

Work-Related Musculoskeletal Occupational Hazards among Nurses

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Abstract: Work-related musculoskeletal disorders are one of the most occupational problems among nurses. The aim of this study was to examine work-related musculoskeletal occupational hazards among nurses. Design: A descriptive research design was utilized. Settings:-This study was conducted at Menoufia University Hospital and El-Shohada hospital, Menoufia Governorate, Egypt. Sample: This study included simple random sample of 160 Staff nurses working at the above settings, Egypt. Tool for data collections:- 1) A structured interviewing questionnaire it was includes; the socio-demographic data of nurses, Occupational health practice, perceptions on job risk factors that may contribute to development of work-related musculoskeletal disorders and coping strategies toward reducing the risk for development of work-related musculoskeletal disorders. 2) Job risk factors scale of 0 to 10 Adopted from Bolanle, et al., (2009)to examine risk factors that may contribute to development of work-related musculoskeletal disorders among all respondents that indicate how much of a problem (if any) each item is for the nurse by circling the appropriate number.". Results: sixty-two point three percent of the nurses have had the work related musculoskeletal disorders during last 12 months in nursing work. Work-related musculoskeletal disorders occurred mostly in low back (44.6%), knees (27.7%) and neck (11.9%). The percent of the work related musculoskeletal disorders in El-Shohada hospital were 52.5% while in Menoufia University hospital were 72%. Outpatient clinics were high percent of the work related musculoskeletal disorders in both El-Shohada and Menoufia University hospital (64.5% and 86.4% respectively). Conclusion: About two third of studied nurses had the work related musculoskeletal disorders and the low back was the most common site of pain. Years of experience had significant effect on development of the work related musculoskeletal disorders. Recommendations: Education programs on injury prevention, body mechanics and coping strategies for nurses.

Keywords: Work-related musculoskeletal disorders, Nurses, Coping Strategies.

1. INTRODUCTION

Work related disorders can develop in an occupational setting due to the physical tasks with which individuals carry out their normal work activities. Work related musculoskeletal disorders (WRMSDs) are associated with work patterns that include: Fixed or constrained body positions, Continual repetition of movements, force concentrated on small parts of the body, such as the hand or wrist, and a pace of work that does not allow sufficient recovery between movements. Additionally workplace psychosocial factors such as organizational culture, the health and safety climate and human factors may create the conditions for WRMSDs to occur. Generally, none of these factors acts separately to cause WRMSDs. They more commonly occur as a result of a combination and interaction among them. [1].

Musculoskeletal disorders (MSDs) represent the leading causes of occupational injuries among nursing staff. Musculoskeletal disorders (MSDs) are " inflammatory and degenerative conditions that affect the muscles, tendons, ligaments, joints or peripheral nerves, usually leading to ache, pain or discomfort MSDs are generally caused by repetitive manual labor, lifting heavy loads, overexertion, or working in an awkward posture". MSDs can have a serious impact on quality of life and may result in work restriction, absenteeism or even the need to change jobs [2].

The Bureau of Labor Statistics of the Department of Labor defines "MSDs as musculoskeletal system and connective tissue diseases and disorders when the event or exposure leading to the case is bodily reaction (e.g., bending, climbing, crawling, reaching, twisting), overexertion, or repetitive motion". Examples of MSDs include Sprains, strains, tears, Back pain and Carpal tunnel syndrome[3].

Work related musculoskeletal disorders are "musculoskeletal disorders (injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs) in which the work environment and performance of work contribute significantly to the condition; and/or the condition is made worse or persists longer due to work conditions" [4].

Work-related musculoskeletal disorders (WMSDs) are a serious problem among hospital personnel, and in particular the nursing staff. Of primary concern are back injuries and shoulder strains which can both be severely debilitating. The nursing profession has been shown to be one of the most risky occupations for low back pain[5].

Work-related musculoskeletal disorders (WMSDs) are responsible for morbidity in many working populations and are known as an important occupational problem with increasing compensation and health costs, reduced productivity, and lower quality of life. WMSDs are reported to significantly impact on quality of life, cause lost work time or absenteeism, increase work restriction, transfer to another job, or disability than any other group of diseases with a considerable economic toll on the individual, the organization and the society as a whole. Consequences of WMSD among professional nurses are increased number of sick days per year, premature retirement and poor health[6].

