

Original Research

Effects of Joint Gymnastics Exercise Intervention on Improving Functional Ability of the Elderly

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ABSTRACT

Background: *The elderly experience changes in the musculoskeletal system in the form of joint disorders that attack the joints and supporting tissue structures around the joints causing pain, loss of physical function, and disability. This requires management to reduce joint pain and improve muscle movement, function, strength, and endurance using joint gymnastics/rheumatism. The purpose of this study was to improve the ability of physical functioning in the elderly.*

Methods: *Quasi-experimental research with pre-post test design. The number of samples was 42 elderly people. This study measured the ability of physical function in the elderly. The research instrument used the KOOS (Knee injury and Osteoarthritis Outcome Score) questionnaire. Data were analyzed using the Wilcoxon signed ranks test.*

Results: *Research shows the majority of respondents are > 59 years old, and the majority are women (62.2%). There was an increase in knowledge with an increase in score of 2.19 and functional ability with an increase of 21.71 which was described in 4 sections, namely for pain score increased by 7.59, sign and symptom score increased by 7.09, ADL score increased by 2.76 and quality of life score increased by 4.26. There was a significant effect ($p = 0.000$) of joint gymnastics training interventions on improving knowledge and functional abilities.*

Conclusion: *There is an effect of joint gymnastics exercise interventions on improving knowledge and functional abilities. Suggestion: the application of joint gymnastics exercises is needed as an additional intervention in the community and to improve functional ability in the elderly.*

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INTRODUCTION

The elderly experience changes in the musculoskeletal system can be in the form of joint disorders that attack the joints and supporting tissue structures around the joints causing pain. Usually, the elderly experience pain when walking, climbing stairs, getting out of bed, or dressing. This joint pain that arises can disturb the elderly and can

limit the elderly in carrying out daily activities. The aging process in old age health problems of the musculoskeletal system is characterized by joint pain and stiffness and usually often occur in the legs, knees, waist, and shoulders (Pangaribuan, R., & Olivia, 2020). This requires management to reduce joint pain and can be used as a method of body movements known as joint gymnastics/rheumatism, in general, joint gymnastics/rheumatism movements are intended to improve movement ability, function, muscle strength, endurance, aerobic capacity, balance, joint biomechanics and a sense of joint position.

Some researchers conduct research on Non-Pharmacological actions in the form of physical exercise given to patients with osteoarthritis. Rheumatic gymnastics in the elderly. joint pain and has a positive effect on increasing joint strength. Research conducted by Suhendriyo (2014), there is an effect of rheumatic gymnastics on pain reduction in patients with knee osteoarthritis in Karangasem Surakarta $p = 0.005$. Gymnastics exercises can reduce joint pain proven in research (Elviani, Gani, & Fauziah, 2022); (Tri Novana, Faradisi, & Fajriyah, 2021); (Wahyuningsih, Erwin, & Nurchayati, 2020).

The purpose of this study was to determine the effect of a joint gymnastics exercise intervention on improving the functional ability of the elderly. The novelty of this study is to look comprehensively at the effects of joint gymnastics exercises not only looking at changes in pain reduction but also seeing improvements in the functional abilities of the elderly where there are 4 parts, namely pain, signs of symptoms, Activity Daily Living (ADL), and quality of life.

MATERIALS AND METHOD

This study used a type of pre-experimental quantitative research with a one-group pre-post test design. The population in this study is elderly in RW 08 Mojosojo Jebres Surakarta Village. With a population of 104 people. Samples were taken from as many as 34 people. With sampling techniques using nonprobability sampling with purposive sampling techniques. The inclusion criteria in this study are 1) the Elderly who come to posyandu, 2) the Elderly who are willing to become respondents by signing Informed Consent, and 3) the Elderly who are willing to practice at home every day for a duration of 10 minutes.

This instrument is used to determine the functional ability of respondents using questionnaires. The instrument used the KOOS (Knee injury and Osteoarthritis Outcome Score) questionnaire. Functional ability measurement using the Likert scale, and has 5 types of assessments. The questionnaire in the previous study consisted of 42 statement items, consisting of 9 pain statement items, 7 symptom statement items, 17 ADL statement items, 5 sport statement items, 4 QOL statement items. Ethical clearance at the ethics committee of Moewardi Hospital Surakarta on September 2022 with certificate number 1.733/IX/HREC/2023.

