

# Effectiveness of stretching exercise program among nurses with neck pain: Palestinian perspective

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## Abstract

The study aimed to assess the effect of muscle stretching exercise on neck pain and disability among nurses in Palestine. A quasi-experimental, pre–post design with a convenience sample of 90 nurses with moderate-to-severe neck pain from two hospitals in Palestine participated in the study. The hospitals were randomly selected to be an experimental and the other one as a control group. The experimental group received the instruction to perform structured neck and around shoulder stretching exercises two sessions/day for 5 days/week for 1 month. The control group was told to maintain their current level of physical activity. Results showed that the magnitude of improvement in neck pain and disability was greater in the experimental group than in the control group ( $t(88) = 8.5, P = 0.001$ ).

## Keywords

Neck, neck pain, exercise program, nurses, stretching

## Introduction

Musculoskeletal conditions are a significant health issue to most healthcare workers and can lead to long-term injuries, but there is no specific professional organization that certifies or controls activity and handling.<sup>1</sup> Epidemiological reports have found that musculoskeletal disorders (MSDs) are the primary occupational health issues for nurses.<sup>2</sup>

MSDs are inflammatory and degenerative processes that affect the muscles, tendons, ligaments, joints, and peripheral,<sup>3</sup> and they are often caused by repeated and long-term stresses in these tissues.<sup>4</sup> According to the World Health Organization, MSDs are work-

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related when work activities significantly lead to the development and exacerbation of these disorders.<sup>5</sup> The occurrence of MSDs may differ between 33.0% and 88.0% among nurses across the world.<sup>6,7</sup> According to a study performed in China, the prevalence of work musculoskeletal disorders (WMSDs) was 77.43% among nurses and even more than half were in the neck (59.77%) and shoulder (49.66%).<sup>8</sup> In Turkey, the prevalence of MSDs among nurses was 79.5%.<sup>9</sup> The prevalence of disorders was found to be 84.0% and 76.2% in Estonia and Taiwan, respectively.<sup>10,11</sup>

Work-related symptoms of the neck and shoulder are still prevalent. Neck/shoulder discomfort is widespread in hospital nursing staff, and patient management procedures that include reaching and pulling are the most critical target for risk mitigation approaches.<sup>10-12</sup> Nursing tasks require a lot of twisting of the back, flexing of the arms and legs and lifting and pulling the patients.<sup>1</sup>

The event of neck pain has been described as repeated episodes happening over a lifetime with various degrees of recovery between events.<sup>13</sup> Various therapeutic methods have been assumed for pain relief, including manual therapy, exercises, ergonomics, multidisciplinary treatment, massage, energized splint, and individual treatment versus group therapy.<sup>14</sup>

Exercise is viewed as an efficient strategy, particularly muscle stretching exercises (MSE), beneficial effects on posture, blood pressure, improved range of motion.<sup>15-19</sup> Also, MSE can minimize muscle fatigue, reduce muscle imbalance, and decrease muscle pain.<sup>20-22</sup> Studies have shown that daily exercise over a 10-week duration has demonstrated beneficial benefits in reducing pain in the neck and increasing strength.<sup>23</sup>

There is inconclusive evidence of the impact of exercise on mechanical neck pain; this has been contradicted by studies across the last decade of resounding evidence of the advantages of active exercise in care across passive alternatives.<sup>24</sup> However, no studies have been performed in Palestine on neck pain among nurses. Therefore, this study aimed to assess the effect of MSE on neck pain and disability among nurses.

## Methods

### *Design and sample*

The current study was a quasi-experimental, control pre- and post-design study. The study was conducted between June and October, 2019. The sample included all nurses working at two hospitals in Palestine. The hospitals have been selected for the high level of agreement in their working conditions. The inclusion criteria were nurses who rated themselves with moderate to severe neck pain (visual analogue scale (VAS)  $\geq 5$  of 10 cm) for more than three months (VAS  $\geq 5$  represents moderate to severe pain).<sup>25</sup> Any nurse with a history of orthopedic trauma, congenital deformities of the neck, back and upper extremities, and a history of neck surgery, or abnormal neurological signs were excluded.