There are risky and less risky strategies to execute the task. An example is lifting heavy objects having the centre of gravity near the body. Workers performing strenuous work are often advised to prevent problems and to cope with musculoskeletal symptoms by changing their working technique, using lifting equipment, taking breaks, and avoiding strenuous work tasks [7].

The prevention of work-related musculoskeletal disorders (WMSDs) risks is not only an economic, social and moral need, but also an employer's obligation within the occupational risk assessment. The preventive approach is a complex one and it should include detection of the work tasks with MSDs risk (e.g. using checklists), ergonomic analysis of these work situations, work stations, activity, work environment and operators' complaints (using also the questionnaires method), training and education (for example, at individual level - physical exercises to prevent and cure WMSDs), monitoring the employees' health state the precocious detection of any signs and symptoms and the corrective measures before the effects become irreversible [8].

AIM OF THE STUDY:

The aim of this study was to examine work-related musculoskeletal occupational hazards among nurses.

RESEARCH QUESTIONS:

1. What is the percentage of work-related musculoskeletal disorders among nurses?
2. What are the risk factors that cause musculoskeletal disorders?
3. What are the coping strategies for reducing the risk of development of WMSDs among nurses?

2. METHODS

2.1 Design: -A descriptive research design was used.

2.2 Settings:-This study was conducted at Menoufia University Hospital and El-Shohada hospital in three areas in hospital "outpatient clinics, intensive care unit and emergency area" one University hospital and one hospital from Ministry of Health selected because of the highest flow rate.

2.3 Sample:- Simple random sample of 160 Staff nurses working at Menoufia University Hospital and El-Shohada hospital was selected.

2.3.1 Inclusion criteria:

- At least one years of experience.

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2.3.2 Sample Size:

It is formed by Epi website (Open Source Statistics for Public Health)*. Our assumptions were:

Population size (N): 300 (nurses working at University and Al shohada hospitals)

Hypothesized % frequency of outcome factor in the population (p): 70% \pm 5

Confidence limits as % of 100(absolute \pm %)(d): 5%

Design effect (for cluster surveys-DEFF): 1

Results were presented using the written equation as shown in the following figure .We used 95%confidence level with 156nurseswhich can be approximated to160 nurses as our sample size. The sample size calculation was found to be N= 160 with the following considerations:

95 % confidence interval

2.3.3 Sampling technique:

The technique used to select the sample was:-

a- Nurses' names from three shifts in three departments at two hospitals were identified

b- All the names were put in a bowl and the 162 names were selected randomly. The selected nurses were asked to fill questionnaire after explaining the aim of the study.

2.4 Data Collection Instruments:

Data was collected through using the following tools:

1-**A structured interviewing questionnaire:** it was include the following.

- Socio-demographic data of nurses including age, sex, education, marital Status, accommodation, income, height, weight, body mass index, current workplace, years of experience, the year of graduation ...etc,
- Occupational health practice, such as work-related ache, pain, discomfort, or injury that lasted for more than three days ?, the place of pain or injury and significant body location/site of sever injury or pain.
- Perceptions on job risk factors that may contribute to development of work-related musculoskeletal disorders consist of 17 items.
- Coping strategies toward reducing the risk for development of work-related musculoskeletal disorders consist of 17 items.

2- **Job risk factors scale of 0 to 10 Adopted from Bolanle, et al., (2009)**to examine risk factors that may contribute to development of work-related musculoskeletal disorders among all respondents that indicate how much of a problem (if any) each item is for the nurse by circling the appropriate number." A score of 0 to 1 was equivalent to a job factor being "no problem," a score of 2 to 7 was rated as a "minimal to moderate problem," and a score of 8 to 10 indicated that a job factor was considered a "major problem.

2.4.1 Reliability of the tools:

Reliability was applied by the researcher for testing the internal consistency of the tool by administration of the tool to the same subjects before collecting the data actually to assess clarity and simplicity of the questions

Reliability was estimated among 15 participants by using test retest method with two weeks apart between them. Then correlation coefficient was calculated between the two scores. Correlation coefficient was 0.83 which indicates that the questionnaire is reliable to detect the objectives of the study.

2.4.2 Validity of the tools:

The tool was tested for its content by jury of five experts in the field of Community Health Nursing and Medical Surgical Nursing to ascertain relevance and completeness.

