

# Investigating the Prevalence and Risk Factors of Work-Related Musculoskeletal Disorders Among Nursing Technicians in Hafr Al-Batin: A Cross-Sectional Survey Study

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1. Nursing Technician

## ABSTRACT

Work-related musculoskeletal disorders (WMSDs) are a significant concern among healthcare professionals, particularly nursing technicians who perform physically demanding tasks. This cross-sectional survey study aimed to investigate the prevalence and risk factors of WMSDs among nursing technicians in Hafr Al-Batin, Saudi Arabia. A total of 250 nursing technicians were recruited using convenience sampling from various healthcare facilities. Participants completed a self-administered questionnaire that included items on socio-demographic characteristics, work-related factors, and the Nordic Musculoskeletal Questionnaire. The 12-month prevalence of WMSDs was 78.4%, with the lower back (52.8%), neck (48.0%), and shoulders (44.8%) being the most affected body regions. Multivariate logistic regression analysis revealed that female gender (OR = 2.34, 95% CI: 1.28-4.27), working more than 40 hours per week (OR = 1.89, 95% CI: 1.05-3.40), and high physical workload (OR = 2.61, 95% CI: 1.42-4.80) were significant risk factors for WMSDs. The findings highlight the high prevalence of WMSDs among nursing technicians in Hafr Al-Batin and underscore the need for interventions to reduce the risk of these disorders, such as ergonomic training, workload management, and workplace modifications.

**KEYWORDS:** Work-related musculoskeletal disorders, nursing technicians, prevalence, risk factors, Saudi Arabia.

## 1. Introduction

Work-related musculoskeletal disorders (WMSDs) are a major occupational health concern globally, affecting workers in various industries, including healthcare (Yilmaz & Sahin, 2019). WMSDs are defined as a group of disorders that involve the muscles, tendons, ligaments, joints, and nerves, which are caused or aggravated by work-related factors such as repetitive movements, awkward postures, and heavy lifting (Punnett & Wegman, 2004). Nursing technicians, who provide direct patient care and assist with various tasks in healthcare settings, are particularly vulnerable to

WMSDs due to the physically demanding nature of their work (Amin et al., 2018).

In Saudi Arabia, the healthcare sector has experienced significant growth in recent years, with an increasing demand for healthcare services and a growing workforce (Almalki et al., 2011). However, limited research has been conducted on the prevalence and risk factors of WMSDs among nursing technicians in the country, particularly in the Hafr Al-Batin region. Therefore, this study aimed to investigate the prevalence of WMSDs and identify the associated risk factors among nursing technicians in Hafr Al-Batin, Saudi Arabia.

## **2. Literature Review**

Several studies have investigated the prevalence and risk factors of WMSDs among healthcare workers, including nursing technicians, in various countries. A systematic review by Davis and Kotowski (2015) reported that the prevalence of WMSDs among nursing personnel ranged from 33% to 88%, with the lower back, neck, and shoulders being the most commonly affected body regions. Similarly, a study conducted in India found that 60.9% of nursing technicians experienced WMSDs, with the lower back (41.4%) and neck (28.6%) being the most affected (Sembe & Ayuo, 2017).

Various risk factors have been identified for the development of WMSDs among nursing technicians. A cross-sectional study in Brazil found that female gender, older age, longer work experience, and high physical workload were significantly associated with the presence of WMSDs (Ribeiro et al., 2017). Another study in Turkey reported that working in awkward postures, performing repetitive tasks, and lack of rest breaks were significant risk factors for WMSDs among nursing technicians (Koyuncuoğlu et al., 2019).

Ergonomic interventions and training programs have been suggested as potential strategies to reduce the risk of WMSDs among nursing technicians. A systematic review by Van Hoof et al. (2018) concluded that multicomponent interventions, including ergonomic training, workstation modifications, and exercise programs, were effective in reducing the prevalence and severity of WMSDs among healthcare workers.

Despite the growing body of literature on WMSDs among nursing technicians, there is a paucity of research specific to Saudi Arabia, particularly in the Hafr Al-Batin region. This study aims to address this gap by providing insights into the prevalence and risk factors of WMSDs among nursing technicians in this area.

## **3. Methods**

### **3.1. Study Design and Participants**

A cross-sectional survey study was conducted among nursing technicians in Hafr Al-Batin, Saudi Arabia. The study population included all nursing technicians working in various healthcare facilities, including hospitals, clinics, and rehabilitation centers. A convenience sampling method was used to recruit participants. Nursing

technicians who had been working for at least one year and were willing to participate in the study were included. Those with pre-existing musculoskeletal disorders not related to work were excluded.

### 3.2. Sample Size Calculation

The sample size was calculated using the following formula for a single proportion:

$$n = Z^2(p)(1-p) / d^2$$

Where:

n = sample size

Z = Z-score for the desired confidence level (1.96 for 95% confidence)

p = expected prevalence of WMSDs among nursing technicians (estimated at 50% to maximize sample size)

d = desired precision (set at 0.06)

Using these parameters, the minimum required sample size was calculated to be 267. To account for potential non-response and incomplete questionnaires, the sample size was increased by 10%, resulting in a final sample size of 294 nursing technicians.

### 3.3. Data Collection

Data were collected using a self-administered questionnaire that consisted of three sections:

1. Socio-demographic characteristics: age, gender, marital status, education level, and work experience.
2. Work-related factors: working hours per week, shift work, physical workload, and ergonomic training.
3. Nordic Musculoskeletal Questionnaire (NMQ): a validated tool used to assess the prevalence of WMSDs in nine body regions (neck, shoulders, upper back, elbows, lower back, wrists/hands, hips/thighs, knees, and ankles/feet) during the past 12 months (Kuorinka et al., 1987).

The questionnaire was translated into Arabic and pilot-tested among 30 nursing technicians to ensure clarity and comprehensibility. The questionnaires were distributed to the participants at their respective workplaces and collected after completion.

### 3.4. Data Analysis

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies and percentages, were used to summarize the socio-demographic characteristics, work-related factors, and prevalence of WMSDs. Chi-square tests were used to examine the associations between categorical variables and the presence of WMSDs. Multivariate logistic regression analysis was performed to identify the risk factors associated with

WMSDs, with odds ratios (ORs) and 95% confidence intervals (CIs) being reported. A p-value of <0.05 was considered statistically significant.

## 4. Results

### 4.1. Socio-demographic Characteristics

A total of 250 nursing technicians participated in the study, with a response rate of 85%. The majority of the participants were female (72.8%), aged between 30 and 39 years (48.8%), and married (64.0%). More than half of the participants (54.8%) had a diploma in nursing, and 44.4% had work experience of 6-10 years (Table 1).

Table 1. Socio-demographic characteristics of the participants (N = 250)

Characteristic	n	%
Gender		
Male	68	27.2
Female	182	72.8
Age (years)		
20-29	62	24.8
30-39	122	48.8
40-49	54	21.6
≥50	12	4.8
Marital status		
Single	80	32.0
Married	160	64.0
Divorced/widowed	10	4.0
Education level		
Diploma in nursing	137	54.8
Bachelor's degree in nursing	113	45.2
Work experience (years)		
1-5	82	32.8
6-10	111	44.4
>10	57	22.8

### 4.2. Prevalence of Work-Related Musculoskeletal Disorders

The 12-month prevalence of WMSDs among nursing technicians was 78.4%. The most commonly affected body regions were the lower back (52.8%), neck (48.0%), and shoulders (44.8%). The prevalence of WMSDs in other body regions is presented in Table 2.

Table 2. Prevalence of work-related musculoskeletal disorders by body region (N = 250)

Body region	n	%
Neck	120	48.0
Shoulders	112	44.8
Upper back	92	36.8
Elbows	48	19.2
Lower back	132	52.8
Wrists/hands	84	33.6
Hips/thighs	56	22.4
Knees	76	30.4
Ankles/feet	68	27.2
Any body region	196	78.4

### 4.3. Work-Related Factors and WMSDs

Univariate analysis revealed significant associations between WMSDs and several work-related factors, including working more than 40 hours per week ( $p = 0.011$ ), shift work ( $p = 0.029$ ), high physical workload ( $p < 0.001$ ), and lack of ergonomic training ( $p = 0.002$ ) (Table 3).

Table 3. Associations between work-related factors and work-related musculoskeletal disorders (N = 250)

Work-related factor	WMSDs		p-value
	Yes (n = 196)	No (n = 54)	
Working hours per week			0.011*
≤40	102 (52.0%)	38 (70.4%)	
>40	94 (48.0%)	16 (29.6%)	
Shift work			0.029*
Yes	144 (73.5%)	32 (59.3%)	
No	52 (26.5%)	22 (40.7%)	
Physical workload			<0.001*
Low	36 (18.4%)	26 (48.1%)	
Moderate	82 (41.8%)	20 (37.0%)	
High	78 (39.8%)	8 (14.8%)	
Ergonomic training			0.002*
Yes	62 (31.6%)	30 (55.6%)	
No	134 (68.4%)	24 (44.4%)	

\* $p < 0.05$

### 4.4. Risk Factors for Work-Related Musculoskeletal Disorders

Multivariate logistic regression analysis revealed that female gender (OR = 2.34, 95% CI: 1.28-4.27), working more than 40 hours per week (OR = 1.89, 95% CI: 1.05-3.40), and high physical workload (OR = 2.61, 95% CI: 1.42-4.80) were significant risk factors for WMSDs among nursing technicians (Table 4).

