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### RESEARCH ARTICLE

#### WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG NURSES OF GOVERNMENTAL HOSPITAL IN AL-MEDINAH, SAUDI ARABIA: A CROSS-SECTIONAL STUDY

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#### Abstract

**Introduction:** Work-related musculoskeletal disorders (WMSDs) considered to be one of the most common public health issues these days. Studies have addressed the issue of increasing prevalence of work-related musculoskeletal (MSK) pain among different occupations. However, contributing factors to MSK pain have not been fully investigated among Nurses. Thus, this study aimed to approximate the prevalence and predictors of MSK pain among the nurses working in governmental hospitals in Medina, Saudi Arabia.

**Methods:** cross-sectional study took place on nurses of King Salman Medical city (KSAMC). The Standardized Nordic questionnaires for the analysis of musculoskeletal symptoms was utilized in our study. Results were analyzed descriptively using a Chi-square test and logistic regression analysis to estimate the odd ratio of experiencing disabling musculoskeletal symptoms.

**Results:** Nearly 55% of the subjects were between ages 31 and 40 and 85% of the sample comprised of females. A multivariate logistic regression analysis revealed being a female nurse seem to have high odds and significant association with Neck pain OR = 5.5 (2.18-13.76,  $p < .001$ )

**Conclusion:** Health care workers, particularly nurses, are at a high risk for work-related musculoskeletal disorders (WRMDs), and therefore, it is imperative that measures are taken to manage this global issue. Occupational therapists can play an integral role in this regard.

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#### Introduction:-

Occupational diseases are those diseases which workers develop due to their work activity in which they are exposed to certain factors more than the remainder of the Population so that certain diseases are occupational diseases or work-related if they are caused by activities performed under certain hazardous conditions (1). The Canadian Centre for Occupational Health and Safety defined WR-MSDs as "a group of painful disorders of muscles, tendons, and nerves caused by work activities which are frequent and repetitive, or activities with awkward postures, these disorders may be painful during work or at rest" (2) musculoskeletal disorders that are Work-related are syndromes characterized by soft tissue pain, anesthesia, stiffness, swelling, fatigue, irritation, and lack of control (3). The National Institute for Occupational Safety and Health (NIOSH), in the USA, characterizes Musculoskeletal Disorder (MSD) as a disorder and injury that affects a part of the body's musculoskeletal system, which consist of bones, nerves, tendons, ligaments, joints, cartilage, blood vessels and spinal discs (4).

Others define Work-related musculoskeletal injury as pain that lasts for more than three days, experienced by workers and caused by their work MSDs are described as disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, or spinal discs. (5-6)

Corresponding to the Overall Burden of all Diseases 2017, Musculoskeletal Disorder considered to be the second most common cause of years lost to injury. Because it has a substantial impact on a working population (7). Health professionals are considered at a larger probability for (MSD) by reason of their occupational responsibilities.

Musculoskeletal disorders (MSDs) affecting the neck, shoulders, and back account for about thirty percent of all incidents of sick leave for health care providers. Due to significant exposure to extreme physical problems implicated in healthcare workers it is the most frequently reported cause of these situations (8). They are considered to be one of the most frequent public health concerns recently, and they are related to a range of risk factors (5-6). It is common in variety of occupations and it the top three main cause of work injury (4-6), it is worth mentioning a cause of workplace injury and incapacities in numbers of countries (7-11).

Health professionals, especially Nurses are the major group of healthcare providers with the highest occurrence of work-related Musculoskeletal disorders (9). One of the highest physical burdens of nurses that have contributed to work-related Musculoskeletal disorders include lifting, stooping, and recurring actions. Occupational therapists (OT) play a major role in preventing work-related Musculoskeletal disorders (9).

A study sought to determine the lifetime, 12-months period, and point prevalence of work-related musculoskeletal disorders (WMSDs) among nurses found that the prevalence of WMSDs among nurses was high, with the lower back being the most commonly affected body part. The study concluded the prevalence of WMSDs was higher among female nurses than male nurses (10).

The estimated prevalence of work-related Musculoskeletal disorders among nurses estimated to range between 40% to 90% in numbers of countries (6).

In Saudi Arabia, numbers of studies have illustrated medical personnel with varying rates. A prevalence of 88.9% was reported for radiologists, (12) and 77.9% among dentists (13). There are no studies examining musculoskeletal symptoms in nurses. There is no information regarding the contributing factors of work-related musculoskeletal disorders (WMSDs), among nurses in Al-Medina.