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Validity of the questionnaire was assessed using content validity by an Expert. The relevancy, clarity, fluency, and simplicity of each component in the questionnaire was examined by the expert and she found the questionnaire is useful and helpful.

2.5 Pilot Study:

A pilot study was carried out on 16 nurses to assess the clarity, feasibility, applicability of the study tools, and the time needed to fill each tool. The necessary modifications were done as revealed from the pilot study. The sample of pilot study was excluded from the total sample to assure the stability of the results.

2.6 Ethical Consideration:

For ethical reasons the protocol was approved by the “Ethical Committee” of the “Faculty of Nursing, Menoufia University”. An official permission was taken from the directors of Menoufia University Hospital and El-Shohada hospital. Before data collection each nurse was informed about the aim of the study and its importance. They were given an opportunity to refuse to participate. Also they were assured that the information would remain confidential and used for the research purpose only. Agreement to measures weight and height from the subjects were taken from the nurses

2.7 Procedure and Data Collection:

- Duration of study: Data were collected during the period of time from the beginning of November 2015 to the end of the may 2016.
- A review of past and current literature covering the various aspects of the topic was done using books, article, magazines, and studies related to musculoskeletal disorders among nurses.
- Tools were developed for data collection after a review of past and current literatures related to musculoskeletal disorders among nurses using books, articles, periodicals and magazines to get acquainted with the various aspects of the problem.
- An official permission were obtained from the Faculty of Nursing, Menoufia University and sent to the directors of Menoufia University Hospital and El-Shohada hospital to get their permission for data collection. The letters explained the aim of the study and sought their cooperation.
- Upon receiving the informal approval through formal channel questionnaire was checked for its validity and reliability
- Before starting the data collection, the agreements and the aim of the study were explained to each manager.
- Oral consent was obtained from every participant at their work, oral explanation about the aim of study and its importance was given to the participants.

2.8 Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS version 16 (Statistical Package for Social Studies) for categorical variable the number and percent were calculated. The relations between the studied variables were tested. The level of significant was adopted at $p < 0.05$.

3. RESULTS

Table (1): demonstrated the sociodemographic characters of studied nursing. The range of studied nurses' age was 21 to less than 59 years, with a mean of 32.8 ± 8.4 years. Majority of them were females (87%), married (84%), having diploma of nursing education (38.9%), and were reside in rural areas (82.7%). About two third of them (60 %) mentioned that their income was enough.

Fig.(1): Showed the work related musculoskeletal disorders (WMSD) among studied nurses. AS shown from the table, More than half of studied nurses (58.0%) had Work-related ache, pain, discomfort, or injury that lasted for more than 3 days, during previous years in nursing work and less than half of them (42.0%) didn't have Work-related ache, pain, discomfort, or injury that lasted for more than 3 days, during previous years in nursing work. Moreover about two third of them (62.3%) had Work-related ache, pain, discomfort, or injury that lasted for more than 3 days, during last 12 months

in nursing work and more than one third of them (37.7%) didn't have Work-related ache, pain, discomfort, or injury that lasted for more than 3 days, during last 12 months in nursing work.

Fig.(2): illustrated significant body location/site of severe injury or pain. As noticed from the table , less than half of studied nurses (44.6%) had severe pain in low back , less than one third of them (27.7%) had severe pain in knee, (11.9%) of them had severe pain in neck. The least percentage of them (3.0%) had severe pain in ankles.

Table (2): presented relation between works related musculoskeletal disorders (WMSD) and body mass index among studied nurses. As presented more than two third of studied nurses (69.2%) were obese and had WMSD and less than two third of them (60.7%) were overweight and had WMSD while more than half of them (58.3%) were normal and had WMSD. As presented there was no a significant statistical relationship between WMSD and body mass index as p value =0.33

Fig.3: illustrated frequency distribution of total score risk factors groups. As illustrated less than three quarter of studied nurses (74.1%) had minimal to Moderate problem. Also less than one quarter of them had major problem, while the least percentage of them (1.2%) had no problem.

Table (3): presented relation between total score risk factors groups and WMSD among studied nurses. As presented from table less than three quarter of studied nurses (72.5%) had major problem and WMSD. Also less than two third of studied nurses (60.0%) had minimal to moderate problem and WMSD. The least percentage of them (0%) had no problem and WMSD. As presented there was a significant statistical relationship between total score risk factors groups and WMSD as p value = 0.04.

