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Original Research

Correlation Between Physical Activity and Musculoskeletal Disorders Among the Elderly

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ABSTRACT

Background: *Engaging in physical activity helps prevent Musculoskeletal Disorders (MSDs) in the elderly, which affect both soft and hard supporting tissues of the limbs. Low physical activity levels in older adults often lead to MSD complaints, especially in the lower back, knees, shoulders, and hands. This study aims to evaluate the correlation of physical activity in the incidence of MSDs among the elderly.*

Methods: *This study employed analytical observational research with a cross-sectional design and purposive sampling technique. The participants consisted of 50 older adults aged 60 and above. The research utilized the Physical Activity Questionnaire-Short Form (IPAQ-SF) to assess physical activity, while musculoskeletal disorders were evaluated using the Nordic Body Map (NBM). Data analysis was performed using the Spearman rank statistical test, facilitated by SPSS version 23 software.*

Results: *The findings showed a notable relationship between physical activity and the occurrence of musculoskeletal disorders in older adults, yielding a p-value of <0.001 and a correlation coefficient of -0.474, indicating a moderate level of strength. This means that the lower a person's level of physical activity, the higher the degree of Musculoskeletal Disorder complaints.*

Conclusion: *This study demonstrates a significant correlation between low levels of physical activity and the prevalence and severity of MSDs among older adults at the Arum Sari Health Post. The findings emphasize the need to raise public awareness and investigate additional risk factors to enhance the prevention and management of MSDs in the elderly.*

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INTRODUCTION

Ageing is an inevitable process in human life. An elderly person is defined as someone who is 60 years old or older, according to Law Number 13 of 1998 concerning elderly welfare. As people age, physiological functions decline, leading to the development of non-communicable diseases commonly observed in older adults (Kemenkes RI, 2017). Aging and a sedentary lifestyle are associated with decreased

muscle function and cardiorespiratory fitness, impairing the capacity to perform daily activities and maintain independent functioning (Izquierdo et al., 2021).

Physical activity includes any movement produced by skeletal muscles that necessitates energy use. It can take many forms, including cycling, walking, playing sports, completing homework, and engaging in recreational activities. These activities can occur in various settings, such as at work, school, or home (WHO, 2020). Based on information from the Behavioral Risk Factor Surveillance System (BRFSS) in 2014, the elderly in America exhibit less active behavior according to the recommendations of physical activity with mild and moderate intensity, which is carried out at least 150 times per week.

Musculoskeletal Disorders (MSDs) affect the muscles, nerves, tendons, joints, cartilage, and associated structures in the upper and lower limbs. These disorders can cause pain and interfere with daily activities, particularly among the elderly (Kishore, 2019). MSDs can cause pain, decreased joint range of motion, reduced sensory function, and maintenance of posture. With increasing age, the risk of developing musculoskeletal disorders is greater, such as being prone to fractures, osteoporosis, osteoarthritis, and rheumatism. MSDs can lead to chronic pain and limitations in physical activity due to reduced quality of life in the elderly (Nawrocka et al., 2019).

In 2019, the global population included 703 million individuals who were 65 or older. The elderly population is projected to reach more than 1.5 billion by 2050 (United Nations, Department of Economic and Social Affairs, 2019). The proportion of older adults in 2021 will reach 10.82% or around 29.3 million people. The province of the Special Region of Yogyakarta has a percentage of older adults reaching around 15.52%.

DI Yogyakarta Province, the proportion of physical activity in the population aged more than ten years according to the characteristics in the 60–64-year age group who perform physical activity in the moderate category reaches 84.75%, and the less active reaches 15.25%, in the older age group. Of the 65-year-olds who did physical activity in the good category, 65.75%, and those who were less active reached 34.23% (Riskesdas, 2018). A recent evaluation of the Global Burden of Disease (GBD) data reveals that approximately 1.71 billion individuals globally are affected by musculoskeletal conditions.