The sample size was determined using the G\*power version 3.0.10 to obtain significant results between the two groups.<sup>26</sup> The approximate sample size for each group was 26 participants. To overcome the attrition rate, the sample size was increased to 45 participants per group.

## *Instruments*

Self-reported structured questionnaires were used to collect data. The questionnaire was composed of two parts. The demographic part included age, gender, years of experience, and work department. The second part was neck disability index developed by Vernon & Mior which was composed of 10 items; Pain Intensity; Personal Care; Lifting, Reading; Headaches; Concentration; Work; Driving; Sleeping; and Recreation.<sup>27</sup> Each item with a score up to 5, for a total score of 50 and then multiply with 2 to yield 100. The lower score, the less pain and self-rated disability.

## *Pilot study*

The study was conducted on 10 nurses with neck pain to assess the feasibility of the study. The participants were excluded from the actual study.

## *Data collection*

Prior to data collection, the researchers obtained ethical approval from the Arab American University and the administration of the two hospitals. The researchers visited the two hospitals on different occasions to screen the neck pain among the nurses based on the VAS. The nurses who had neck pain for 3 months and more with VAS  $\geq 5$  of 10 cm were selected. All eligible nurses were invited to participate in the study. They were first asked to sign the informed consent and they completed the questionnaires after a full explanation about the purpose of the study. The questionnaire required 10–15 min to be completed. The confidentiality was preserved. The two targeted hospitals were given symbols A and B. Then, randomly hospital A was selected to be in the experimental group and hospital B to the control group.

The participants in the experimental group notified the researchers when they had time to perform interventions such as rest or break time. The participants were individually instructed to perform stretching exercises of the neck under the guidance of a physiotherapist.

Structured neck stretching exercises consisted of the following patient instructions; relaxing the neck and shoulders sufficiently, looking down, turning face to the right side, turning face to the left side, inclining head to the right side, inclining head to the left side, turning shoulders round and round, and slowly raising shoulders fully then lowering again, holding each movement for 30 s. Each exercise was repeated three times. Finally, a neck stretching exercise was performed by returning the head five times for 3–5 s.<sup>28</sup> The participants were informed to perform the stretching program two sessions/day for 5 days/week for 1 month, each session took about 10 min to perform. The participants were also instructed to keep compliance by an exercise diary to monitor their exercise frequency. Also, the participants received a brochure indicating the proper position and ergonomics to be applied during daily work. These brochures were prepared in simple Arabic language with illustrations. Then, the researchers asked the participants to complete the questionnaires post-test. The control group was told to maintain their current level of physical activity. After completing the study, the

control group was instructed to perform the stretching exercises of the neck under the guidance of the same physiotherapist to benefit from the program.

### *Ethical consideration*

Ethical approval was obtained from the Arab American University before starting data collection. Nurses' participation was voluntary and confidentiality was preserved. Also, nurses were assured that their responses will be confidential. Consent forms and questionnaires were distributed to all nurses who expressed interest in participating in the study. Consent included information about the purpose of the study, a brief description of what the nurse would be asked to do, clarification that no risks or harms in participation, an explanation of how the participant information will be kept confidential, and how much time they will spend by participating in the study. Furthermore, nurses were told that they could withdraw from the study at any time and there will be no penalty or loss of benefits if they decide to stop.

### *Statistical analysis*

Statistical Package of Social Science (SPSS, Version 23; SPSS Inc., Chicago, Illinois) was used for this purpose. An independent *t*-test was used to assess the difference between mean scores of neck disability between the experimental and the control after muscle stretching exercise.

## **Results**

### *Sample description*

A total of 90 participants completed the study. The analysis showed that the mean age of nurses was 36.8 (SD = 7.4) years and nurses' mean years of experience was 10.7 (SD = 6.3) years. The majority of samples were males 70 (77.5%) and 20 (22.5%) years of working. One-third of them work in medical and surgical wards 30(33.3%).