Table (4): represent strategies to reduce work related musculoskeletal disorders WMSD among studied sample distributed by working hospital. As represented in Elshohada hospital, more than half of studied nurses (58.8%) reported that sometimes getting someone to help to handle a heavy patient, more than one third of them (37.5%) reported that always getting someone to help to handle a heavy patient and the least percentage of them (3.8%) reported that never getting someone to help to handle a heavy patient. In university hospital less than three quarter (74.4%) reported that sometimes getting someone to help to handle a heavy patient, less than one quarter of them (22%) reported that always getting someone to help to handle a heavy patient and the least percentage of them (3.7%) reported that never getting someone to help to handle a heavy patient. There was no significant statistical relationship between WMSD and getting someone to help to handle a heavy patient.

As represented in Elshohada hospital, less than two third of studied nurses (63.8%) reported that sometimes modifying patient's position/ nurse position, less than one third (32.5%) of them reported that always modifying patient's position/ nurse position, and the least percentage of them (3.8%) reported that never modifying patient's position/ nurse position. In University hospital, more than half of studied nurses (58.5%) reported that sometimes modifying patient's position/ nurse position, more than one third of them (37.8) reported that always modifying patient's position/ nurse position and the least percentage of them (3.7%)reported that never modifying patient's position/ nurse position. There was no significant statistical relationship between WMSD and modifying patient's position/ nurse position.

Fig.(4): represented total grade groups for strategies they used to eliminate pain or injury in WMSD disorders. As presented more than three quarter of studied nurse (80.2%) were sometimes used strategies to eliminate pain or injury in WMSD disorders and less than one quarter of them (19.8%) never used strategies to eliminate pain or injury in WMSD disorders

Table1: Sociodemographic characters of 162studied nurses.

Sociodemographic data	No	%
<u>Age</u> : X ± SD (years) = 32.8 ± 8.4 (range: 21 - 59 years)		
<u>Age groups:</u> 20-<30years	68	42.0
30-<40 years	53	32.7
40- 60 years	41	25.3

<u>Sex:</u>	Male	21	13.0
	Female	141	87.0
<u>Marital status</u>			
	Single	24	14.8
	Married	136	84.0
	Widowed	2	1.2
<u>Education</u>			
	Diploma	63	38.8
	Technical Institute	44	27.2
	Bachelor	55	34.0
<u>Residence:</u>	Rural	134	82.7
	Urban	28	17.3
<u>Income</u>			
	Not enough	63	38.9
	Enough	98	60.5
	More than enough	1	0.6
Total		162	100.0

Answering research question number 1: Fig.(1):

What is the percentage of work-related musculoskeletal disorders among nurses?

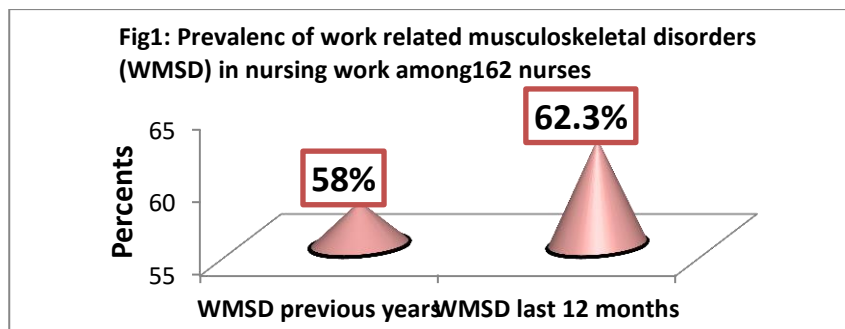


Fig.(1): Work related musculoskeletal disorders (WMSD) among studied nurses

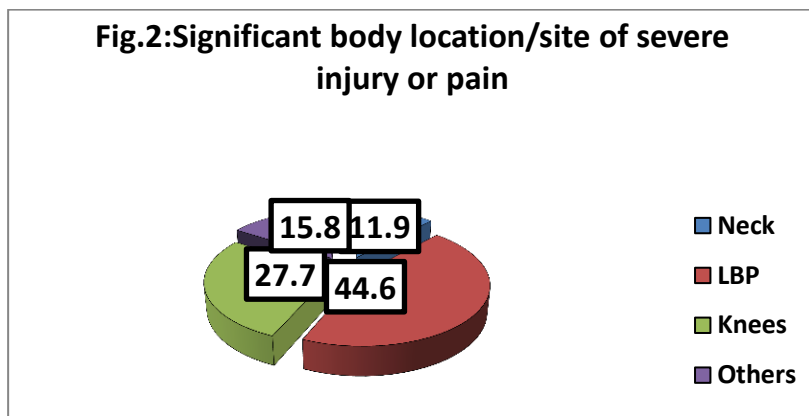


Fig.(2): Significant body location/site of severe injury or pain

Answering research question number (2)

What are the risk factors that cause musculoskeletal disorders?