Hence, the goal of this study is to investigate the prevalence and the risk factors of work-related Musculoskeletal disorders, among nurses employed in governmental hospital in Al-Medina, Saudi Arabia.

## **Materials and Methods:-**

### **Participants and setting**

This study was conducted in King Salman Medical city (KSAMC) in Madinah. KSAMC is one of the largest hospitals in the western region of KSA. The required number of participants needed for the study was calculated using the Kish's formula equal to 384 subjects, only 207 nurses responded with response rate of 53%. Registered nurses working in KSMC were the target population of this study. To be included in the study, the nurse should have a working experience of at least one year of work experience, student as well as training nurses were excluded.

### **Study design and data collection**

Our study was a self-administrated questionnaire-based cross-sectional study design. Data was collected using the Nordic Musculoskeletal Questionnaire (NMQ) which is a valid and reliable assessment tool [13,14]. The NMQ is divided into two sections, the first section is a general questionnaire identifying the body areas causing musculoskeletal problems, body map is provided that indicates nine symptom sites (neck, shoulder, upper back, elbows, low back, wrist/hands, hips/thighs, knees, and ankles/feet). The participant is requested to answer (yes or no) if he/she has had any musculoskeletal trouble during the last 12 months. The questionnaire then identifies whether the symptoms prevented the respondent from doing his/her normal work at home or away from home during the last 12 months, and whether he/she had troubles at any time during the last 7 days in any of the nine body sites.

The second section focuses on the numbers of joints including: neck, shoulder and lower back. This part identifies

any accidental effect on each of the three body sites in more details such as whether the respondent has change jobs or duties because of the trouble in the low back, neck, or shoulder, functional impact on home and work duties, duration of the problem, assessment by a health professional and musculoskeletal symptoms in last 12 months [13,14].

This study was approved by the Institutional Review Board (IRB) of King Salman Bin Abdulaziz Medical City /Madinah, before the beginning of data collection. The questionnaire was distributed in different words of KSAMC. A convenient sampling method was used.

### Data analysis

Descriptive statistics were reported in the form of frequencies and percentages for categorical data, The data was analyzed using statistical analysis, Statistical Package for the Social Sciences (SPSS) version 23 for Windows. For data analysis, The Chi-square test was used to confirm the bivariate relationship between the explanatory and outcome variables. A multivariable logistic regression was performed to identify independent factors associated with musculoskeletal symptoms,  $p < 0.05$  were considered significant in the final models.

### Results:-

**Table 1:-** Socio-demographic characteristics.

Variable		N %
Age	From 21 To 30	73 (35.5)
	From 31 To 40	113 (54.6)
	From 41 To 60	21 (10.1)
Gender	Female	177 (85)
	Male	30 (14.4)
Nationality	Saudi	135 (65.2)
	Non-Saudi	72 (34.8)
BMI	Underweight	12 (5.8)
	Normal	112 (54.1)
	Overweight	83 (40.01)
Chronic disease	Yes	35 (16.9)
	No	172 (83.1)
Smoking	Yes	19 (9.2)
	No	188 (90.8)
Experience	Less than 5 years	54 (26.1)
	Between 5 to 10 years	59 (28.5)
	More than 10 years	94 (45.4)
Educational degree	Diploma degree	39 (18.8)
	Bachelor's degree	146 (70.5)
	Master's degree	22 (10.6)
Department	Administrator	30 (14.5)
	Ward Nurse	95 (45.9)
	ICU	27 (13)
	Emergency Department	33 (15.9)
Marital Status	Outpatient Clinic	22 (10.6)
	Single	89 (43)
	Married	133 (54.6)
	Divorced/Widow	5 (2.4)
Body mass index, Intensive care unit		

Table 1 shows the distribution and characteristics of the study participants. Nearly 55% [113/207] of the subjects were between ages 31 and 40 and 85% of the sample comprised of females. 55% of the subjects were currently married. It was noted that 65.2% of the sample representative of Saudi nationals and 40.1% of the total sample were found to be overweight. Regarding chronic disease prevalence, 17%. It was found that 90.8% were nonsmokers or past smokers. Almost two thirds of the participants had related work

experience of 5 years or more. The majority of them (70%) were holding a bachelor's degree while 10% were having Masters. Around 30% of the participants were from the intensive care and emergency department.