Low back pain is a major contributor to the overall burden. Other notable contributors include fractures, which impact 436 million people around the world; osteoarthritis, affecting 343 million; various injuries, involving 305 million; neck pain, experienced by 222 million; amputations, which concern 175 million; rheumatoid arthritis, influencing 14 million individuals. Among elderly populations, who are especially vulnerable to MSDs, the highest prevalence of these issues is observed in the lower back (49.7%), followed by the knees (26.7%), hands (26%), and shoulders (20.8%) (Park & Lee, 2020).

According to research conducted by Puspitasari and Ariyanto (2021) on 45 older adults with poor physical activity levels, 53.33% complained of musculoskeletal disorders and were very sick, which was caused by poor physical activity and several factors such as work. The elderly are among the least physically active people, so WHO recommends doing physical activity for ages 18-65 years in the form of 90-150 minutes of aerobics a week plus two exercises to increase muscle strength every week. Physical activity can improve cardiorespiratory, increase muscle strength, improve fitness, bone health, and functional ability, and reduce the risk of developing non-communicable diseases (NCDs), depression, and cognitive decline.

Lack of physical activity in the elderly can cause musculoskeletal disorders. Musculoskeletal disorders contribute to long-term disability and cause extreme pain among the elderly worldwide. Issues related to musculoskeletal disorders negatively impact the elderly by disrupting their daily activities; a rise in musculoskeletal complaints signifies a decline in functional abilities among older adults. Seniors who suffer from musculoskeletal pain frequently restrict their movements to lessen the discomfort, which can interfere with their everyday lives (Kamil & Hasan, 2021).

Physiotherapy as a health worker plays a significant role and must have the ability to maximize the potential for movement and function in the scope of promotive, preventive, curative, and rehabilitative. This is evidence that physiotherapy not only plays a curative and rehabilitative role but also plays an essential role in preventive measures to reduce the level of complaints of musculoskeletal disorders. This study aims to identify the correlation of physical activity on the incidence of musculoskeletal disorders in the elderly.

MATERIALS AND METHOD

This research falls under the category of analytical observational study. It employs a cross-sectional time approach and purposive sampling. The population for this research consists of all older adults aged 60 to 70, amounting to 100 individuals at Integrated Health Post Arum Sari on 11 June 2022. Purposive sampling is a data collection technique based on specific considerations to ensure that the selected samples align with the research objectives. The sample in this study consisted of 50 elderly individuals.

Data collection began with recruiting respondents, who were then asked to complete an informed consent form. The inclusion criteria in this study were elderly individuals aged 60 years and above, able to perform physical activities independently, and having a good memory. The exclusion criteria were inability to communicate effectively and unwillingness to participate as research respondents. The variables in this study were physical activity and musculoskeletal disorders. This research obtained ethical clearance from the Health Research Ethics Committee of Universitas ‘Aisyiyah Yogyakarta with the number 2057/KEP-UNISA/V/2022.

Based on the validity test, the correlation value was greater than 0.2681, which means the Nordic Body Map (NBM) is valid. The reliability test showed a Cronbach’s Alpha of 0.876 (87.6%), indicating the NBM questionnaire is reliable. Then, the International Physical Activity Questionnaire Short-Form (IPAQ-SF) was filled out to assess physical activity, and the Nordic Body Map (NBM) questionnaire was completed to evaluate musculoskeletal disorders. Height and weight measurements were also taken. Once all data has been collected, it undergoes processing through editing, coding, data entry, and tabulation. The analysis used the Spearman Rank test in SPSS because the data were ordinal, so this test was suitable to find the correlation between variables.

RESULTS

Table 1. Characteristics of Respondents (n = 50 Eldery)

Variable	n	(%)
Age		
<65 years old	22	44
>65 years old	28	56
Total	**50**	**100**

Variable	n	(%)
Gender		
Male	11	22
Female	39	78
Total	**50**	**100**
Body Mass Index (BMI)		
Underweight	1	2
Normal	38	76
Overweight	8	16
Obese	3	6
Total	**50**	**100**
Occupation		
Housewife	36	72
Trader	5	10
Farmer	2	4
Retired	7	14
Total	**50**	**100**
Physical Activity		
Mild	28	56
Moderate	16	32
Severe	6	12
Total	**50**	**100**
Musculoskeletal disorders		
No Complaints	6	12
Mild	7	14
Moderate	17	34
Severe	20	40
Total	**50**	**100**

Note: n = number of observations; % = percentage

Based on Table 1, it can be concluded that of the 50 samples, with the highest number of people aged > 65 years, there were 28 samples (56%), for the female sex, there were 39 samples (78%), for the most BMI category, namely the normal BMI category, there was 38 sample (76%). Based on the table, the most physical activity was in the mild physical activity category, namely 28 samples (56%), and for musculoskeletal disorders with the highest degree of severe complaints, there were 20 samples (40%).