Table 2: Relation between works related musculoskeletal disorders (WMSD) and body mass index among 162 studied nurses

BMI	WMSD				Total No. %		X2	P value
	No No.	%	Yes No.	%				
Underweight	1	100.0	0	0.0	1	100.0	LR=3.4	P=0.33 NS
Normal	20	41.7	28	58.3	48	100.0		
Overweight	24	39.3	37	60.7	61	100.0		
Obese	16	30.8	36	69.2	52	100.0		
Total	61	37.7	101	62.3	162	100.0		

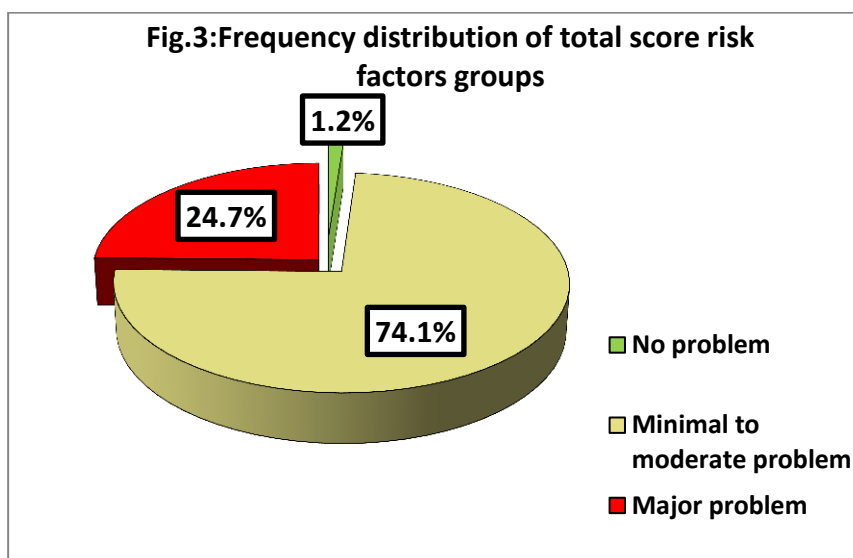


Fig.3: Frequency distribution of total score risk factors groups

Table 3: Relation between total risk factors score and WMSD among studied nurses (N162)

Total risk factors groups	WMSD disorders				Total No. %		X2	P value
	No NO.	%	Yes NO.	%				
No problem	2	100.0	0	0.0	2	100.0	LR=6.0	0.04 Sig.
Minimal to Moderate problem	48	40.0	72	60.0	120	100.0		
Major problem	11	27.5	29	72.5	40	100.0		
Total	61	37.7	101	62.3	162	100.0		

Total risk factors groups	WMSD disorders		Total		X2	P value
	No NO.	%	Yes NO.	%		
No problem	2	100.0	0	0.0	LR=6.0	0.04 Sig.
Minimal to Moderate problem	48	40.0	72	60.0		
Major problem	11	27.5	29	72.5		
Total	61	37.7	101	62.3		
			162	100.0		

Answering research question number (3)

What are the coping strategies for reducing the risk of development of WMSDs among nurses?

Table4: Strategies to reduce work related musculoskeletal disorders (WMSD)among studied sample distributed by working hospital

