

The Effect Of Ergonomic Exercises On Reducing Uric Acid Levels In The Elderly

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ABSTRACT

Health problems occur in the elderly due to a decrease in body function, one of which is a decrease in musculoskeletal function, namely Arthritis Gout. Ergonomic gymnastics is a physical activity that can help lower uric acid levels. This study aims to determine the effect of ergonomic gymnastics on uric acid levels in the elderly. The research uses a quantitative design with a pretest-posttest group with control group design. The sample consisted of 30 elderly people who were selected by random sampling. The research instrument is the assessment of uric acid levels carried out before and after the intervention is given. The research analysis consisted of univariate analysis and bivariate analysis using the Mann Whitney test with STATA software version 17. The results of the analysis showed that the mean uric acid level was 6.34 ± 0.97 , before intervention and the mean decreased to 5.30 ± 0.7 , after intervention. There was an effect of ergonomic gymnastics on the reduction of uric acid levels in the elderly with a Mann-Whitney p-value test of 0.0001. Ergonomic gymnastics can be a non-pharmacological treatment option to lower uric acid levels in the elderly. Ergonomic gymnastics can lower uric acid levels with muscle relaxation which can improve the process of reabsorption of uric acid in the urine. The application of ergonomic gymnastics 3 times a week showed a significant difference in uric acid levels in the elderly.

Keywords: Ergonomic Gymnastics, Elderly, Gout

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INTRODUCTION

Gout, also known as uric acid disease, is a condition commonly found in the elderly population. It is characterized by high levels of uric acid in the blood. One of the causes of increased uric acid levels is the aging process, which leads to a decline in kidney function, making it harder to eliminate uric acid from the body (Firdausia & Mulyaningsih, 2024). According to data from the World Health Organization (WHO), approximately 335 million people worldwide are estimated to suffer from gout, with a significant prevalence in Indonesia, where an estimated 27.1 million elderly individuals are at risk of elevated uric acid levels (Arifuddin et al., 2024). The prevalence of gout disease in Central Java is 26.4%, with 24.3% in

men and 11.7% in women. Meanwhile, in Wonogiri, the prevalence of gout is 16.3% as diagnosed by healthcare workers, while 33.1% were diagnosed based on symptoms (Noviyanti, 2018).

The aging process not only affects physical health but also increases vulnerability to degenerative diseases such as gouty arthritis. Uric acid levels are considered abnormal if they exceed 6 mg/dL for women and 7.2 mg/dL for men (Firdausia & Mulyaningsih, 2024). Therefore, effective management is crucial to prevent further complications. Several aging-related factors can influence vulnerability to gout, such as decreased kidney function and changes in purine metabolism. One major change in the elderly is the decline in kidney function. Underperforming kidneys cannot efficiently excrete uric acid, resulting in increased levels in the bloodstream. Hyperuricemia (elevated uric acid levels) is the primary cause of gout (Zuniawati et al., 2024). Additionally, aging also affects purine metabolism—compounds that are converted into uric acid in the body. This metabolic process becomes less efficient with age, causing uric acid to accumulate (Zuniawati et al., 2024).

One non-pharmacological approach that has been increasingly studied is ergonomic exercise. Ergonomic exercise consists of physical movements designed to improve flexibility, muscle strength, and blood circulation (Firdausia & Mulyaningsih, 2024). Research has shown that ergonomic exercise can help lower uric acid levels by enhancing the body's metabolism and facilitating uric acid excretion through urine (Kumala & Meihastini, 2019).

Furthermore, some studies have found that ergonomic exercise improves blood circulation. These exercises involve physical movements that stimulate blood vessel dilation, increasing blood flow to various parts of the body, including the kidneys, which play a crucial role in uric acid excretion. Better circulation enables the body to more efficiently eliminate excess uric acid through urine and feces (Erman et al., 2021). Ergonomic exercise also includes breathing techniques and muscle relaxation that can help reduce stress. Stress is known to disrupt hormonal balance and increase inflammation in the body, potentially worsening gout. By reducing stress, ergonomic exercise helps maintain stable uric acid levels (Saputri, 2023).