A chi-square test was performed to determine whether there was a significant difference between the intervention and the control groups regarding gender and work department at baseline. Also, an independent *t*-test was performed to determine whether there was a significant difference between both groups regarding age and experience. The findings showed no significant difference in variations between the two groups ( $P > 0.05$ ), which confirmed that the two groups were similar in baseline statistics, as seen in Table 1.

An independent *t*-test was performed to assess the differences between both groups regarding neck pain and disability at the baseline. The analysis indicated total neck pain and disability were similar between both groups ( $t(88) = 0.385$ ,  $P = 0.701$ ). The analysis also indicated that neck pain and disability before the MSE were similar between both groups in different work departments, as seen in Table 2.

An independent *t*-test was performed to assess the differences between both groups regarding neck pain and disability after the MSE. The analysis revealed

**Table 1.** Comparison between nurses' demographic characteristics at baseline (N = 90).

Variable	Total		Experimental group		Control group		Statistical test	P value
	N (%)	M (SD)	n (%)	M (SD)	n (%)	M (SD)		
Age (years)	90 (100.0)	36.8 (7.4)	45 (45.0)	37.1 (7.4)	45 (45.0)	36.7 (7.6)	t, 0.268	0.790
Experience (years)	90 (100.0)	10.7 (6.3)	45 (45.0)	10.8 (6.3)	45 (45.0)	10.6 (6.4)	t, 0.149	0.882
Gender	Male	70 (77.5)	34 (75.6)		36 (80.0)		$\chi^2$ , 0.257	0.612
	Female	20 (22.5)	11 (24.4)	9 (20.0)				
Work department	Intensive care unit	25 (27.8)	15 (33.3)	10 (22.2)			$\chi^2$ , 3.7	0.443
	Medical and surgical wards	30 (33.3)	14 (31.1)	16 (35.6)				
	Emergency department	10 (11.1)	3 (6.7)	7 (15.6)				
	Operation department	10 (11.1)	4 (8.9)	6 (13.3)				
Orthopedic department	15 (16.7)	9 (20.0)	6 (13.3)					

P value significant at the 0.05 level.

**Table 2.** Comparison of neck pain and disability between both groups at baseline assessment ( $N = 90$ ).

Variable		Total		Experimental group		Control group		Statistical test	
		<i>N</i>	<i>M</i> ( <i>SD</i> )	<i>n</i>	<i>M</i> ( <i>SD</i> )	<i>n</i>	<i>M</i> ( <i>SD</i> )	<i>t</i>	<i>P</i> Value
Neck pain and disability	Intensive care unit	25	39 (8.5)	15	40.1 (9.2)	10	37.2 (7.3)	0.841	0.409
	Medical/surgical wards	30	53.5 (15.8)	14	58.1 (15.0)	16	49.5 (15.8)	1.53	0.136
	Emergency department	10	61.0 (15.7)	3	59.3 (21.2)	7	61.7 (14.8)	0.207	0.841
	Operation department	10	59.4 (15.9)	4	60.5 (17.2)	6	58.7 (16.6)	0.169	0.870
	Orthopedic department	15	63.5 (13.9)	9	62.4 (14.2)	6	65.0 (14.7)	0.337	0.742
Total neck pain		90	52.6 (16.3)	45	53.2 (16.2)	45	52.0 (16.7)	0.385	0.701

*P* value significant at the 0.05 level.

significant differences between both groups in neck pain ( $t(88) = 8.5$ ,  $P = 0.001$ ). There was less neck pain and disability in the experimental group ( $M = 26.6$ ,  $SD = 9.4$ ) than the control group ( $M = 51.3$ ,  $SD = 17.2$ ). Also, there were significant differences between neck pain and disability after muscle stretching exercise in different work departments between both groups ( $P < 0.005$ ), as seen in Table 3.

