The results of the univariate analysis included the characteristics of the respondents (age and sex) and uric acid levels. Pre-Post Test of ergonomic exercise.

Table 1. Frequency Distribution of Respondents' Characteristics by Age and Gender to The Community in Asuli Village, Towuti Wawondula District in 2022

Characteristics Respondent	Frequency	Percentage (%)
Age (Years)		
Early Adulthood (26-35)	3	10,0%
Late Adulthood (36-45)	13	43,4%
Early Elderly (46-55)	11	36,6%
Late Elderly (56-65)	3	10,0%
Total	30	100,0%
Gender		

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Man	11	36,7%
Woman	19	63,3%
Total	30	100,0%

In table 1, it can be seen the frequency distribution of respondents' characteristics where: the majority age is in the late adult category (36-45 years) by 13 respondents (43.4%) while the minority is in the early adult category (26-35) & late elderly (56 -65) by 3 respondents (10.0%). The gender distribution of the majority is in the female category of 19 respondents (63.3%) while the minority is in the male category of 11 respondents (36.7%).

Table 2. Distribution of Uric Acid Levels Pre-Post Test Ergonic Gymnastics in the Community in Asuli Village, Towuti Wawondula District in 2022

Uric Acid Level	Before		After	
	Frequency	Percentage (%)	Frequency	Percentage (%)
High	28	93,3	5	16,7%
Normal	2	6,7	25	83,3%
Low	0	0,0%	0	0,0%
Total	30	100,0%	30	100,0%

In table 2 it can be seen that the frequency distribution of uric acid levels before the ergonomic exercise intervention was given, the majority were in the high category of 28 respondents (93.3%) while the minority was in the normal category of 2 respondents (6.7%). As for the frequency distribution of uric acid levels after being given ergonomic exercise intervention, the majority were in the normal category of 25 respondents (83.3%) while the minority was in the high category of 5 respondents (16.7%).

Bivariate Analysis

Table 3. Analysis of Differences in Uric Acid Levels Pre-Post Test Ergonomic Gymnastics

	N	Mean	Minimum	Maximum	P-Value
Uric acid levels Pre-Test Ergonomic Gymnastics	30	8,62	6	16	0.000
Uric acid levels Post-Test Ergonomic Gymnastics	30	5,20	5	5	

In table 3 it can be seen statistically that there is a significant difference in the average uric acid level before and after the ergonomic exercise intervention. As for the Asymp value. Sig. (2-tailed) = 0.000 so that p-value <0.05 then there is an effect of giving ergonomic exercise intervention to decrease uric acid levels.

Discussion

The results of this study indicate that age and gender are factors that can affect the occurrence of gout arthritis. The influence of age can affect uric acid levels associated with the aging process. This is by the theory that states that a decrease in kidney function can result in decreased excretion of uric acid in the kidney tubules in the form of urine. In addition, the aging process can result in a decrease in the production of the urikinase enzyme, so the disposal of uric acid is inhibited.¹³

In this study, gender has an influence on the occurrence of gout arthritis which can be associated with the aging process, especially in women who have entered menopause,

namely the age of 45-59 years when the amount of the hormone estrogen begins to decrease so that at this age gout arthritis occurs mostly in women. The hormone estrogen affects the occurrence of gout arthritis because this hormone functions as the excretion of uric acid through urine.¹⁴ The occurrence of gout arthritis in men in this study was due to the increase in uric acid levels in men with increasing age. This is also supported by the research of Rentawati Purba et al. (2021)¹⁵ which was conducted for 2 months on 16 respondents where the gender distribution of the majority was in the category of women compared to men. In this study, there were 11 respondents (68.8%) in the female category, while 5 respondents (31.3%).

Another result in this study stated that there was a significant difference in uric acid levels before and after the ergonomic exercise intervention where the average difference in uric acid levels in the intervention group was 6,558 mg/dl and the average uric acid levels in the control group were 7,293. The analysis showed the difference in the average pre and post-uric acid level reduction between the intervention and control groups with a p-value = 0.000.¹² Ergonomic exercise which was carried out for 1 month (1 time a week with a duration of 30 minutes) was effective in reducing uric acid levels in the Asuli Village, Towuti Wawondula District. This is by the theory that states that ergonomic exercise can affect uric acid levels because this exercise is a combination of muscle movement and breathing techniques. A conscious, diaphragmatic breathing technique allows the abdomen to rise slowly and the chest to expand fully. This breathing technique can provide massage to the heart as a result of the rise and fall of the diaphragm, open blockages, and facilitate blood flow to the heart and blood flow throughout the body to facilitate the removal of combustion residues such as uric acid by blood plasma from cells to the kidneys and large intestine to be excreted. in the form of urine and feces.¹⁰ For gout sufferers, the relaxation of nerves that occurs during exercise can be useful in overcoming pain due to gout, improving the condition of joint strength and flexibility, and reducing the risk of joint damage due to arthritis. 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 relax so that stress can be reduced and controlled and metabolism 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 accumulation of uric acid in the body.¹³ Therefore, according to the assumptions of exercise researchers can provide many benefits for the body and mind and can prevent and treat gout arthritis.

Conclusion

The results of this study indicate that there is a significant effect of ergonomic exercise on reducing people's uric acid levels, so the researchers recommend to the community, especially gout arthritis sufferers, to make ergonomic exercise interventions one of the intervention options that can be done independently, practically and efficiently in reducing levels. gout and the need for attention to the regulation of a healthy lifestyle to prevent more severe complications in the future.

Conflict of Interest Declaration

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