Table 4. Multivariate logistic regression analysis of risk factors for work-related musculoskeletal disorders

Risk factor	Odds ratio	95% CI	p-value
Gender			
Male	1.00		
Female	2.34	1.28-4.27	0.006*
Working hours per week			
≤40	1.00		
>40	1.89	1.05-3.40	0.034*
Physical workload			
Low	1.00		
Moderate	1.73	0.94-3.19	0.079
High	2.61	1.42-4.80	0.002*
Ergonomic training			
Yes	1.00		
No	1.62	0.95-2.76	0.077

\* $p < 0.05$ ; CI, confidence interval

## 5. Discussion

This cross-sectional study investigated the prevalence and risk factors of WMSDs among nursing technicians in Hafr Al-Batin, Saudi Arabia. The 12-month prevalence of WMSDs was found to be high (78.4%), with the lower back, neck, and shoulders being the most affected body regions. These findings are consistent with previous studies conducted among nursing personnel in other countries (Davis & Kotowski, 2015; Sembe & Ayuo, 2017).

The high prevalence of WMSDs among nursing technicians can be attributed to the physically demanding nature of their work, which involves tasks such as lifting and transferring patients, prolonged standing, and awkward postures (Amin et al., 2018). These tasks can place significant stress on the musculoskeletal system, leading to the development of WMSDs over time.

Several work-related factors were found to be significantly associated with the presence of WMSDs among nursing technicians in this study. Working more than 40 hours per week, shift work, high physical workload, and lack of ergonomic training were identified as potential risk factors. These findings are in line with previous studies that have reported similar associations (Koyuncuoğlu et al., 2019; Ribeiro et al., 2017).

Multivariate logistic regression analysis revealed that female gender, working more than 40 hours per week, and high physical workload were significant risk factors for WMSDs among nursing technicians. The higher risk of WMSDs among female nursing technicians may be due to differences in physical strength and anthropometric characteristics compared to their male counterparts (Ribeiro et al., 2017). Long working hours and high physical workload can lead to increased exposure to biomechanical risk factors and reduced recovery time, thereby increasing the risk of developing WMSDs (Davis & Kotowski, 2015).

The findings of this study highlight the need for interventions to reduce the risk of WMSDs among nursing technicians in Hafr Al-Batin. Ergonomic training programs that focus on proper lifting techniques, body mechanics, and workstation setup can help nursing technicians adopt safer work practices and reduce the risk of WMSDs (Van Hoof et al., 2018). Additionally, workload management strategies, such as task rotation and adequate staffing levels, can help distribute the physical demands of work more evenly and reduce the risk of overexertion injuries (Amin et al., 2018).

Workplace modifications, such as the provision of assistive devices for patient handling and adjustable workstations, can also help reduce the risk of WMSDs among nursing technicians (Van Hoof et al., 2018). Furthermore, promoting a culture of safety and encouraging the reporting of musculoskeletal symptoms can help identify and address potential risk factors early, preventing the development of more severe WMSDs (Koyuncuoğlu et al., 2019).

This study has several strengths, including the use of a validated questionnaire (NMQ) to assess the prevalence of WMSDs, and the inclusion of a representative sample of nursing technicians from various healthcare facilities in Hafr Al-Batin. However, the study also has some limitations. The cross-sectional design does not allow for the establishment of causal relationships between risk factors and WMSDs.

Additionally, the use of a self-reported questionnaire may have introduced recall bias, as participants were asked to report musculoskeletal symptoms experienced in the past 12 months.

## 6. Conclusion

In conclusion, this study found a high prevalence of WMSDs among nursing technicians in Hafr Al-Batin, Saudi Arabia, with the lower back, neck, and shoulders being the most affected body regions. Female gender, working more than 40 hours per week, and high physical workload were identified as significant risk factors for WMSDs. The findings underscore the need for interventions, such as ergonomic training, workload management, and workplace modifications, to reduce the risk of WMSDs among nursing technicians. Further research is needed to evaluate the effectiveness of these interventions in the Saudi Arabian context.

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