The procedure for conducting this research includes; 1) Researchers determine respondents based on predetermined inclusion and inclusion criteria 2) Researchers explain to the enumerator about the research to be carried out 3) Respondents who agree are asked to fill out an informed consent (letter of consent) as well as a pre-test before joint gymnastics intervention is carried out 4) Researchers carry out intervention for elderly respondents in March 2023, by dividing the implementation time according to joint gymnastics interventions, followed up by the elderly to carry out 1 time in one day for one month with a duration of 10 minutes 5) Researchers assisted by enumerators in

distributing post-tests in April 2023 6) Analysis stage; Conducted from questionnaire answers analyzed by researchers using analysis tests using the Wilcoxon signed ranks-test.

RESULTS

Characteristics of Respondents

Gender was found to be more female than male, female 64% and majority age > 59 years a number of 69%.

Table 1. Characteristics of the subject of study

	Characteristic	N	%	Kumulatif %
Age	Senior (>59 years)	29	69	69
	Pre senior (50-59 years)	13	31	100
	Total	42	100	
Gender	Woman	27	64	64
	Man	15	36	100
	Total	42	100	

Knowledge and Functional Abilities Before and After Elderly Joint Gymnastics at RW 08 Mojosongo Village, Year 2023 (n = 42).

The results of the study found an increase in knowledge on the results of the pretest mean score of 6.26 and post-test 8.45, this score increased by 2.19. Likewise, there was an increase in functional ability in the results of the pretest mean score of 34.86 and post-test 56.57, this score increased by 21.71, while functional ability was described in 4 parts, namely pain, signs of symptoms, ADL, quality of life, the four parts experienced an increase each, for pain scores increased 7.59 from the results of the pre-test mean score of 10.98 and post-test 18.57, sign and symptom scores increased by 7.09 from pretest mean scores of 9.86 and post-test 16.95, ADL scores increased by 2.76 from pretest results mean scores of 7.10 and post-test 9.86 and quality of life scores increased 4.26 from pretest results mean scores of 6.93 and post-test 11.19.

Table 2. Central Tendency to Knowledge and Functional Ability (Pain, Signs of Symptoms, ADLs, Quality of Life) Before and After Joint Gymnastics

	Characteristic	N	Mean	SD	(Min–Max)	(95% CI)
Knowledge	Pre test	42	6,26	0,989	54-81	5,95-6,57
	Post test		8,45	2,491	6-12	3,68-9,23
	Difference		2,19			
Functional Ability	Pre test	42	34,86	9,296	24-61	31,96-37,75
	Post test		56,57	13,147	39-83	52,47-60,67
	Difference		21,71			
Pain	Pre test	42	10,98	5,928	6-27	9,13-12,82
	Post test		18,57	7,702	9-35	16,17-20,97
	Difference		7,59			
Symptom Signs	Pre test	42	9,86	4,20	6-24	8,55-11,17
	Post test		16,95	3,313	12-26	15,92-17,98
	Difference		7,09			

Characteristic		N	Mean	SD	(Min–Max)	(95% CI)
ADL	Pre test	42	7,10	2,184	6-18	6,41-7,78
	Post test		9,86	4,200	6-24	8,55-11,17
	Difference		2,76			
Quality of Life	Pre test	42	6,93	2,341	4-11	6,20-7,66
	Post test		11,19	2,965	5-17	10,27-12,11
	Difference		4,26			

The Effect of Joint Gymnastics Exercise Intervention on Increasing Knowledge and Functional Ability in the Elderly RW 08 Mojosongo Village, Year 2023 (n = 42).

The study found that in a number of 42 respondents in the elderly, there was an increase in knowledge of 25 respondents, a decrease in knowledge of 4 people, and 13 people in the same state of knowledge. The results of statistical tests show that $p = 0.000$ which means there is a significant difference. Likewise, there was a significant increase in functional ability in the elderly ($p = 0.000$) after joint gymnastics intervention. both in the section on pain, signs of symptoms, ADL, and quality of life, the four parts experienced a better change including a decrease in pain 33 respondents, an increase in ADL there were 32 respondents, and there was an increase in quality of life in the elderly a total of 41 people.