Regarding Bivariate analysis of MSK pain predictors it was found that neck pain was significantly lower among female with OR 0.21 (0.08-0.52,  $p < .001$ ) and higher among smokers with OR 2.1(0.78-5.50,  $p < .001$ ) respectively. Whereas age less than 40 were found to be protective against neck pain. [Table 2]

Similarly, shoulder pain was found to be significantly associated being female, smokers and emergency worker with OR =0.1(0.47-0.35,  $p < .001$ ) and OR=3 (1.0-7.8,  $p < .05$ ) and OR =4.7 (1.43-15.1,  $p < .001$ ). [Table 3]

The results also illustrated Similar result of the lower back pain, it was found to be significantly associated being female, smokers and emergency worker with OR =4.6 (1.86-11.21,  $p < .001$ ) and OR=3.5 (1.22-10.23,  $p < .05$ ) and OR =4.1 (1.27-13.21,  $p < .05$ ). [Table 4]

**Table 2:-** Risk factors associated with neck pain.

Variable		Positive Neck Pain		Negative Neck Pain		OR	CI 95%	P-value
		N.O.	%	N.O.	%			
Gender	Female	104	51.69	73	35.26	0.21	(0.08-0.52)	<0.001
	Male	7	3.38	23	11.11	Reference		
Chronic disease		20	9.66	15	7.25	0.82	(0.39-1.71)	.603
Smoking		6	2.90	12	5.79	2.1	(0.78-5.50)	0.105
Nationality	Saudi	76	36.71	59	28.50	1.6	(0.88-2.78)	0.124
	Non-Saudi	37	17.87	35	16.91	Reference		
Age	From 20 To 30	43	20.77	30	14.49	0.21	(0.07-0.66)	0.007
	From 31 To 41	62	29.95	51	24.64	0.25	(0.08-0.75)	0.013
	From 42 To 57	5	2.42	16	7.73	Reference		
BMI	Underweight	7	3.38	5	2.42	Reference		
	Normal	62	29.95	50	24.15	0.7	(0.20-2.37)	0.56
	Overweight	41	19.81	42	20.29	0.8	(0.44-1.39)	0.41
Department	Administrator	18	8.70	12	5.80	1.42	(0.44-4.54)	0.546
	Ward Nurse	48	23.19	47	22.71	2.1	(0.78-5.60)	0.140
	ICU	14	6.76	13	6.28	2	(0.61-6.42)	0.250
	ED	15	7.25	18	8.70	2.6	(0.83-7.95)	0.101
	OPD	15	7.25	7	3.38	Reference		
Education	Diploma degree	22	10.63	17	8.21	0.92	(0.32-2.65)	0.888
	Bachelor's degree	76	36.71	70	33.82	1.10	(0.44-2.71)	0.827
	Master's degree	12	5.80	10	4.83	Reference		
Experience	Less than 5 years	31	14.98	23	11.11	Reference		
	Between 5 to 10 years	30	14.49	29	14.01	.81	(0.41-1.58)	0.537
	More than 10 years	49	23.67	45	21.74	1.05	(0.54-2.01)	0.877

OR, odds ratio; BMI, body mass index; CI, confidence interval; ICU, intensive care unit; ED, emergency department; OPD, outpatient department

**Table 3:-** Risk factors associated with shoulder pain.

Variable		Positive shoulder Pain		Negative shoulder Pain		OR	CI 95%	P-value
		N.O.	%	N.O.	%			
Gender	Female	108	52.17	69	33.33	0.1	(0.47-0.35)	<0.001
	Male	5	2.42	25	12.08	Reference		
Chronic disease		23	11.11	12	5.80	0.6	(0.26-1.22)	0.192
Smoking		6	2.90	13	6.28	3	(1.0-7.8)	0.051
Nationality	Saudi	76	36.71	59	28.50	1.2	(0.68-2.16)	0.558
	Non-Saudi	37	17.87	35	16.91	Reference		
Age	From 20 To 30	44	21.26	29	14.01	0.5	(0.18-1.32)	0.160

