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Prevalence of musculoskeletal disorders among nurses

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Abstract

Musculoskeletal disorders (MSDs) are widely known as the cause of severe long-term pain and physical disability affect hundreds of millions of people worldwide and are common among healthcare workers. The nursing population constitutes about 33% of the hospital workforce and is at high risk and accounts for 60% of the reported occupational injuries which significantly affects their work ability and quality of life. Thus, a study with the objective to determine the prevalence of the musculoskeletal disorders, job risk factors, coping strategies and work ability among nurses at private hospital was conducted among 100 nurses using the socio-demographic, Nordic-Musculoskeletal and work ability self-administered questionnaire 12 month prevalence of work-related MSDs (WMSDs) was 92%. Neck Pain (79%) was found to be the most prevalent disorder followed by pain in lower back (67%). 95% of the respondents perceived working in the same positions for prolonged time as a major risk factor leading WMSDs. Most of the respondents have good work ability, 32%. Work ability was significantly associated with age, Experience, working hours and exercise habits. The commonly used coping strategies in order to prevent musculoskeletal discomfort were being helped to handle heavy patients (92%) and modifying nursing procedures (81%). Owing to the high prevalence of MSDs among nurses, they should be educated about risk factors and adequate training should be given for prevention of WMSDs.

Keywords: Musculoskeletal disorders, prevalence, work ability, risk factors, coping strategies

Introduction

Musculoskeletal disorder (MSD) is described as a disease that causes muscular pain or injury due to sudden or constant contact, repeated exercises, or inappropriate postural movements (Ajibade *et al.*, 2013). [1] Musculoskeletal disorders (MSDs) are widely recognized as the cause of chronic pain and physical disability that affects hundreds of millions of people worldwide (Akodu *et al.*, 2019) [2]. MSDs such as neck and low back pain are more prevalent among occupational disorders and affect most of the population. Nursing is an integral part of the health care system, that includes health promotion, disease prevention, and caring for the physically sick, mentally sick, and disabled of all ages, in all health care and other public settings (Bartz 2010) [19]. It involves personal and transdisciplinary care for people of all ages, families, groups and societies, the sick or fit and in all cases. Numerous internal and external factors have been embroiled in the pathophysiology of WMSDs. Repeated movements, abnormal posture, and high energy levels as the three main risk factors associated with WMSD (Kwon YJ *et al.*, 2022) [20]. Nurses are reportedly the hardest hit among health care professionals (Yasobant *et al.*, 2014) [16]. The prevalence of the work-related Musculoskeletal Disorders (WMSDs) among the nurses varies among studies. Studies in Turkey 90%, Japan 85.5%, Nigeria 84.4% Estonia 84%, and Australia 80% (Tezel *et al.* 2005; