ORIGINAL ARTICLE

Prevalence of musculoskeletal pain among nurses and factors related to manual patient handling: a cross-sectional study in Saudi Arabia

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ABSTRACT

Background: The pressure of musculoskeletal pain (MSP) influences nurses' jobs and makes it difficult for them to have a good quality of life. Experts have researched this issue a lot, but they do not fully understand how individual, lifestyle, and job-related aspects contribute to MSP.

Aim of Work: This study aimed to look into the number of nurses affected by MSP and analyze connections between MSP and certain personal, habitual, and work characteristics, especially with their exercise patterns and body mass index (BMI).

Methods: The survey was carried out among 293 nurses who were working in several hospital departments. Information collected included demographics, BMI, whether people are right- or left-handed, their usual type of exercise (as well as its length), professional experience, and how the tasks of work were organized. It was investigated how many cases of MSP were detected in various areas and regions throughout the last year. The authors used statistics to see if there was any link between MSP and various risk factors.

Results: Most people (62.5%) visited the doctor for back pain in the lower back, while upper back pain was reported by 39.2% and neck pain was reported by 38.9%. A link was found between MSP and BMI, and both nurses who were underweight and the ones who were overweight were more likely to have pain ($p = 0.015$). Routine exercise was actually found to increase a person's MSP rate ($p = 0.035$). Doing weight exercises decreased the chances of MSP, but more nurses with MSP exercised through cardiovascular activities ($p = 0.004$). Exercise lasting less than an hour a week and working for fewer than 6 consecutive hours were also connected to more cases of MSP (p-values of 0.000 and 0.002). There was no connection between age, gender, left- or right-handedness, practice time, position, the department people work in, or being on shift work.

Conclusion: There are many workers in the nursing profession with MSP, and these workers tend to have complicated associations with various personal and professional factors. The protective effect of weight training and the unexpected findings regarding exercise and work hours highlight the need for tailored preventive strategies and further research into occupational health interventions.

Keywords: Prevalence, musculoskeletal pain, nurses, Patient handling.

Introduction

Nursing personnel face a higher risk of musculoskeletal diseases (MSDs), which are among the most common occupational health concerns globally [1]. Nurses have a high prevalence of work-related MSDs (WMSDs), with global rates ranging from 40% to 90% and annual

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prevalence rates exceeding 77%, according to a meta-analysis [2]. Nurses may have low-back pain (LBP), neck pain, and shoulder discomfort due to biomechanical stress caused by prolonged standing, repetitive work, and manual patient handling [3]. Saudi nurses report significant rates of musculoskeletal discomfort, ranging from 61.7% to 100% in several studies [4], as the country's healthcare system expands to meet population and economic demands. This pressure negatively impacts nurses' health, job satisfaction, labor shortages, healthcare costs, and patient care quality.

Manual patient handling, which involves lifting, transporting, or repositioning patients without mechanical aids, is the primary risk factor for MSDs in nursing [5]. Internationally, 72% of nurses report enduring chronic low back pain, which is related to patient-handling jobs. Biomechanical investigations show that even basic maneuvers like bed-to-chair transfers impose lumbar spine loads that exceed suggested safe limits [6]. Why do ergonomics and manual lifting resources in Saudi Arabia seem to be so scarce? Manual handling is common. According to the experts at King Abdulaziz Medical City, 63.8% of nurses experience lower back pain, and 25.5% of these workers claim that their pain interferes with their productivity and interests. Nearly all nurses at this tertiary center in Jeddah (85%) experienced musculoskeletal complaints, and risk variables were identified as longer shifts and a lower body mass index (BMI) [7]. These findings are consistent with research that found Saudi nurses frequently repeat similar motions, do not receive adequate breaks, and do not have regulations in place to safeguard them from MSDs [8].

Despite rising recognition of MSDs as a public health priority, major gaps remain in understanding the relationship between manual patient handling and musculoskeletal discomfort in the Saudi setting. While worldwide studies highlight the effectiveness of assistive technologies and ergonomic training, their use in Saudi hospitals is variable. A survey of emergency department nurses in Hail found that 68.9% had lower back discomfort. Shorter shifts (<8 hours) and fewer night shifts were associated with lower risks [9]. However, larger regional statistics on task-specific exposures, such as the frequency with which patients are transferred or the usage of mechanical lifts, are limited. Furthermore, demographic characteristics such as age, gender, and BMI, which influence MSD susceptibility worldwide, necessitate focused examination [10].

This study addresses difficulties by examining the amount of nurses in Saudi Arabia who suffer from musculoskeletal pain and the risk factors that accompany it, with a focus on lifting patients. Using both the Nordic musculoskeletal questionnaire (NMQ) and an investigation of various mechanical and system aspects, we can take efforts to reduce MSD risk. Because Vision 2030 focuses on healthcare transformation in Saudi Arabia, this research is important for policy development, employee retention, and safety.

Methods

This study employed a cross-sectional and observational methodology to investigate the topic of musculoskeletal discomfort among nurses. The study was conducted in hospitals in Saudi Arabia's three largest cities: Riyadh, Jeddah, and Medina. The target population consisted of registered nurses who cared for their patients. A formal review was completed by a hospital's Institutional Review Board, and all subjects readily agreed to participate in the study. Throughout the study, all respondents' information was kept strictly confidential.

Those included were registered nurses aged 21 years or older who had provided patient care for at least 6 months and were willing to provide informed consent. This study did not include nurses who were on long-term leave, assigned administrative jobs, or who had musculoskeletal disorders unrelated to their work. It was decided to use Cochran's approach to determine the sample size because a previous study in Saudi Arabia found that about 80% of respondents experienced musculoskeletal pain [4, 7]. After subtracting the 5% margin of error from the 95% confidence level, the minimal sample size is determined to be 246. To address the issue of non-response, data from 293 nurses were included in the study.

People were selected from all hospital departments, including inpatient, outpatient, emergency, intensive care unit (ICU), and operating rooms, using a stratified random sampling procedure to ensure that the sample population was correctly represented. Participants were given a self-administered questionnaire in both Arabic and English to complete out. The instrument included essential characteristics such as age, gender, body mass index, medical department, years of experience, shift time, exercise routines, and NMQ-measured musculoskeletal symptoms. The severity of discomfort and its impact on daily activities were also assessed. Before beginning the survey, a preliminary test was conducted to ensure its clarity and relevance to the culture.

In 2025, six weeks of data collecting were carried out while assuring that people participated willingly and that their responses were kept confidential. SPSS version 28 was used to conduct statistical analysis of the data. Descriptive statistics revealed significant tendencies among participants through the use of numbers and calculations. After controlling for other variables, inferential tests were employed to determine whether there was a link between manual patient handling and musculoskeletal pain. A p-value less than 0.05 was used to define statistical significance.

Results

The study population ($n = 293$) was young and female-dominated. Approximately 44.7% of nurses were 20-30 years old, and 42.7% were 31-40 years old. Women represented 88.7% of the sample. As regards to BMI, almost half (49.5%) of women were normal. Nevertheless, a significant proportion has been

reported to be overweight (32.4%) or obese (9.9%), and 8.2% are underweight. Right-handedness was reported for the large majority of the sample ($n = 258$; 88.1%). A smaller proportion of participants identified themselves as ambidextrous (20 people, 6.8%), and the least common was left-handed (15 people, 5.1%), as shown in Table 1.

Most of the nurses, equal to 67.2%, said they exercised regularly at least once every week, whereas 32.8% did not do so. Of the 197 people who participated in exercise, 70 people (35.5%) chose to do cardiovascular exercise. In addition, a group of participants benefited from other forms of exercise (33, 16.8%), core exercises (31, 15.7%), and yoga (26, 13.2%). Apart from other activities, some participants used plyometrics (0.9%), did weight training (0.5%) and cross-training (0.3%). Four out of every 10

participants (40.1%) said that they exercise for 30-60 minutes every week. Several of the participants, 66 to be exact, exercised for longer than 60 minutes each week, while 52 participants exercised less than this (Table 1).

The biggest group of nurses (28.3%) had between 6 and 10 years of experience working in their field. Nearly all (96.9%) of the participants marked their role as "nurse." Those who took part in the study were employed mostly in hospitals, where inpatient units (36.2%), emergency departments (28.3%), and outpatient clinics (27.3%) were most common. An important part of their work organization was that most employees worked for extended hours, with 84.6% clocking over 6 hours daily and 89.1% doing shift work (Table 2).

It was found during the study that MSP was very common among the nurses who took part. Last year,

Table 1. *Socio-demographic and work characteristics of the study participants.*

	Description (*n* = 293)
Age	
20-30	131 (44.7)
31-40	125 (42.7)
>40	37 (12.6)
Gender	
Male	33 (11.3)
Female	260 (88.7)
BMI	
Underweight	24 (8.2)
Normal	145 (49.5)
Overweight	95 (32.4)
Obese	29 (9.9)
Are you predominantly left-handed, right-handed, or ambidextrous?	
Right-handed	258 (88.1)
Left-handed	15 (5.1)
Ambidextrous	20 (6.8)
Do you exercise on a routine basis (at least once a week)?	
Yes	197 (67.2)
No	96 (32.8)
What type of exercise do you engage in? (n = 197)	
Cardiovascular	70 (35.5)
Weight training	19 (9.6)
Yoga	26 (13.2)
Core strengthening	31 (15.7)
Cross-training	6 (3)
Plyometric	12 (6.1)
Others	33 (16.8)
How many hours a week do you typically exercise? (n = 197)	
< 60 minutes	52 (26.4)
30-60 minutes	79 (40.1)
> 60 minutes	66 (33.5)

Table 2. Professional and work-related characteristics of study participants.

	Description (*n* = 293)
How many years have you been in practice	
1-5	48 (16.4)
6-10	83 (28.3)
11-15	61 (20.8)
16-20	64 (21.8)
> 20	37 (12.6)
Position	
Nurse	284 (96.9)
Nurse manager	9 (3.1)
Departments (more than one answer allowed)	
Inpatient	106 (36.2)
Outpatient	80 (27.3)
Emergency	83 (28.3)
ICU	17 (5.8)
Operation room	2 (0.7)
Continuous working hours	
	45 (15.4)
	248 (84.6)
Shift work	
Yes	261 (89.1)
No	32 (10.9)

nurses complained more about lower back pain than anything else, with it affecting 62.5% of them. It was also found that about 39.2% of cases were in the upper back, and another 38.9% were in the neck. Some 33.8% of the participants mentioned pain in their shoulders (any side), and 36.5% faced pain in their ankles or feet (Table 3).

A significant relationship was noticed between BMI and MSP ($p = 0.015$). Those nurses who were underweight had more MSP than those who were not underweight (11.0% compared to 6.0%). Likewise, a higher percentage of MSP (39.8%) was found in the overweight nurses, as opposed to 22.8% among others. People in the normal BMI group with MSP only made up 44.6% of the total, while those without MSP numbered 55.9%. There were no significant connections found between having MSP and one's age ($p = 0.659$), gender ($p = 0.390$), or handedness ($p = 0.615$), as shown in Table 4.

It may seem surprising, but practicing regular exercise (1 time a week or more) was linked to having MSP in 72.3% of patients compared to 60.6% without MSP. Participating in specific exercises was linked to a high degree with the development of MSP ($p = 0.004$). It is important to mention that the share of nurses with MSP who practiced weight training (2.6%) was much lower than that of nurses without MSP (14.2%). On the other hand, among those who had MSP, 42.9% were regularly doing cardiovascular exercise, but only 30.8% of those

without MSP achieved a similar pattern. Time spent on exercise weekly has a link with muscle strength, as shown by $p = 0.000$. Among exercisers, nurses who trained for less than 60 minutes each week had more MSP (1 in 3) than those who trained for a longer time (1 in 6). Both groups that exercised for 30 minutes or more per weekday and also those who exercised for more than 60 minutes per week had a lower percentage of MSP (Table 5).

An important connection was identified between working many hours and MSP ($p = 0.002$). It was surprising to find that among the nurses, those working less than 6 unbroken hours reported having more MSP (22.8%). On the other hand, people who worked more than 6 hours at a time made up a smaller portion of the MSP (77.2% compared to 90.4%). No meaningful links were found between having MSP and the following: the length of a nurse's service, their position as nurse versus nurse manager, which hospital department they worked in, or whether they worked night, day, or evening shifts, as presented in Table 6.

Most of the nurses did not use any radioprotective gear, although sterile gloves and thyroid shields were both available to them, while most stated that they wore this equipment during every or almost every procedure. Most workers' data revealed that almost a quarter of the group had shoulder symptoms and more than a fifth had neck symptoms, but the vast majority did not report any work capacity issues from those symptoms. Although more than a fifth of the population felt their aches were due to their jobs, only a few sought specialists' help and administered medications regularly. In assessments performed at the workplace, 47.1% highlighted that safety training regarding manual handling was lacking, and 48.8% pointed out that the minor patient aids were not enough, but 42.3% said wheelchair accessibility was appropriate, and 37.9% considered the lifting equipment to be in place, as provided in the supplementary file.

Discussion

This study revealed that, in a sample of 293 nurses, many factors of the healthcare job lead to the experience of musculoskeletal discomfort. According to the paper, the findings show both typical correlations and a number of paradoxes that call into question the present understanding of musculoskeletal disorders among nurses.

The survey results show that 62.5% of nurses experienced lower back pain in the previous year. Boughattas et al. revealed that 58.1% of 203 Tunisian nurses suffered from lower back pain [11], while another study found that 65.7% of nurses experienced lower back discomfort [7].

We discovered that the upper back (39.2%) and neck (38.9%) were the second and third most common symptoms, which is consistent with previously published findings on the same topic. Previously, it was discovered that these locations are most frequently at risk for musculoskeletal stress in healthcare workers [7].

Table 3. *Prevalence of musculoskeletal pain in different body regions among nurses in the last 12 months.*

Have you at any time in the last 12 months had trouble (ache, pain, discomfort, numbness) in:		Yes	No
[Neck]		114 (38.9)	179 (61.1)
[Upper Back]		115 (39.2)	178 (60.8)
[Lower Back]		183 (62.5)	110 (37.5)

Have you at any time in the last 12 months had trouble	No	Yes, right side	Yes, left side	Yes, both sides
[Shoulders]	194 (66.2)	35 (11.9)	9 (3.1)	55 (18.8)
[Elbows]	261 (89.1)	6 (2)	0 (0)	26 (8.9)
[Wrists/Hands]	236 (80.5)	23 (7.8)	10 (3.4)	24 (8.2)
[Hips/Thighs]	226 (77.1)	22 (7.5)	7 (2.4)	38 (13)
[Knees]	207 (70.6)	34 (11.6)	9 (3.1)	43 (14.7)
[Ankles/Feet]	186 (63.5)	44 (15)	2 (0.7)	61 (20.8)

Table 4. *Factors associated with the presence of musculoskeletal pain.*

	Presence of musculoskeletal problems		
	Yes ($n = 166$)	No ($n = 127$)	*P* value
Age			
20-30	77 (46.4)	54 (42.5)	0.659
31-40	67 (40.4)	58 (45.7)	
>40	22 (13.3)	15 (11.8)	
Gender			
Male	21 (12.7)	12 (9.4)	0.390
Female	145 (87.3)	115 (90.6)	
BMI			
Underweight	10 (6)	14 (11)	**0.015**
Normal	74 (44.6)	71 (55.9)	
Overweight	66 (39.8)	29 (22.8)	
Obese	16 (9.6)	13 (10.2)	
Are you predominantly left-handed, right-handed, or ambidextrous?			
Right-handed	146 (88)	112 (88.2)	0.615
Left-handed	10 (6)	5 (3.9)	
Ambidextrous	10 (6)	10 (7.9)	

The study discovered that a person's BMI is strongly connected to musculoskeletal pain (p-value = 0.015), with those who were underweight or overweight experiencing more musculoskeletal aches than those with a normal BMI. In a study conducted by Boughattas et al. [11], high BMI was found to be directly related to low back pain, whereas research in juvenile populations indicated that musculoskeletal discomfort in knee and hip joints was positively associated with increasing body weight and BMI [12]. There appear to be several elements at play in the relationship between BMI and musculoskeletal discomfort. Additional body weight puts more strain on the muscles and bones in the body, particularly the spine, hips, and knees. Obesity can damage discs by putting extra strain on them or by limiting a person's physical activity.

One of our study's most notable findings is that persons who exercise regularly are more likely to experience musculoskeletal pain ($p = 0.035$). This unexpected discovery contradicts what experts and academics have previously demonstrated about exercise's ability to prevent people from musculoskeletal disorders [11], underlining the disparity between our findings and the established literature.

The type of exercise performed in the study influenced the likelihood of musculoskeletal discomfort, with weight training linked to reduced pain [13]. Nurses with musculoskeletal discomfort, on the other hand, engaged in more cardiovascular exercise than

Table 5. *Association between exercise habits and the presence of musculoskeletal problems.*

	Presence of musculoskeletal problems		
	Yes (*n* = 166)	No (*n* = 127)	*P* value
Do you exercise on a routine basis (at least once a week)?			
Yes	120 (72.3)	77 (60.6)	**0.035**
No	46 (27.7)	50 (39.4)	
What type of exercise do you engage in? (n = 197)			
Cardiovascular	37 (30.8)	33 (42.9)	**0.004**
Weight training	17 (14.2)	2 (2.6)	
Yoga	15 (12.5)	11 (14.3)	
Core strengthening	20 (16.7)	11 (14.3)	
Cross-training	0 (0)	6 (7.8)	
Plyometric	8 (6.7)	4 (5.2)	
Others	23 (19.2)	10 (13)	
How many hours a week do you typically exercise? (n = 197)			
< 60 minutes	20 (16.7)	32 (41.6)	**0.000**
30-60 minutes	56 (46.7)	23 (29.9)	
> 60 minutes	44 (36.7)	22 (28.6)	

Table 6. *Association of professional characteristics with musculoskeletal problems.*