Table 2. Relationship of Physical Activity with Musculoskeletal Disorders (MSDs) (n =50 Elderly)

	Musculoskeletal Disorders	
Physical Activity	*p-Value**	r
	<0.001	-0.474

Note: *the Spearman rank test; r = correlation

Table 2 presents the findings from the *Spearman rank test*, which yielded a p-value of <0.001 (less than 0.05) and a correlation coefficient of -0.474. Because the p-value is lower than 0.05, this research accepts the alternative hypothesis (Ha) and discard the null hypothesis (Ho). Therefore, this research can infer that a significant

association exists between physical activity and the incidence of musculoskeletal disorders in older adults. The correlation coefficient of -0.474 indicates a moderate strength of the inverse relationship between physical activity and MSDs. This means that the lower a person's level of physical activity, the higher the degree of Musculoskeletal Disorder complaints.

DISCUSSION

In this study of 50 elderly participants, age was a key factor in MSD complaints. Those aged over 65 tended to experience more severe symptoms. This aligns with research showing that physical activity declines with age, increasing the risk of MSDs (Suryadinata et al., 2020). As we age, our muscle mass shrinks, by about 3–8% every decade after 30, and even faster after 60. This loss of strength is also due to smaller muscle size and changes in muscle structure.

Moreover, because older adults tend to move less, these effects become even more noticeable over time (Teixeira et al., 2022). Aging also causes degenerative changes, like scar tissue and fluid loss, that reduce muscle and bone stability (Helmina et al., 2019). Gender also played a role. Women reported more MSD complaints than men, which is supported by studies showing that women tend to have lower physical activity levels and muscle strength (Ivanali et al., 2021).

Physiological differences, including menstrual cycles and menopause, can reduce bone density (Sudarman & Mangunsong, 2022). As women age, declining estrogen levels also increase the risk of bone-related disorders (Puspitasari & Ariyanto, 2021). When grouped by BMI, underweight, normal, overweight, and obese, participants from all categories reported MSD symptoms. Even those with normal BMI experienced complaints. Low physical activity was found in both obese and non-obese elderly (Suryadinata et al., 2020).

However, obese women were twice as likely to suffer from MSDs, likely due to added strain on the joints. Extra body weight, especially around the waist, can pressure the spine and cause pain (Djaali, 2019). Interestingly, some studies found no direct link between BMI and MSDs, highlighting that age, gender, and physical activity might be more critical factors (Tjahayuningtyas, 2019). Occupational roles also mattered.

Participants were grouped as homemakers, traders, farmers, or retirees. Homemakers reported frequent complaints, likely due to repetitive physical tasks such as cleaning, cooking, or lifting. These daily tasks are similar to work-related movements that cause MSDs, especially in the lower body, back, and shoulders (Jacob & Ying, 2020). Limited body positions and repetitive motions increase the risk of musculoskeletal strain.

Physical activity plays a key role in healthy aging. It helps prevent falls, reduce pain, and protect against muscle loss, bone thinning, and memory problems (Eckstrom et al., 2020). In this study, physical activity among the elderly was classified into three levels including mild, moderate, and vigorous. Interestingly, most older adults in the study only did mild physical activity.

This aligns with findings by Ikhsan et al. (2020) who observed a general decline in physical activity levels among the elderly, with many sticking to light movements that unfortunately increase the risk of falls. This decline is mainly due to the natural aging process, which weakens muscles, reduces flexibility, and lowers physical endurance. Inactivity is a well-known risk factor for musculoskeletal disorders (Djaali, 2019).