Table 3. Paired test results (*Wilcoxon signed ranks test*)

	Ranks	N	Mean Rank	Sum of Ranks	P - value
Knowledge Post test Knowledge Pre test	Negative Ranks	4 ^a	7.88	31.50	.000
	Positive Ranks	25 ^b	16.14	403.50	
	Ties	13 ^c			
	Total	42			
Post- Functional Abilities of the Elderly Pre- Functional Abilities of the Elderly	Negative Ranks	0 ^p	.00	.00	.000
	Positive Ranks	41 ^q	21.00	861.00	
	Ties	1 ^r			
	Total	42			
Pain Pre test Pain post test	Negative Ranks	8 ^d	10.63	85.00	.000
	Positive Ranks	33 ^e	23.52	776.00	
	Ties	1 ^f			
	Total	42			
Symptom Post test Symptom Pre test	Negative Ranks	3 ^g	10.83	32.50	.000
	Positive Ranks	39 ^h	22.32	870.50	
	Ties	0 ⁱ			
	Total	42			
ADL Post test - ADL Pre test	Negative Ranks	2 ^j	9.25	18.50	.000
	Positive Ranks	32 ^k	18.02	576.50	
	Ties	8 ^l			
	Total	42			

	Ranks	N	Mean Rank	Sum of Ranks	P - value
Quality of Life Post test	Negative Ranks	0 ^m	.00	.00	.000
	Positive Ranks	41 ⁿ	21.00	861.00	
Quality of Life Pre test	Ties	1 ^o			
	Total	42			

DISCUSSION

This study found respondents who had knee osteoarthritis in Mojosongo Village were mostly aged >59 years. Many occur at the age of over 60 years because they have decreased proteoglycan synthesis, this is in accordance with Amin Wan, (2014) who explained that Osteo Arthritis (OA) is a joint degenerative disease that is quite high among the elderly according to the clinical diagnosis of the American College of Rheumatology (ACR), this age there is a change in collagen and a decrease in proteoglycan synthesis which causes bones and joints to be more susceptible to pressure and lack of joint elasticity. Other studies also mention the increasing age of OA disease in both women and men, the peak occurs mostly at the age of over 60 years and is rarely found at the age of under 40 years (Siswono 2013) (Aprilyadi & Soewito, 2020).

Research Kurdi et al., (2023) It is also found in 60% of the elderly. The aging process in old age can affect the musculoskeletal system which is characterized by joint pain and stiffness and usually often occurs in the legs, knees, waist, and shoulders (Pangaribuan, R., & Olivia, 2020). The fact found in this study is that the majority of respondents who experience OA are women 64% higher (27 people) than men 36% (15 people), this is because women in the elderly have experienced menopause where there are hormonal changes that play a role in the incidence of OA. It is supported by Nursarifah, (2011) where osteoarthritis of the knee generally occurs twice as much in elderly women than in elderly men. Elderly women experience hormonal changes, namely a decrease in the hormone estrogen so which the risk of causing bone loss.

Research-backed Amin Wan, (2014) there is a lot of OA in women, which is 57%. The overall heritability of knee OA surgery was 0.53 (95% confidence interval [CI] 1/4 0.31e0.75), with higher heritability in women (H2 1/4 0.80 (95% CI 1/4 0.73e0.87)) than men (H2 1/4 0.39 (95% CI 1/4 0.10e0.69) (Magnusson, Turkiewicz, & Englund, 2019). Research by Dinartika et al., (2018) found that in elderly women more than men 63.6%. Knowledge and Functional Abilities Before and After joint Gymnastics. The results of pre and post-research showed an increase in knowledge by 2.19 and functional ability of the elderly by 21.71.