Several studies have demonstrated positive outcomes from the implementation of ergonomic exercise in elderly individuals with high uric acid levels. For instance, studies by (Purba et al., 2021) and (Suryani et al., 2023) found that regular ergonomic exercise resulted in a significant decrease in uric acid levels among participants. This suggests the potential of ergonomic exercise as an effective intervention for managing uric acid levels in the elderly. Similarly, research by (Firdausia & Mulyaningsih, 2024) confirmed that ergonomic exercise is effective as a non-pharmacological therapy for reducing uric acid levels in older adults. In line with this, a study by (Erman et al., 2021) showed that the movements involved in ergonomic exercise can stimulate blood circulation and aid in uric acid excretion through urine. Other research also confirms that ergonomic exercise is beneficial in enhancing the physical health of the elderly and reducing the risk of gout-related conditions (Arifuddin et al., 2024).

Given these findings, further investigation into the optimal application of ergonomic exercise for uric acid management is warranted to enhance preventive and therapeutic strategies for elderly populations.

The present study aims to further explore the effects of ergonomic exercise on lowering uric acid levels in the elderly. This research is expected to contribute to the development of health programs for the elderly and raise awareness of the importance of physical activity in maintaining overall health.

METHOD

This study employs a quantitative research design using an experimental approach, specifically a pretest-posttest control group design. The variables in this study include the independent variable, which is ergonomic exercise, and the dependent variable, which is uric acid levels. Data collection was conducted in August 2024. The study population consists of all elderly individuals in Wonogiri (220,000 elderly). The sampling technique used was simple random sampling, with a total of 30 participants. The research instrument involved measuring uric acid levels before and after the intervention was administered. The data analysis included univariate and bivariate analyses, with the Mann-Whitney test applied using STATA version 17.

RESULTS

Respondent Characteristics

Table 1. Characteristics of Respondents

No.	Variable	Frequency (n)	Percentage (%)
1.	Sex		
	Male	15	50
	Female	15	50
2.	Age (year)		
	60-65	18	60
	66-74	12	40
3.	History of Occupation		
	Not working	4	13.33
	Labor	5	16.67
	Farmer	9	30
	Employee	7	23.33
	Civil Servant	5	16.67
4	Education		
	Elementary	8	26.67
	Junior High	4	33.33
	Senior high	8	26.67
	University	4	13.33

Based on table 1, it can be seen that each of the male and female sexes are 15 respondents (50%), aged 60-65 years (60%) and have worked mostly as farmers 9 respondents (30%). As for education, the most are elementary and high school (26.67%).

Table 2. Comparison of Mean Uric Acid Levels of Intervention and Control Groups

Variable	Urid Acid				<i>p-value</i>
	Pre		Post		
	Mean ± SD	Min – Max	Mean ± SD	Min - Max	
Ergonomic Exercise	6.34± 0.97	4-8	5.30 ± 0.7	4-6.5	0.0001

Table 2 shows the results of the Mann-Whitney test analysis showed there was a

difference in the average decrease in uric acid levels ($p < 0.0001$). Based on the decrease in the average value of uric acid levels showed after the intervention was given as much as 1.04 points (6.34 ± 0.97 to 5.30 ± 0.7).

DISCUSSION

Based on the Mann-Whitney test analysis, the average uric acid level in elderly individuals with gout before being given ergonomic exercise treatment was 6.34 mg/dL with a standard deviation of 0.97. The high uric acid level may be caused by the consumption of purine-rich foods such as red meat, organ meats, seafood (anchovies, sardines, shellfish, tuna), alcohol, sugary drinks, and legumes, which can increase the body's production of uric acid. Purines in the body are metabolized by an enzyme called xanthine oxidase, which functions to convert hypoxanthine into xanthine and eventually into uric acid (Listiani et al., 2023).

In elderly individuals, high uric acid levels are often found, which may be due to the decreased production of enzymes and hormones involved in the excretion of uric acid. The enzyme that functions to convert uric acid into allantoin for excretion through urine is uricase. When this enzyme is impaired, it affects the excretion of uric acid through urine. The deterioration of cells in the elderly due to the aging process can trigger various health issues, including increased uric acid levels or hyperuricemia. Elderly people experience loss of body mass, including muscle and organ mass, while fat mass increases. A decline in physical activity can lead to increased fat mass and obesity, which are risk factors for elevated uric acid levels (Hidayat & Cloudia, 2020).

