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Research Article

The Effect of Workplace Stretching Exercise (WSE) Intervention on Musculoskeletal Complaints Among Nursing Students in Clinical Practice

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Abstract

Background: Musculoskeletal complaints are a common discomfort experienced by nursing students during clinical practice in hospitals. This occurs because they do not pay attention to important factors that pose risks, particularly related to improper patient handling. One intervention used to address these complaints is Workplace Stretching Exercise (WSE). WSE is a series of muscle-stretching exercises designed to relax and increase the flexibility of muscles that are considered problematic.

Objectives: To determine the effect of WSE on musculoskeletal complaints among nursing students during clinical practice in hospitals.

Methods: This research is a pre-experimental study with a two-group pre-test and post-test design. The sample consists of 26 individuals in both the intervention and control groups, selected using purposive sampling. The questionnaire used is the Nordic Body Map (NBM) to detect musculoskeletal complaints.

Results: Statistical test results using the Wilcoxon test showed $p = 0.000$ ($\alpha = 0.05$), indicating that WSE has an effect on musculoskeletal complaints among nursing students during clinical practice in hospitals.

Conclusion: WSE should be routinely performed by nursing students during clinical practice to address musculoskeletal complaints.

Keywords: musculoskeletal complaints, nursing students, workplace stretching exercise

Introduction

Nursing students engaged in hospital practice perform tasks that are nearly identical to those of nurses in the ward. They sometimes carry out independent actions for patients or act as nurse assistants. While performing these tasks, they often overlook actions that may pose a risk of work-related illnesses, such as improper techniques when pushing, lifting, pulling, carrying, holding, and lowering patients. This situation can lead to muscle injuries that develop into musculoskeletal complaints. Such tasks make nursing one of the most significant predictive factors for musculoskeletal complaints.¹ Musculoskeletal complaints also occur due to non-ergonomic work positions that are repeated frequently.²

Additionally, these complaints may be caused by a lack of stretching in static work positions.³ Jobs that involve physical activity have the potential to cause muscle disorders, which typically manifest as musculoskeletal complaints. These issues arise due to repeated minor or major impacts during work, leading to pain and discomfort in the bones, joints, and muscles. Musculoskeletal complaints are among the most frequently reported issues. There is a positive correlation between work posture and the occurrence of musculoskeletal complaints, which is related to ergonomic risk factors or incorrect work positions.^{4,5} Moreover, musculoskeletal complaints can be triggered by non-ergonomic work positions, repetitive actions, excessive force, and static work positions.⁶ Boakye also mentions that long-duration, monotonous work, and a work environment that does not align with anthropometry are additional triggers, along with individual factors such as gender, age, length of employment, work patterns, and smoking habits.¹

IOSH and Suwartini et al. state that musculoskeletal complaints are caused by damage to muscles, tendons, nerves, and supportive structures in the back, such as discs.^{7,8} These complaints affect skeletal muscles, ranging from mild to severe symptoms.^{9,10} Other factors that contribute to these complaints include excessive muscle stretching, repetitive movements, pressure, vibration at the workplace, and unnatural work postures.¹¹ If not addressed promptly, these complaints can lead to reduced work concentration due to fatigue, increased risk of injury, and ultimately disrupt the nursing care process and lower work productivity. A survey conducted by Hamid et al. (2018) on 200 workers at five healthcare facilities in Lahore, Pakistan, reported that ergonomic errors led to musculoskeletal complaints, including muscle pain/sprains (76.5%), posture problems (56.0%), excessive muscle stretching (67.5%), and bending at work (55.5%). Additionally, there were hazards caused by biological factors, including cuts/lacerations (69.0%), contact with specimens (56.0%), airborne exposure (64.0%), needle sticks (90.0%), and other infections (72.9%). Meanwhile, the percentage of physical hazards included tripping/falling (65.0%), high noise levels (64.0%), and chemical spills (54.0%). Psychosocial hazards such as stress also occurred (77.0%).¹²