Strategies	Working hospitals	Grades giving by studied nurses						X2	P value
		Always		Sometimes		Never			
		No.	%	No.	%	No.	%		
1- Using body mechanics	Elshohada hospital	0	0.0	33	41.2	47	58.8	X2=2.0	0.15 NS
	a university hospital	0	0.0	25	30.5	57	69.5		
2-Get someone to help me handle a heavy patient	Elshohada hospital	30	37.5	47	58.7	3	3.8	X2=4.7	0.09 NS
	University hospital	18	22.0	61	74.3	3	3.7		
3-Modify patient's position/nurse position	Elshohada hospital	26	32.5	51	63.8	3	3.7	LR=0.50	0.77 NS
	University hospital	31	37.8	48	58.5	3	3.7		
4-Take adequate rest before performing my nursing duties	Elshohada hospital	8	10.0	42	52.5	30	37.5	X2 = 8.0	0.01 Sig.
	University hospital	5	6.1	28	34.1	49	59.8		
5-Reduce movement during work	Elshohada hospital	11	13.7	38	47.5	31	38.8	X2 = 9.3	0.009 Sig.
	University hospital	1	1.2	43	52.5	38	46.3		
6- Doing exercise	Elshohada hospital	3	3.8	15	18.7	62	77.5	X2 =0.30	0.85 NS
	University hospital	2	2.5	17	20.7	63	76.8		
7-Thinking to leave the nursing profession	Elshohada hospital	8	10.0	36	45.0	36	45.0	X2=24.9	0.000 HS
	University hospital	37	45.1	22	26.8	23	28.1		

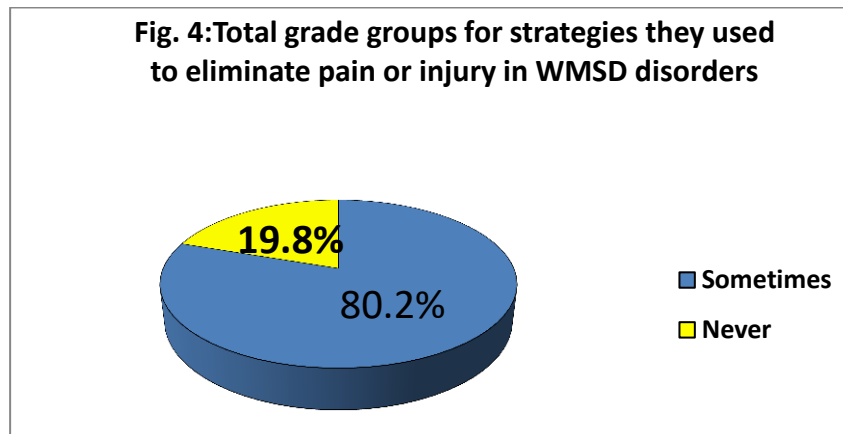


Fig.4: Groups of nurses of total grade for strategies they used to eliminate pain or injury in WMSD disorders

4. DISCUSSION

Musculoskeletal disorders are one of the most frequent health problems related directly to working conditions and they occur in nurses who get little or no training in the safety and ergonomic principle of patients' care. This is a major problem in most developing countries due to poor working conditions and the absence of effective work injury prevention programs [9]. The aim of this study was to examine work-related musculoskeletal occupational hazards among nurses.

Regarding percentage of work related musculoskeletal disorders (WMSD) among studied nurses. The current study revealed that about two third of the studied nurses had work-related musculoskeletal disorders (Fig 1). The current study finding was consistent with [10] who studied "assessment of work-related musculoskeletal symptoms in among nurses who were working at operation room, Cairo University hospitals". They reported that "the prevalence of work-related musculoskeletal symptoms was 76.1%". Also, this finding came in agreement with [11] who studied musculoskeletal disorders and their related risk factors among Iranian nurses at three public hospitals of the Ilam province of Iran. The participants reported that "the prevalence of hospitals' nurses experienced MSDs in at least one anatomical site within the last year was 71.9%". Additionally this finding came in agreement with [12] who studied work-related musculoskeletal disorders among health workers in a Nigerian Teaching Hospital and they reported that "68.7% of the respondents have experienced WMSDs in their occupational lives". Additionally this finding came in agreement with [13] who studied work related musculoskeletal disorders in female nursing personnel: prevalence and impact. The researchers reported that "73.1% of the nursing staff sustained WRMSDs symptoms in at least one anatomical site one year prior to the study". Also this finding came in agreement with [14] who studied musculoskeletal disorders among Tunisian hospital staff: prevalence and risk factors. The researchers reported that the prevalence of MSD among hospital staff was 65.4%.