Cell damage due to aging results in decreased function of various organs. This includes reduced production of hormones, enzymes, and substances needed for the immune system (Wulandari et al., 2022). Decreased kidney function can lead to reduced uric acid excretion. Additionally, the aging process can reduce uricase production, which plays a role in uric acid elimination (Hidayat & Cloudia, 2020). In postmenopausal women, the decline in estrogen levels can increase blood uric acid levels and raise the risk of gout arthritis (Zuniawati et al., 2024).

After ergonomic exercise treatment was given to the elderly, the Mann-Whitney test analysis showed that the average uric acid level decreased to 5.30 mg/dL with a standard deviation of 0.7. This result indicates a decrease in uric acid levels among the elderly, showing that ergonomic exercise is highly effective in lowering uric acid. The reduction in uric acid levels is due to the combination of ergonomic movements and breathing techniques that involve diaphragm movement, which can massage the heart, clear blockages, and improve blood circulation throughout the body (Nur, 2023). This improved circulation helps carry metabolic waste, including uric acid, from the cells to the kidneys and colon for excretion via urine and feces (Firdausia & Mulyaningsih, 2024).

Ergonomic exercise requires oxygen during the metabolic process and produces water vapor, which aids in the elimination of waste products. Muscle relaxation during ergonomic exercise can improve the reabsorption process of uric acid in urine, thereby reducing uric acid levels in the blood. Nerve relaxation during exercise can help relieve pain caused by uric acid, improve joint condition and flexibility, and reduce the risk of joint damage from inflammation (Firdausia & Mulyaningsih, 2024). Ergonomic exercise combines muscle movements and breathing techniques that can massage and press on the heart, thereby opening blockages and enhancing blood flow to the heart and the entire body. This increased blood flow helps transport metabolic waste, including uric acid, from the cells to the kidneys and colon for elimination through urine and feces.

Ergonomic exercise was conducted for three days in this study, and the results indicated a reduction in uric acid levels. In a study by Arifuddin et al. (2024), the average reduction in uric acid levels after three days was 1.4 mg/dL in two elderly patients. That study also showed an average reduction of 2.925 mg/dL after three days (Arifuddin et al., 2024). In patients aged 53 and 58, ergonomic exercise performed three times a week showed a significant decrease in uric acid levels after three days, with a total reduction of 2.3 mg/dL and 2.4 mg/dL, respectively (Firdausia & Mulyaningsih, 2024). Similarly, research by Anggraeni & Mujahid (2020) showed a significant decrease in uric acid levels after performing ergonomic exercise for 19–20 minutes, three times a week. A study by Irdiansyah et al. (2022) also found that routine ergonomic exercise three times a week led to a reduction in uric acid levels. The average uric acid level in the intervention group, which performed ergonomic exercise and received medication, was 6.558 mg/dL, which decreased faster than the control group that only received medication, with an average level of 7.293 mg/dL.

In this study, the Mann-Whitney test yielded a p-value of 0.0001, indicating that ergonomic exercise has a significant effect on reducing uric acid levels in the elderly. The influence of ergonomic exercise enhances blood circulation, thereby stimulating nerves and promoting the production of endorphins. These hormones function as natural tranquilizers that create a sense of comfort and help reduce stress in the elderly. Moreover, ergonomic exercise restores nerve flexibility and blood flow, optimizes oxygen supply to the brain, and opens the pathways for uric acid metabolism and the release of negative energy.

Based on the results of the analysis and discussion, the researchers conclude that ergonomic exercise has a significant effect on lowering uric acid levels in the elderly. The findings show that respondents who were given ergonomic exercise treatment benefited from it as a non-pharmacological therapy aimed at reducing uric acid levels.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that there is an effect of ergonomic exercise on reducing uric acid levels in the elderly. There is a significant difference in the average uric acid levels before and after doing ergonomic exercises. Ergonomic gymnastics can be a non-pharmacological treatment option to reduce uric acid levels in the elderly. Ergonomic gymnastics can reduce uric acid levels by relaxing muscles which can increase the process of re-absorption of uric acid in the urine. The application of ergonomic exercises 3 times a week shows a significant difference in uric acid levels in the elderly.

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