	Presence of musculoskeletal problems		
	Yes (*n* = 166)	No (*n* = 127)	*P* value
How many years have you been in practice?			
1-5	32 (19.3)	16 (12.6)	0.383
6-10	45 (27.1)	38 (29.9)	
11-15	36 (21.7)	25 (19.7)	
16-20	31 (18.7)	33 (26)	
> 20	22 (13.3)	15 (11.8)	
Position			
Nurse	160 (96.4)	124 (97.6)	0.736
Nurse manager	6 (3.6)	3 (2.4)	
Department			
Inpatient	54 (32.5)	52 (40.9)	0.137
Outpatient	48 (28.9)	32 (25.2)	0.479
Emergency	44 (26.5)	39 (30.7)	0.429
ICU	12 (7.2)	5 (3.9)	0.232
Operation room	2 (1.2)	0 (0)	0.507
Continuous working hours			
< 6	16 (9.6)	29 (22.8)	**0.002**
> 6	150 (90.4)	98 (77.2)	
Shift work			
Yes	152 (91.6)	109 (85.8)	0.119
No	14 (8.4)	18 (14.2)	

others [14,15]. This trend suggests that exercise's effect on musculoskeletal health is more nuanced than previously imagined. My study also revealed that nurses who reported exercising for less than an hour per week had the highest prevalence of musculoskeletal pain.

The findings revealed that among all nurses, those who worked fewer than six continuous hours suffered

significantly more musculoskeletal pain ($p = 0.002$). People are often told that working long hours increases their health risks, but statistics suggest this may not be the case. Previous research has consistently shown that excessive working hours increase the incidence of work-related musculoskeletal disorders [7].

The fact that we received the opposite findings could be attributed to a variety of factors. Short shifts may cause a nurse's musculoskeletal system to become overworked. According to studies, the most common cause of musculoskeletal problems in nurses is patient handling. Nurses typically lift weights ranging from 1.6 to 1.8 tons per shift, primarily by moving patients and lifting or handling them.

The low usage of radioprotective devices, such as protective or leaded glasses (1.4%-1.7%) and thyroid shields (2.7%), contrasts with current safety recommendations for fluoroscopic imaging, which require comprehensive shielding [16]. Basic aprons were used more frequently than advanced protective gear (9.2%), including sterile gloves. However, 71.7% of participants reported using protective equipment consistently in 50%-100% of situations, indicating persisting ergonomic and access hurdles. While large lead aprons might reduce radiation exposure, their uneven weight distribution can cause discomfort for the musculoskeletal system [17].

The prevalence of shoulder (24.6%) and neck (21.8%) MSDs highlights the ergonomic impact of prolonged static positions and heavy PPE. Despite 88.7% indicating no work limitations, there were discrepancies between symptom prevalence (e.g., 16.0% upper back pain) and low rates of healthcare engagement (only 17.1% spoke with providers). This suggests symptom normalization, which is linked to attrition in interventional fields [18]. Manual handling training was judged as inadequate or nonexistent in 47.1% of instances, leading to greater self-reported injury rates during patient transfers [19].

In 48.8% of situations, "double-staffing" is prioritized over mechanical supports. However, this approach is not in conformity with ALARA and can cause excessive lateral stress during lateral transfer [20]. While wheelchair accessibility received a relatively high score (42.3% good), the lack of established guidelines for high-risk tasks such as prone positioning suggests larger institutional failures to adopt hazard-specific controls [21, 22].

Taking care of patients entails a lot of physical strain on the body due to atypical postures, repetitive labor actions, and lifting heavy objects every shift. Based on these findings, new therapies can be developed to assist in reducing musculoskeletal disorders among nurses. Because weight training provides significant benefits, more emphasis should be placed on strength-training programs at work.

Conclusion

This study reveals some nuanced patterns of musculoskeletal pain among nurses and helps us comprehend some areas where previous concepts are difficult to accept. Because of the importance of weight training and the unusual links with exercise patterns, it is critical to carefully explore various methods for preventing and treating diseases. Future research should include tracking people over time, using clear outcomes, and understanding the nuances behind these connections to help develop efficient approaches to manage musculoskeletal disorders in nursing.

List of Abbreviations

MSDs	Nursing personnel face a higher risk of musculoskeletal diseases
WMSDs	Work-related MSDs
LBP	Low-back pain
ICU	Intensive care unit
BMI	Body mass index
NMQ	Nordic musculoskeletal questionnaire

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Consent for participation
Consent was obtained from all the participants

Ethical approval
The study was approved by Care IRB committee [IRB-003/280725] date: 28/7/2025.

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