Currently, musculoskeletal complaints are a significant occupational health issue worldwide (12). They impact quality of life and work productivity. It has been reported that the highest prevalence of musculoskeletal complaints occurs among nurses and midwives, particularly in the lower back, neck, and upper back. Lifting patients has been identified as a major risk factor for musculoskeletal complaints.¹ This is supported by research from Mardiani et al. (2022), which found that musculoskeletal complaints are the most common among healthcare workers, particularly nurses.¹³ Factors such as work posture, length of employment, work shifts, and job type contribute to these complaints.¹³ Another study on hemodialysis nurses showed that musculoskeletal complaints and fatigue are two common issues due to non-ergonomic work positions.⁸ Reducing musculoskeletal complaints in the workplace requires identifying and controlling the physical and psychosocial causes. One method to prevent and reduce these complaints is by practicing Workplace Stretching Exercises (WSE).¹⁴ WSE is a muscle-stretching exercise that can be performed at work to address musculoskeletal complaints.^{8,15,16} Muscle stretching involves lengthening the muscles to make them more relaxed and flexible. WSE is designed based on the principles of muscle stretching or stretching exercises. According to Syafrianto et al. (2019), WSE is essential in the workplace because it improves work quality, reduces workplace accidents, and enhances employee health, well-being, and satisfaction.¹⁵ Stretching exercises help increase motivation and physical function, improve blood circulation, enhance muscle flexibility, and reduce the risk of injury and musculoskeletal complaints.¹⁷ Several studies have shown that WSE therapy can reduce musculoskeletal complaints. WSE therapy reduces fatigue and musculoskeletal complaints.^{3,18}

Rafflesia Health Science College is a Health College in Depok, which consists of three study programs, one of which is nursing. Data on musculoskeletal complaints in

nursing students who are practicing at the Hospital have not been reported in writing, but based on the results of observations, nursing in providing nursing actions with the wrong and inappropriate positions such as installing Intra Vena, taking blood, and bathing patients in a position that is too bent over so that in a long time it causes pain in the waist. If this is not prevented as soon as possible, it will cause less than optimal nursing care given to patients, the risk of injury to nurses while working will be greater, and can reduce nurse productivity at work which will result in reduced hospital income. From this background and phenomenon, WSE therapy is believed to be able to reduce musculoskeletal complaints. Therefore, researchers are interested in knowing the effect of WSE therapy in reducing musculoskeletal complaints in nursing students who are practicing at the Hospital.

Methods

This study utilized a pre-experimental method with a Two-Group Pre-Test-Post-Test design. The research compared a control group with an intervention group that was given Workplace Stretching Exercise (WSE) training. In this study, the first measurement (pretest) was conducted on both the first and second groups to assess musculoskeletal complaints among nursing students using the Nordic Body Map questionnaire. Afterward, the first group received the Workplace Stretching Exercise (WSE) intervention, while the second group did not. A second measurement (posttest) was then conducted on both groups to observe the differences in musculoskeletal complaints between the pretest and posttest.

The sample in this study consisted of second and third-year nursing students who were practicing at KiSA General Hospital in Depok City and Brimob Hospital in Depok City, selected through simple random sampling. The inclusion criteria were second and third-year nursing students who were undergoing clinical practice at the hospital, agreed to participate in the study by signing a consent form, and had a musculoskeletal complaint score below 71. The exclusion criteria included experiencing trauma or musculoskeletal system diseases such as bone fractures, joint disorders or abnormalities, nerve disorders that result in movement impairments, bone infections, a history of bone surgery, and those who withdrew from the study as respondents. The sample consisted of 26 individuals in the intervention group and 26 in the control group. The independent variable in the study was musculoskeletal complaints, while the dependent variable was the Workplace Stretching Exercise intervention.