Concerning significant body location/site of severe injury or pain The current study revealed that the low back (lumbar/sacral) was the most common site affected (44.6%) followed by knees were (27.7%) then neck was (11.9%) (figure 2). The current study finding was consistent with [15] who studied relationship between musculoskeletal disorders, job demands, and burnout among nurses who were working at the emergency departments, Zagazig University Hospital and Al-Ahrar, Hospital, Zagazig, Egypt. The researchers reported that "lower back pain was the most common site affected (72.4%) followed by the neck (67.2%), shoulder (65.5%)". More over the present study findings was supported by a study that was carried out by [14] who studied musculoskeletal disorders among Tunisian hospital staff: Prevalence and risk factors. The researchers reported that "Musculoskeletal disorders occurred mostly in low back (74.5%), neck (38.1%), and knees (31.1%)". Also, these findings were consistent with [16] who studied work related musculoskeletal disorders among nurses in rural Maharashtra, India: a multi centre survey. They reported that WMSDs was highest in the low back (48.2%), followed by the shoulder (34.6%), neck (33.1) and knee (29 %). Moreover these findings were supported by [10] who studied assessment of work-related musculoskeletal symptoms among nurses who working at operation room, Cairo University hospitals. They reported that lower back was the most commonly affected site in the past 12 months (76.1%). Additionally this finding came in agreement with [17] who studied "frequency and risk factors of musculoskeletal pain in nurses at a tertiary centre in Jeddah, Saudi Arabia: a cross sectional study". The researcher reported that "the most common site affected was the lower back (65.7%), followed by the ankle/foot (41.5%) and shoulder (29.0%)".

Regarding relation between work related musculoskeletal disorders (WMSD) and body mass index among the studied nurses. The present study revealed that more than two third of studied nurses (69.2%) were obese and had WMSD and less than two third of them (60.7%) were overweight and had WMSD and there was no a significant statistical relationship between WMSD and body mass index as p value =0.33 (table 2). The present study findings were supported by [18] who studied work-related musculoskeletal disorders among health care professionals: A cross-sectional assessment of risk factors in a tertiary hospital, India in a tertiary care hospital in Chennai, India. The researchers reported that "overweight (OR = 2), obese (OR = 1.26) professionals have a greater chance of developing WMSDs". Also these findings came in agreement with [14] who studied musculoskeletal disorders among Tunisian hospital staff: Prevalence and risk factors. The researchers reported that "factors associated to MSD were 228 (53.7%) reported that they were overweight/obese". Also the current study findings came in agreement with [10] who studied assessment of work-related musculoskeletal symptoms among nurses who were working at operation room, Cairo University hospitals, Egypt. The researchers reported that "body mass index BMI was significant risk factor for MSDs and there was a significant positive correlation between BMI and MSDs at hips and knees. The results can be explained by the increasing loading of the lower limb joints by the overweight person than in normal subjects". Also the present study findings were supported by [19] who studied musculoskeletal disorders and their related risk factors among Iranian nurses in public hospitals of the Ilam province of Iran. The researchers reported that body mass index (BMI) had no significant association with MSDs. Similar finding was recorded by [20] who studied determinants of low back pain among operating room nurses in Gaza Governmental Hospitals, Palestine. The researchers reported that the highest percentage 24 (82.8%) of the study's participants had the highest BMI 30 and more complaining of LBP. However, there is no statistical significant difference between BMI in relation to LBP (Chi square = 3.95, P-value = 0.138). The current study finding was contradicted with [21] who studied prevalence of work-related musculoskeletal disorders and associated risk factors among nurses in a Public Hospital in Imam Hospital, in Sari. The researchers reported that there was a significant relationship between the subject's body mass index (BMI) and prevalence of WMSDs (P < 0.005) this may be due to large number of obese nurses in sample. Also this study finding was contradicted with [17] who studied frequency and risk factors of musculoskeletal pain in nurses at a tertiary centre in Jeddah, Saudi Arabia: a cross sectional study. the researcher reported that the most significant risk factors were prolonged shifts (>10 hours per day) and being underweight this might be due to change in behaviour, culture and working environment.