In functional there are 4 parts, namely pain, signs of symptoms, ADL, and quality of life. There is an increase in knowledge due to additional information from researchers about joint gymnastics, its benefits, and functional respondents, this is in accordance with research Burmester, G. R., & Pope, (2017) there is an increase in knowledge due to education that knowing the benefits of joint gymnastics exercises explains the benefits of joint gymnastics including reducing joint pain and maintaining the physical health of rheumatic sufferers.

The condition of the bones becomes flexible, the muscles remain tight, facilitate blood circulation, maintain normal blood fat levels, are not easy to injury, and the reaction speed of body cells becomes better. Supported by other research that mentions Supported research Agung Akbar et al., (2022), Education provided data on the level of knowledge of the elderly group with rheumatoid arthritis in Village 1 PusaTanjung

agung with an average of 73% (sufficient level of knowledge) and the average level of knowledge of the elderly group with rheumatoid arthritis in Village 2 Pesar Tanjung Agung 80% (good level of knowledge). Patient education is needed regarding the management that will be carried out for rheumatic patients (Widiyaningsih, D., & Suharyanta, 2020). There is a functional improvement for the elderly because the benefits of joint gymnastics reduce pain, so doing daily activities (ADL) is more comfortable to do and improves fitness, this is supported by other studies that say joint gymnastics provides benefits to improve the ability to walk the elderly, maintain and is an effort to prevent and improve fitness, gymnastics is very helpful in reducing pain from joint pain caused by rheumatoid arthritis (Lase, 2022).

Effect of Joint Gymnastics Exercise Intervention on Increased Knowledge and Functional Ability. In this study, there was a significant influence on increasing the knowledge and functional ability of the elderly ($p = 0.000$). This happens because with additional information related to gymnastics exercises has an impact on increasing knowledgeability, this is in line Hasbullah, (2013) which states that the more information a person obtains, the more knowledge he gets, which is supported by the statement Budiman and Riyanto (2013) in Zega, (2021) that information is a technique for collecting, preparing, storing, manipulating, announcing, analyzing, and disseminating information with a specific purpose.

This is according to research by Desmonika et al., (2022), After being educated, respondents can find out about rheumatic gymnastics, rheumatic gymnastics itself is one of the practical and effective methods of maintaining a healthy body. The movements contained in rheumatic gymnastics are very effective, efficient, and logical movements because the series of movements are carried out regularly and organized for rheumatic sufferers. Physical exercise research is a fundamental therapeutic approach to the treatment of OA.

Previous systematic reviews and meta-analyses have shown the efficacy of diverse exercise modalities in effectively reducing pain among KOA patients, which is in line with the findings of our current study (Guo et al., 2022; Raposo et al., 2021; Yang et al., 2021; al., 2021). Gymnastics exercises can reduce joint pain proven in research (Elviani et al., 2022); (Tri Novana et al., 2021); (Wahyuningsih et al., 2020), Explained that there is a decrease in pain scale after doing rheumatic gymnastics in the elderly and it is also recommended to the elderly to always routinely do rheumatic exercises. Rheumatic gymnastics exercises can improve the functional activity of the elderly (Nurhidayah, 2012).

Joint gymnastics exercises have an influence on improving the ability to exercise the elderly with joint pain in doing Daily Living Activities (ADL) at Dharma Bakti Pajang Surakarta nursing home (Susilowati, 2017). Joint gymnastics is also able to reduce signs of rheumatic symptoms Joint pain management cannot be optimal if you only pay attention to it, but combined with exercise is very influential in reducing joint pain and physical function (Hall, Castelein, Wittoek, Calders, & Van Ginckel, 2019). Joint gymnastics exercises can improve the quality of life of the elderly (Sulistyowati, 2020), This is supported by research (Suharno, Nugraha, & M, 2020), A significant relationship between gymnastics and quality of life with a value of $\rho = 0.000$.

CONCLUSION

There is a significant influence of art gymnastics training on improving knowledge and functional abilities including; pain, signs of symptoms, ADLs, and

quality of life). This joint exercise should still be done independently by the elderly because there are many benefits in addition to reducing joint pain, also improving ADL, and the quality of life of the elderly. Suggestion: the application of joint gymnastics exercises is needed as an additional intervention in the community and to improve functional ability in the elderly.

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