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Original Research

The Impact of Stretching Exercise on Musculoskeletal Pain and Quality of Life of Occupational Therapists

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ABSTRACT

Background: *The occupational therapy profession has risks from its work, namely musculoskeletal pain. This problem, if not properly addressed, will have a serious impact, including a deterioration in quality of life. Some attempts that can be made to overcome musculoskeletal pain are pharmacological and non-pharmacological efforts. This study will look at the effect of intervention in the form of stretching exercises on musculoskeletal pain and quality of life in occupational therapists in the Klaten district. The aim of this study is to measure the effect of stretching exercises on musculoskeletal pain and quality of life among occupational therapists in the Klaten district.*

Methods: *This study utilized a pre-experimental pretest-posttest design and employed purposive sampling to select participants. Musculoskeletal pain was assessed using the Nordic Body Map questionnaire, while the WHOQOL-BREF instrument was used to measure quality of life.*

Results: *The study found a statistically significant decrease in musculoskeletal pain with a p-value of 0.000 using a paired t-test. Similarly, both the Wilcoxon signed-rank test and the paired t-test showed statistically significant improvements across all four quality-of-life domains, yielding a p-value of 0.001.*

Conclusion: *Stretching exercise has the effect of reducing musculoskeletal pain and improving the quality of life of occupational therapists in the Klaten district.*

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INTRODUCTION

Musculoskeletal pain is a condition that impairs the normal functioning of the musculoskeletal system as a result of recurrent exposure to numerous risk factors on the job. Musculoskeletal pain has an impact on health domains such as physical limitations that cause loss of participation and withdrawal from social, community, and work activities, as well as reduced quality of life and well-being, including mental health (El-Tallawy et al., 2021). Work-related musculoskeletal diseases (WRMDs) are a collection of painful muscle, tendon, and nerve conditions. Repetitive job activities or activities

that require inappropriate postures produce discomfort at work or at rest (Huang et al., 2020).

According to the 2018 Basic Health Survey, the prevalence of joint illnesses diagnosed by doctors among government servants/military/police/state-owned firms/regional companies in Indonesia is 7.50%, behind only farmers and the non-working population (Kemenkes, 2018). In Indonesia, based on the results of a study conducted in 12 districts on 9,482 workers, it was found that 16% of workers suffered from musculoskeletal pain as the main disorder (Indika et al., 2022). Many workers suffer from musculoskeletal discomfort as a result of ergonomic variables such as work speed, inappropriate posture, chair use, improper hand position during work, repeated motions, and stress (Soares et al., 2019).

Based on a preliminary survey of occupational therapists in the Klaten district through interviews, it can be seen that occupational therapists experience musculoskeletal pain with different pain intensities; the pain is due to the work attitudes that are carried out every day in providing occupational therapy services with manual handling. One of the impacts of the musculoskeletal pain experienced by occupational therapists is to reduce quality of life. Work attitude during manual handling work can cause more musculoskeletal pain to the risk work attitude; the wrong work position can cause injury to the body (Azzahra et al., 2022).

Individual variables (age, gender, educational status, work position, and marital status) and illness factors (living with carers, family support, and family burden) all have an impact on quality of life (Aryani et al., 2023). Chronic pain is linked to quality of life, which is assessed using physical, psychological, and social factors that are prevalent in daily life and experiences as a result of musculoskeletal problems (Savvakis & Kolokouras, 2019). Several efforts can be made to prevent and overcome musculoskeletal pain, either pharmacologically or non-pharmacologically. A form of non-pharmacological effort that can reduce musculoskeletal pain is stretching exercise.

Based on previous research, stretching exercise is effective for reducing musculoskeletal pain in the workplace (Purwantini et al., 2021). Stretching exercises can help reduce physical strain and stress from awkward positions as well as static loading. Stretching improves circulation, posture, flexibility, range of motion, and stress reduction (King et al., 2020). Stretching exercise is needed because it is able to relax the muscles and joints and increase blood circulation in the surrounding area, resulting in reduced musculoskeletal pain (Syafrianto et al., 2019).