	From 31 To 41	60	28.99	53	25.60	0.7	(0.25-1.69)	0.391
	From 42 To 57	9	4.35	12	5.80	Reference		
BMI	Underweight	7	3.38	5	2.42	Reference		
	Normal	64	30.92	48	23.19	0.7	(0.21-2.49)	0.617
	Overweight	42	20.29	41	19.81	0.8	(0.43-1.35)	0.365
Department	Administrator	19	9.18	11	5.31	1.5	(0.46-5.10)	0.477
	Ward Nurse	49	23.67	46	22.22	2.5	(0.90-6.94)	0.078
	ICU	17	8.21	10	4.83	1.6	(0.46-5.31)	0.470
	ED	12	5.80	21	10.14	4.7	(1.43-15.12)	0.010
	OPD	16	7.73	6	2.90	Reference		
Education	Diploma degree	19	9.18	20	9.66	1.5	(0.52-4.37)	0.437
	Bachelor's degree	81	39.13	65	31.40	1.15	(0.46-2.88)	0.751
	Master's degree	13	6.28	9	4.35	Reference		
Experience	Less than 5 years	31	14.98	23	11.11	Reference		
	Between 5 to 10 years	29	14.01	30	14.49	1	(0.48-1.88)	0.904
	More than 10 years	53	25.60	41	19.81	1.34	(0.69-2.57)	0.383

**Table 4:-** Risk factors associated with back pain.

Variable		Positive back Pain		Negative back Pain		OR	CI 95%	P-value
		N.O.	%	N.O.	%			
Gender	Female	103	49.76	74	35.75	4.6	(1.86-11.21)	<0.001
	Male	7	3.38	23	11.11	Reference		
Chronic disease		23	11.11	12	5.80	0.05	(0.250-1.14)	0.137
Smoking		5	2.42	14	6.76	3.5	(1.22-10.23)	0.016
Nationality	Saudi	69	33.33	66	31.88	0.8	(0.44-1.40)	0.466
	Non-Saudi	41	19.81	31	14.98	Reference		
Age	From 20 To 30	40	19.32	33	15.94	1.1	(0.41-2.92)	0.849
	From 31 To 41	58	28.02	55	26.57	1.3	(0.49-3.23)	0.625
	From 42 To 57	12	5.80	9	4.35	Reference		
BMI	Underweight	8	3.86	4	1.93	Reference		
	Normal	58	28.02	54	26.09	0.6	(0.15-2.01)	0.379
	Overweight	44	21.26	39	18.84	1.1	(0.59-1.85)	0.865
Department	Administrator	16	7.73	14	6.76	2.3	(0.71-7.60)	0.160
	Ward Nurse	47	22.71	48	23.19	2.7	(0.98-7.55)	0.054
	ICU	18	8.70	9	4.35	1.3	(0.38-4.57)	0.647
	ED	13	6.28	20	9.66	4.1	(1.27-13.21)	0.018
	OPD	16	7.73	6	2.90	Reference		
Education	Diploma degree	24	11.59	15	7.25	0.6	(0.21-1.79)	0.383
	Bachelor's degree	75	36.23	71	34.30	1	(0.38-2.32)	0.905
	Master's degree	11	5.31	11	5.31	Reference		
Experience	Less than 5 years	24	11.59	30	14.49	Reference		
	Between 5 to 10 years	35	16.91	24	11.59	1.5	(0.75-2.90)	0.251
	More than 10 years	51	24.64	43	20.77	0.8	(0.42-1.57)	0.539

Adjusting the influence of related variables of nationality, smoking, BMI, educational degree, experience in years, and chronic diseases were not significantly associated with having issue in Neck, Shoulders and back.

Female nurses seem to have high odds and significant association with Neck pain OR = 5.5 (2.18-13.76, p<.001), Shoulders pain OR = 11 (3.67-32.36, p<.001) and Back pain OR = 4.36 (1.74-10.94, p<.05) respectively.

The age groups between 20 to 30 as well as 31 to 41 found to be significantly associated with Neck pain OR = 6 (1.89-18.40, p<.05) and OR = 4.4 (1.47-12.93, p<.05).

While only the age group between 20 to 30 found to be significantly associated with Shoulders pain OR = 4.4 (1.40-13.78, p<.05.)  
 Finally working in Emergency department yield significant association and lower odds of having Shoulders pain OR = 0.2 (0.04-0.63, p<.05) and Back pain OR = 0.3(0.08-0.93, p<.05). [table 5]

**Table 5:-**Multivariate logistic regression showing the odd ratios for independent factors associated with disabling musculoskeletal symptoms.