On the other hand, Zhu et al. (2024) found that physical activity can significantly lower the risk of musculoskeletal problems in adults over 45, when done at the right intensity. As people age, they often struggle with joint and muscle issues. However, the good news is that regular movement can help maintain strength and ease these discomforts (Gharib & Rashedi, 2021).

Older adults are also more vulnerable to illness and may lack awareness about how beneficial physical activity is. Supporting these findings, Thornton et al. (2025) reported that regular physical activity can lower the risk of death by up to 31% while also protecting against chronic conditions like heart disease, diabetes, osteoporosis, and dementia. Beyond just health, staying active boosts strength, balance, brain function, and overall quality of life, making it one of the best habits for aging well.

In the results of this study, musculoskeletal disorders were divided into four groups: no complaints, mild, moderate, and severe. Musculoskeletal disorders with severe complaints dominated the results obtained in the study. Musculoskeletal complaints are caused by muscle contractions, which result in muscle pressure and obstruction of blood flow in blood vessels.

Decreased blood flow in the vessels can lead to static contractions. Prolonged static contractions may initiate a pathological process that results in symptoms of musculoskeletal disorders. According to the research by Puspitasari and Ariyanto (2021), static situations related to musculoskeletal disorders can be connected to both occupational and daily activities in older adults. This study largely involved homemakers among its respondents. In such circumstances, there is a considerable risk of experiencing musculoskeletal disorder symptoms.

The findings of this study highlight a strong connection between physical activity and MSDs in older adults. Aging leads to a decrease in muscle mass, bone density, and an increase in muscle stiffness, which impacts musculoskeletal issues. However, physical activity is key in preventing and easing these complaints across all age groups. Supporting this, Puspitasari and Ariyanto (2021) found that older adults with low physical activity were likely to report severe musculoskeletal problems.

Regular movement helps reduce muscle and joint pain, while inactivity can do the opposite. Pain in specific areas often discourages people from staying active, which worsens their condition. That is why keeping the body moving, primarily through moderate to vigorous physical activity is essential for maintaining muscle strength, joint flexibility, and good posture (Grabara, 2023).

Physical activity strengthens muscles, enhances physical function, and supports joint stability. When the muscles around the joints are strong and well-nourished, and the cartilage is healthy, the body is more resilient to stress and injury. On the other hand, doing only mild activity may lead to weaker bones and a higher risk of fractures. Moreover, research shows that staying active does not just improve physical function, it can also reduce pain (Grabara, 2023).

A large-scale study by Wakaizumi et al. (2024) confirmed a strong link between frequent physical activity and lower pain intensity. Those who exercised regularly, especially at a higher frequency, experienced significant relief from chronic pain. This study has several limitations that should be acknowledged. The relatively small sample size of 50 elderly participants from a single health post limits the generalizability of the findings to the broader elderly population. Additionally, reliance on self-reported data for both physical activity levels and MSD complaints may introduce recall and response bias.

The cross-sectional design also prevents the establishment of causal relationships between physical activity and the severity of MSDs. Furthermore, other potential contributing factors, such as nutritional status, chronic illnesses, medication use, and psychological conditions, were not examined. Future research should involve a larger and more diverse sample, employ objective measurement tools (e.g., accelerometers, clinical assessments), and utilize longitudinal or experimental designs to better understand causal pathways. It is also recommended that future studies explore additional risk factors such as hormonal changes, ergonomic factors in daily tasks, and psychosocial influences to develop more comprehensive prevention and intervention strategies for MSDs in older adults.

CONCLUSION

The results of this study demonstrate a significant correlation between the level of physical activity and the degree of MSD complaints among the elderly. With increasing age, natural physiological changes, such as decreased muscle mass, reduced bone density, and increased joint stiffness raise the risk of MSDs, particularly when physical activity is limited. These findings support the conclusion that lower physical activity levels are associated with more severe musculoskeletal complaints. This highlights the importance of promoting regular, moderate physical activity among older adults to help maintain muscle strength, joint flexibility, and overall functional capacity. Public awareness regarding the benefits of physical activity and elderly health must be strengthened to support healthy aging.

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