The research location was in Klaten, which included hospitals, clinics, and schools, using occupational therapist respondents, with the urgency being based on a preliminary survey of occupational therapists experience and feelings about musculoskeletal pain from mild to severe degrees as a result of their work, and some experience a decrease in quality of life, so it is important to study. Given the aforementioned concerns, a study was conducted in Klaten district to investigate the impact of stretching exercises on musculoskeletal pain and the quality of life of occupational therapists.

MATERIALS AND METHOD

The research was conducted in Klaten District in June-August 2023. This research is a quantitative study that employs a pre-experimental design, particularly a 'one-group pre-posttest design'. This study's population consists of occupational therapists who work in hospitals, clinics, and special schools in the Klaten area.

The sampling approach was complete sampling, with a sample size of 40 individuals, which includes the total number of occupational therapists in Klaten. The implementation of the intervention was carried out every day 14 times, and 30 minutes for each session, carried out in place with each sample by imitating the movements on video guidance that the researcher had prepared. The researcher monitored the course of the intervention every day through a WhatsApp group to ensure it had been implemented according to the guidelines or not.

This research was conducted after ethical clearance was issued with number 2380/UKH.L.02/EC/V/2023 from the Health Research Ethics Committee, Kusuma Husada University of Surakarta. The data collection techniques involved primary sources utilizing questionnaire data that has been filled in by the sample; the instrument used is the Nordic Body Map (NBM) (with a validity value between 0.501 and 0.823, while the reliability value based on Cronbach's alpha is 0.726) (Ramdan et al., 2019) to measure musculoskeletal pain and WHOQOL-BREF (with valid measuring instruments r = 0.6, and the reliability test was carried out using Cronbach's alpha coefficient resulting in r = 0.880) (Anisah & Djuwita, 2019) to measure the quality of life. Statistical analysis is performed using the paired t-test for normally distributed data and the Wilcoxon test for non-normally distributed data.

RESULTS

The data on musculoskeletal pain was collected twice: first, prior to the intervention, and then again thereafter. Data were collected using the Nordic Body Map (NBM) questionnaire to assess musculoskeletal pain and the WHOQOL-BREF instrument to assess quality of life. Respondents completed the intervention eight times each day.

Respondent Characteristics

An overview of the respondents will be presented based on gender, age range, smoking habits, work area, length of employment, and body mass index (BMI).

Table 1. Overview of Respondent Characteristics

Respondent Characteristics	n (%)	
	Stretching Exercise	
	n	%
Gender		
Male	1	2,5
Female	39	97,5
Total	**40**	**100**
Age range		
Late teens	9	22,5
Early adulthood	15	37,5
Late adulthood	16	40
Total	**40**	**100**
Smoking habits		
Yes	0	0
No	40	100
Total	**40**	**100**

Respondent Characteristics	n (%)	
	Stretching Exercise	
	n	%
Work area		
Pediatric	30	75
Adult physical	2	5
Psychiatric	2	5
Other work areas	6	15
Total	**40**	**100**
Body Mass Index (BMI)		
Severely thin	1	2,5
Mildly thin	2	5
Normal	18	45
Slightly obese	5	12,5
Severe fat	14	35
Total	**40**	**100**

The result indicated that most of the respondents were female, 39 (95%); the most common age range was late adult, 16 (35%); 100% did not smoke; the most common job area was paediatrics, 30 (70%); and the most common body mass index (BMI) was normal, 18 (45%).

Musculoskeletal pain at baseline/before and after intervention

Musculoskeletal pains are described through the Nordic Body Map questionnaire. The results, including the mean values of the Nordic Body Map for the research respondents before and after the intervention, are presented in Table 2 as follows:

Tabel 2. Table of Nordic Body Map Mean Values Before and After Intervention

Variable	Mean	Difference of Mean
Pre test of musculoskeletal pain	43,15	11,3
Post test of musculoskeletal pain	31,85	

The results revealed that there was a mean difference before and after the intervention, which was 11.3.