Data analysis in this study used univariate and bivariate analysis. Univariate analysis employed descriptive analysis, while bivariate analysis used the Wilcoxon test to determine the effect of WSE on musculoskeletal complaints among nursing students practicing in the hospital. Participation in the study was voluntary and without coercion. The researcher used informed consent as evidence of the respondent's participation in the research process.

Results

The univariate analysis was conducted to examine the characteristics of the students in this study, including age and gender categories, as well as the musculoskeletal complaints of nursing students in both the control and intervention groups before and after therapy. The results of the analysis are shown in the following table:

Table 1. Frequency Distribution of Nursing Students' Characteristics by Age and Gender (n=52)

Respondent Characteristics	Intervention Group		Control Group		Total	
	Frequency	%	Frequency	%	Frequency	%
Gender						
Male	5	19.2	4	15.4	9	100
Female	21	80.8	22	84.6	43	100

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Age						
19 years	0	0	5	19	5	100
20 years	4	15	12	46	16	100
21 years	11	42	7	27	18	100
22 years	8	31	2	8	10	100
23 years	3	12	0	0	3	100

The results of the analysis in Table 1 show that the majority of respondents in the intervention group were female (80.8%), and similarly, in the control group, the majority of respondents were also female (84.6%). The most common age in the intervention group was 21 years (42%), while in the control group, the most common age was 20 years (46%).

Table 2. Musculoskeletal Complaints Among Nurses Before (Pre-Test) and After (Post-Test) in the Intervention and Control Groups

Musculoskeletal Complaints	Group	n	Mean
Pretest	Intervention	26	33.00
	Control	26	33.00
Posttest	Intervention	26	28.00
	Control	26	31.00

Table 2 shows that the mean of musculoskeletal complaints before the intervention (pretest) among nursing students in the intervention group was 33, indicating a low level of musculoskeletal complaints. The mean for the control group was also 33, indicating a low level of complaints. Additionally, after the intervention (posttest), the mean musculoskeletal complaints among nursing students in the intervention group decreased to 28, indicating no musculoskeletal complaints, while the mean for the control group was 31, indicating a low level of complaints.

The bivariate analysis illustrates the effect of WSE on musculoskeletal complaints among nursing students practicing in the hospital. The statistical test used was the Wilcoxon test. The results of the analysis are shown in the table below.

Table 3. Differences in Average Musculoskeletal Complaints Before (Pretest) and After (Posttest) Intervention in the Intervention and Control Groups

Group	n	Mean	Std. Deviation	Z	p
Intervention Group					
Pretest	26	33.00	2.401	-4.469	0.000
Posttest	26	28.00	0.571		
Pre-Post Difference		5.00	2.059		
Control Group					
Pretest	26	33.00	2.432	-4.529	0.000
Posttest	26	31.00	1.745		
Pre-Post Difference		2.00	1.148		

Table 3 shows that the average musculoskeletal complaints in the intervention group before the intervention (pretest) were 33.00 ± 2.401 , and after the intervention (posttest) it was 28.00 ± 0.571 . The difference in the reduction of musculoskeletal complaints was 5.00 ± 2.059 . The Wilcoxon test results showed a p-value of 0.000 ($\alpha = 0.05$), which means that H_0 is rejected, indicating a statistically significant effect of WSE on musculoskeletal complaints.

Meanwhile, the average musculoskeletal complaints in the control group before the intervention (pretest) was 33.00 ± 2.432 , and after the intervention (posttest) it was 31.00

± 1.745 . The difference in reduction was 2.00 ± 1.148 . The Wilcoxon test showed a p-value of 0.000 ($\alpha = 0.05$). Statistically, this result indicates a difference in musculoskeletal complaints before and after the intervention, but the reduction in musculoskeletal complaints was not as significant as the difference observed in the intervention group.