Regarding risk factors for work related musculoskeletal disorders (WMSD) among studied nurses. The current study revealed that managing large number of patient in one day (63%), inadequate rest breaks during work (59.9%), continue to work while injured or hurt (56.8%), inadequate training on injury prevention (56.8%), working with unconscious patients (54.9%), bending or twisting her/his back in an error manner (52.5%), working in same position for long period (53.7%) and lifting or transferring dependent patients (49.4%) were the major perceived job risk factors for WMSDs (Fig.3). The finding of the present study came in agreement with [15] who studied relationship between musculoskeletal disorders, job demands, and burnout among emergency nurses on nurses working in the emergency departments of Zagazig University Hospital and Al-Ahrar, Hospital, Zagazig, Egypt. The researchers reported that "an increased prevalence of MSDs among emergency nurses, as predicted by increased job demand and associated with a higher level of burnout". Similar finding was recorded by [22] who studied work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria. The researchers reported that "working in the same positions for long periods (55.1%), lifting or transferring dependent patients (50.8%) and treating an excessive number of patients in one day (44.9%) were the most perceived job risk factors for WMSDs". More over the present study finding was supported by a study that was carried out by [16] who studied work related musculoskeletal disorders among hospital nurses in rural Maharashtra, India. The researchers reported that working in the same positions for long periods (47.6%), lifting or transferring dependent patients (52.4%), treating an excessive number of patients in one day (41.0%) and carrying, lifting or moving heavy material or equipment's (42.4%) were the most perceived job risk factors precipitating WMSDs during their hospital duties. Also this result was in accordance with the study carried out by [23] who studied factors related to musculoskeletal disorders in nursing workers. The researchers reported that "musculoskeletal disorders in neck, shoulder or upper back and musculoskeletal disorders in low back are associated to physical demand (material handling, poor back posture and work repetitiveness), psychosocial demand and precarious physical fitness. Musculoskeletal disorders in distal upper extremities are associated to physical demands (repetitiveness and force) and years of work (> 19)". Additionally this finding came in agreement with [24] who studied relationship between knowledge of ergonomics and workplace

conditions with musculoskeletal disorders among nurses at Tehran University of Medical Sciences including Imam Khomeini and Shariati hospitals. The researchers reported that causes for these disorders were included doing work while standing (93.1%), lack of safety and health facilities (49.3%), moving and handling patients (38.5%), working with machines and equipment (37.6%), lack of adequate training (24.7%), lack of proper function of equipment (13.4%) and carelessness of nurses (6.9%). Also, these findings were consistent with [25] who studied musculoskeletal disorder risk factors among nursing professionals in low resource settings: across-sectional study in Uganda. The researchers reported that "significant risk factors for reported MSD included often working in a slightly bent posture, often working in a slightly twisted posture for long, and feeling rested after a break working in awkward postures, pushing/pulling of heavy loads".

Concerning strategies to reduce work related musculoskeletal disorders (WMSD) among studied sample. The finding of the present study revealed that modify patient's position/ nurse position (70.3%), get someone to help me handle a heavy patient (59.5%), adjust bed height (55.5%), thinking to leave the nursing profession (55.1%) were the most common coping strategies used by nurses (Table 4). The present study findings were supported by [16] who studied work related musculoskeletal disorders among hospital nurses in rural Maharashtra, India: a multi-centre survey. The researchers reported that getting help to handle heavy patients (57.1%), nursing procedure modification in order to avoid stress injury (50.2%), modification of patients or self-position (41.2%) were the most common strategies used by nurses. Also, these findings came in agreement with [22] who studied work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria. The researchers reported that getting help in handling heavy patients (50.4%), modification of nursing procedures in order to avoid re-injury (45.4%), and modifying patient's/nurse position (40.3%) were the top three coping strategies. In the same line with the present finding was the study carried out by [26] who studied work related musculoskeletal disorders (WMSD) in hospital nurses: Prevalence and coping strategies in the GMC hospital, Ajman. The researchers reported that "the top three coping strategies suggested were modifying patient's /nurses position (58.5%), modifying nursing procedures to avoid re-injury (45.9%), and adjusting plinth/bed height to change the posture (45.1%)".

5. CONCLUSIONS

In the light of the present study findings, it can be concluded that about two third of studied nurses had WMSDs at some body site in their occupational lives with the low back was the most common site of pain. Years of experience had significant effect on development of WMSDs. Managing large number of patient in one day, inadequate rest breaks during work, continue to work while injured or hurt and inadequate training on injury prevention were the major job risk factors for WMSDs. Modifying patient's position/ nurse position, getting someone help to handle a heavy patient, adjust bed height, thinking to leave the nursing profession were the most common coping strategies used by nurses.

6. RECOMMENDATION

It was recommended that education programs on injury prevention and coping strategies for nurses. A program of regular exercise and weight control with an emphasis on ergonomics. Health education about body mechanics for nurses

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