Quality of life before and after intervention

The results of the mean value of WHOQOL-BREF in research respondents before and after the intervention are presented in Table 3 as follows:

Tabel 3. Table of WHOQOL-BREF Mean Values Before and After Intervention

Pre Test	Mean	Post Test	Mean
WHOQOLBREF		WHOQOLBREF	
Physical health	42,58	Physical health	55,55
Psychological	43,95	Psychological	48,35
Social relationships	42,25	Social relationships	54,42
Environment	43,08	Environment	53,15

Based on the data normality test result, it was found that the distribution of data in the pre-test and post-test of the stretching exercise group was normally distributed, so a paired t-test statistical test was used. The WHOQOL-BREF scale categorizes quality of life into four domains: physical health, psychological, social connections, and environment. The normality test findings for physical health, social interactions, and environmental data were not normally distributed; therefore, bivariate analysis utilized the Wilcoxon test; however, psychological data had a normal distribution, so bivariate analysis used the paired-sample t-test.

The results of the Wilcoxon and paired-sample t-tests were obtained. The outcomes of the difference test are presented in the following paragraphs and also in tables 4 and 5 below. The difference between pre-test and post-test musculoskeletal pain from the data from the paired t-test results showed that the p-value = 0.000 ($p < 0.005$), which means that there is a significant difference in the values of musculoskeletal pain among exercise respondents before and after the intervention.

Tabel 4. Table of Wilcoxon test results for quality-of-life domain 1,2 and 3

Data	Significant Value (p value)
Pre – post physical health	0.001
Pre – post social relationships	0.001
Pre – post environment	0.001

Tabel 5. Paired-sample t test results for domain 4 quality of life

Data	Significant Value (p *value*)
Pre – post test psychological	0.001

Based on the Wilcoxon test and paired-sample t-test results, there is a substantial difference in respondents' quality of life across all four areas before and after the intervention, with a p-value of 0.001 ($P < 0.05$) remaining constant.

DISCUSSION

Stretching exercise affects musculoskeletal pain

Based on the results of the paired sample t-test in this study, it was found that there was a difference in musculoskeletal pain values before and after respondents did stretching exercises ($P < 0.05$). The results of this study are in line with research conducted by Harwanti et al., (2017) which examined the effect of stretching exercise and had a positive impact on musculoskeletal pain in batik workers, concluding that the provision of interventions in the form of stretching exercise can reduce musculoskeletal pain in the middle and final measurements (Harwanti et al., 2017). The same results were also found in the conclusion of research on Korean-Chinese migrant women workers, namely stretching exercise programs can increase flexibility and reduce musculoskeletal pain (Lee et al., 2017).

A scientific article on handling DOMS (Delayed Onset Muscle Soreness) wrote that of 60 respondents who experienced DOMS, 45% overcame it by stretching and 42% by resting, and this method was quite effective in overcoming DOMS (Prihantoro & Ambardini, 2018). Stretching is an attempt to lengthen the muscles so as to cause the muscles to relax and flex, so as to prevent muscle tension (spasm). Flexibility is the ability of a joint to move in its full range (Gifford, 2020).

When muscle contraction occurs, the muscle produces muscle force or movement as desired (the muscle tightens), and when relaxation occurs, the muscle returns to rest or returns to its original position (the muscle relaxes). Relaxed muscles are muscles that do not experience tension (spasm), while flexible muscles are muscles that can be moved in full range (Madri, 2017). Pain occurs due to vasoconstriction of blood vessels in the muscles due to continuous excessive contraction and eventually causes tissue ischemia. The mechanism of ischemia and excessive muscle spasm will stimulate nociceptors that play a role in delivering pain impulses to the brain (Uchmanowicz et al., 2019).