Discussion

The study results show that the average musculoskeletal complaints before the intervention (pretest) were 33.00 ± 2.401 , and the average after the intervention (posttest) was 28.00 ± 0.571 . The difference in the reduction of average musculoskeletal complaints before and after the intervention was 5.00 ± 2.059 . The statistical test results showed a p-value of 0.000 ($\alpha = 0.05$), which means that p is smaller than α , indicating that H_a is accepted. This means that there is a significant difference in the average musculoskeletal complaints before and after the intervention, confirming that WSE affects musculoskeletal complaints among nursing students undergoing clinical practice in hospitals. This finding aligns with the research by Hariani et al. (2023), which also found that WSE had an impact on reducing musculoskeletal complaints among nursing students at Udayana University, with the average musculoskeletal complaint score decreasing from 51.00 to 39.25 after the intervention.¹⁸ WSE interventions have been shown to reduce musculoskeletal complaints.^{14,19} Maksuk et al. (2022) also found that WSE is effective in reducing musculoskeletal complaints among weavers who work for long periods in static positions.²⁰ Regular stretching exercises can reduce musculoskeletal complaints among healthcare workers in Bengkulu.¹³

This reduction may be due to WSE's ability to alleviate muscle tension and increase muscle flexibility.¹⁴ WSE can improve blood circulation, leading to relaxed muscles and more efficient nutrient delivery to the engaged muscles.^{3,15} The stretching exercises in WSE help lengthen the muscles, making them more flexible. Additionally, stretching can stimulate muscle spindles, which in turn activate $A\alpha$ and $A\beta$ nerve fibers. The stimulation of these nerve fibers helps reduce pain caused by muscle spasms.²⁰ WSE aims to strengthen muscles, thereby balancing the work between bones and muscles. Additionally, WSE increases oxygen supply to the muscles, which can lower high blood pressure and gradually reduce pain. According to the gate control theory, when a muscle spasms, the muscle fibers shorten due to overlapping myofilament structures. Stretching helps elongate the muscle structure by reducing this overlap, thereby reducing spasms. Stretching exercises can also alleviate musculoskeletal pain by stimulating thick, non-nociceptive nerve fibers (A alpha and A beta), which can block the transmission of pain signals carried by thin nerve fibers (A delta and C) to the brain.²¹ Suwartini et al. (2020) demonstrated in their study on nurses in the hemodialysis unit that workplace stretching and ergonomic posture correction can reduce fatigue and musculoskeletal complaints.⁸

During muscle activity, lactic acid levels in the muscles increase every 9 to 45 seconds. This increase leads to a decrease in oxygen and nutrient supply to the muscles. Muscles deprived of these supplies for extended periods result in muscle spasms, characterized by pain and fatigue in the affected area.³ Muscle spasms cause the muscle fibers to shorten as the myofilament structures overlap. When stretched for a few seconds, the muscle position elongates, and the structure of the muscle fibers, especially the sarcomeres, also lengthens. This elongated muscle structure reduces muscle tension.⁸ Additionally, according to research by Retnosari et al. (2023), stretching exercises in WSE can decrease the activation of muscle spindles or muscle proprioceptors that cause spasms. Muscle spindles send signals to the muscles to contract when there is a sudden and excessive change in muscle tone. This process helps relax the muscles, preventing injury.²⁰

Conclusion

The results of the study showed that there was an effect of WSE therapy in reducing musculoskeletal pain complaints in students who were practicing in hospitals. The results of this study can be a reference for nursing education to use WSE as a therapy during practice to prevent musculoskeletal complaints. The results of this study can also contribute in the form of creating a WSE module and NBM format in quickly assessing musculoskeletal complaints in students who are practicing in hospitals. In addition, the results of the study can be used by hospitals as one of the programs to improve occupational health and safety for their employees, especially nurses, to carry out WSE therapy in between work, thereby reducing musculoskeletal complaints and increasing work productivity.

Conflict of Interest Declaration

No potential conflict of interest is relevant to this article.

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