	Variable		OR	CI 95%	P-value
Neck Pain	Age	From 20 To 30	6	(1.89-18.40)	0.002
		From 31 To 41	4.4	(1.47-12.93)	0.009
		From 42 To 57	Reference		
	Gender	Female	5.5	(2.18-13.76)	<0.001
		Male	Reference		
Shoulders Pain	Age	From 20 To 30	4.4	(1.40-13.78)	0.011
		From 31 To 41	1.6	(0.20-1.75)	0.353
		From 42 To 57	Reference		
	Gender	Female	11	(3.67-32.36)	<0.001
		Male	Reference		
	Department	Administrator	1	(0.26-3.66)	0.976
		Ward Nurse	0.3	(0.09-0.90)	0.033
		ICU	0.6	(0.15-2.43)	0.482
ED		0.2	(0.04-0.63)	0.008	
OPD		Reference			
Low Back Pain	Gender	Female	4.36	(1.74-10.94)	0.002
		Male	Reference		
	Department	Administrator	0.51	(0.15-1.72)	0.277
		Ward Nurse	0.36	(0.13-1.03)	0.058
		ICU	0.72	(0.20-2.54)	0.608
		ED	0.3	(0.08-0.93)	0.038
OPD	Reference				

OR, odds ratio; CI, confidence interval; ICU, intensive care unit; ED, emergency department; OPD, outpatient department

### Discussion:-

The main objective of this research was to investigate the prevalence of WRMDs including nurses employed in Al-Madinah. It was assumed that awareness regarding WRMDs could influence their prevalence. The results of this study were consistent with those of similar research.

A significant proportion of participants (approximately 54%) reported experiencing neck discomfort, which in some cases, hindered their daily activities and necessitated medical attention. These observations are consistent with the findings of previous studies (15, 16–23). Furthermore, issues with the shoulders and lower back were the next most common complaints.

While the reviewed literature reported similar issues, the exact ranking of these problems varied across studies. The key point to note here is the high prevalence of WRMDs among nursing staff and the subsequent impact on their work and leisure activities. This often resulted in sick leaves, reduced productivity, mental health impacts, and increased healthcare costs. These findings are also consistent with previous studies (15, 24). Therefore, WRMDs appear to be a global issue among bedside nurses, which is unsurprising given the physically demanding nature of their work, including long hours of standing, bending, and twisting as part of patient care (22).

As such, measures must be taken to mitigate this problem and its effects on the physical and psychological health of nurses, who constitute the primary workforce in hospitals. Each hospital must address and manage WRMDs among nurses to prevent its consequences. Most hospitals have rehabilitation facilities with occupational therapy services, which should be utilized as WRMDs fall within their purview. Occupational therapists (OTs) should aim to increase

nurses' awareness about WRMDs and proper body mechanics. They should also evaluate the nurses' work environment and identify ergonomic hazards, implementing necessary modifications.

Nurses should be educated, individually or in groups, about the primary causes of WRMDs, such as repetitive movements, improper patient handling, prolonged standing. Given that nurses often work long hours shifts for three or more consecutive days, this places cumulative stress on their bodies over time (24).

The nurse-to-patient ratio should not exceed accredited standards. Mechanical devices, such as transfer lifts, should be made available to nurses. Additionally, lifting teams and teamwork should be emphasized for all bedridden and mobility-dependent patients. As nursing is a physically and psychologically demanding job, nurses should be physically fit. OT training programs for nurses should focus on range-of-motion, stretching, and strengthening exercises, particularly for the back, shoulders, neck, and extremities. After initial training and supervision by the OTs, nurses should be able to perform these exercises independently more than two times per week, either at home or work, to improve their physical fitness.

Even though this study was conducted in a large medical city (KSAMC), the results are not universally applicable. Future research should focus on nurses in different hospitals in the Western region, with larger sample sizes. These studies should also use outcome measures that target not only the physical but also the psychosocial aspects of nurses' lives. Implementing the recommended interventions, followed by an evaluation using various outcome measures, can help demonstrate the effectiveness of these programs and their impact on nurses' overall job satisfaction and wellbeing.

### **Conclusion:-**

Health care workers, particularly nurses, are at a high risk for occupational injuries especially musculoskeletal disorders, and therefore, it is imperative that measures are taken to manage this global issue. Occupational therapists can play an integral role in this regard. Given their critical role in patient care, the largest group of health care professionals in hospitals are nurses, and it is essential to work in an ergonomically suitable environment and adopt proper body mechanics to decrease their likelihood of experiencing WRMDs. Consequently, hospital administrators, rehabilitation departments, and nurses themselves should make concerted efforts to address this issue.

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### **Conflict of interest**

None to report.

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