## Discussion

Individuals in the nursing field are more vulnerable to WMSDs. According to a previous report, work overload and non-standard working posture were risk factors for WMSDs.<sup>29</sup>

**Table 3.** Neck pain and disability between both groups at post muscle stretching exercise ( $N = 90$ ).

Variable		Experimental group		Control group		Statistical test	
		<i>n</i>	<i>M</i> ( <i>SD</i> )	<i>n</i>	<i>M</i> ( <i>SD</i> )	<i>t</i>	<i>P</i> Value
Neck pain and disability	Intensive care unit	15	20.9 (8.8)	10	36.0 (8.9)	4.17	0.001
	Medical/surgical wards	14	27.7 (5.3)	16	48.4 (15.8)	4.91	0.001
	Emergency department	3	28.7 (9.9)	7	61.7 (14.8)	3.48	0.008
	Operation department	4	28.5 (9.0)	6	58.7 (16.6)	3.28	0.011
	Orthopedic department	9	32.9 (11.8)	6	65.0 (14.7)	4.7	0.001
Total neck pain		45	26.6 (9.4)	45	51.3 (17.2)	8.5	0.001

*P* value significant at the 0.05 level.

In particular, handling and lifting conditions, such as bed making and shifting of the patient's body, may cause the onset of musculoskeletal injuries. In fact, a significant number of nurses can be injured during the transfer of the patient. In Palestine, the Ministry of Health has not defined any policies regarding the safety of nurses in bedside procedures.

The exact cause of musculoskeletal pain is unknown, but physical exercise is believed to be an important non-pharmacological technique for pain relief.<sup>17,30,31</sup>

The positive effect of exercise on the sense of pain shown in nurses in this study supports the results of the literature. The Asian study conducted by Chen et al.<sup>32</sup> ascertained the efficacy of the MSE program for pain in 127 nurses, split up into experimental and control groups, joined for 24 weeks; the experimental group study reported lower pain intensity than the control group following the intervention.

Another study conducted by Silva et al.<sup>33</sup> showed that MSE achieved meaningful changes, decreasing the level of musculoskeletal pain quickly after one session and after 8 weeks of practice among nurses. In comparison, home-based stretching exercises have a favorable effect in reducing discomfort in patients with serious osteoarthritis.<sup>34</sup> This method of therapy has also been studied in other patient populations and the findings have also been favorable,<sup>30</sup> close to those results showed that MSE is successful and can be a form of intervention in people with pain that has a beneficial impact on their everyday life and work activities.<sup>21</sup>

In addition, this type of intervention was also investigated in other occupations and results were also positive. For example, Irmak and colleagues<sup>35</sup> published results of a study using a software program that reminded 39 office employees in performing 10-week exercises, including stretching, strengthening, and posture exercises for all parts of the body. Their findings endorse the application of reminder software systems that can help alleviate discomfort in office employees. Another study conducted by Tunwattanapong et al.<sup>36</sup> that showed a daily stretching exercise regimen conducted for 4 weeks will alleviate neck and shoulder pain and increase neck function and quality of life for office employees who have chronic moderate to serious neck or shoulder pain.

However, the findings in this study were contradictory with the previous study conducted by Weerapong and colleagues.<sup>37</sup> The study aimed to determine the effectiveness of a computerized stretching exercise program over a period of 4 weeks to reduce pain in the neck and shoulder of the office staff. The improvement in neither the visual analog measure nor the Northwick Park Neck Pain Questionnaire ratings could not be displayed.

The main limitation of this study was measuring the level and intensity of pain with a self-reported questionnaire. The findings of the current study only relate to those individuals with neck pain due to muscular fatigue or neck immobility with no other medical or physical complications. Also, the study did not have a long-term follow-up. However, the strength of the study was experimental control study.

## Conclusion

The study confirmed significant evidence on the influence of stretching physical exercise in the occupational health and safety of nursing staff, a population that is at risk for the

onset of workplace injuries but which, nonetheless, is highly reflective of the health workforce. The results corroborate what the literature also indicates about the benefits that physical exercise may contribute to the individual's wellbeing.

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