In muscles that experience excessive spasms, there will be a shortening of muscle fibres because the myofilaments overlap each other. Muscle proprioceptors (muscle spindles and Golgi tendon organs) are receptors associated with muscle movement. Muscle spindles are responsible for regulating signals to the brain about changes in muscle fiber length, while the Golgi tendon organs detect muscle tension (Zampieri & de Nooij, 2021). Complaints of pain in the musculoskeletal system are signs and warnings from the body because there are injured tissues and even damage (Sallis et al., 2020).

Respondents who do stretching exercise interventions regularly get benefits. When stretching, there is a dynamic contraction of the muscles that causes more blood to flow to the muscles, so that the supply of oxygen and nutrients needed for metabolic processes can be fulfilled effectively. Stretching means changing the static position to be more dynamic; this can stimulate the smooth process of metabolism in the body so that the hoarding of muscle metabolic products (lactic acid and CO2) can be minimized and musculoskeletal pain can be prevented or reduced (Tarwaka, 2014). From the discussion above, it can be concluded that regular muscle stretching exercises have an impact on reducing musculoskeletal pain due to increased muscle flexibility and increased blood and oxygen supply to the muscles, so muscle metabolism is effective.

Stretching exercise affects quality of life

In total, the statistical test results showed that the provision of the stretching exercise intervention had a positive effect (p value = 0.001) on the respondents' quality of life (physical health, psychological, social relationships, and environment). According to the World Health Organization Quality of Life (WHOQOL), quality of life is the individual's perception of his or her position in life according to the cultural context and value system to which he or she adheres, where he or she lives, and his or her relationship with the expectations, goals, standards, and concerns of the individual. The issues encompassed by the quality of life are broad and complex, including physical health issues, psychological status, level of freedom, social relationships, and the environment in which they exist.

(“Development of the World Health Organization WHOQOL-BREF Quality of Life Assessment The WHOQOL Group.,” 1998). Quality of life is also a crucial criterion in assessing the medical outcomes of chronic disease treatment. Individuals' perceptions of impact and satisfaction with their health status and limitations are important as a final assessment of treatment (Reis et al., 2014).

This stretching exercise solution was administered in eight sessions of 60 minutes each. Regular physical exercise of more than 60 minutes per day enhances physical, psychological, and social well-being (Granero-Jiménez et al., 2022). Improving

musculoskeletal pain has a positive influence on a person's quality of life, as the physical element is a key component of quality of life (Pacheco-Da-costa et al., 2022).

Physical activity boosts the synthesis of hypothalamic β-endorphins, which can regulate temperature and minimize hot flashes. Furthermore, exercise might enhance one's overall quality of life (Pilozzi et al., 2020). Medrano-Ureña et al., (2020) stated in their study that exercise can increase the quality of life. Pain is subjective; everyone understands pain through the experience of injury or injury to the body. Pain is usually accompanied by stress responses such as anxiety, increased heart rate, blood pressure, and respiratory rate.

Pain that is not handled properly can prolong the stress response and have an impact on reducing the body's resistance. Decreased immune function accelerates tissue damage and can affect the quality of a person's health and life (Brenda Tam et al., 2021). From the discussion, it can be concluded that prolonged musculoskeletal pain affects almost all aspects of life, including the quality of health and quality of life of individuals, so muscle stretching exercises are useful for improving quality of life because physical health is a major component of quality of life. This study has limitations; the instrument used is the Nordic Body Map (NBM), which is subjective, and there are no other instruments used that are more objective, and the research design is pre-experimental, which does not use a control group.

CONCLUSION

This study concluded that stretching exercises significantly reduced musculoskeletal pain. In addition, exercise had a positive impact on quality of life in all four domains (physical health, psychological, social, and environmental relationships) as measured by the WHOQOL-BREF. Suggestions for future research are to use other instruments that are objective such as the Rapid Upper Limb Assessment (RULA), to measure the level of musculoskeletal disorder load, and use a quasi-experimental research design involving a treatment group and a control group.

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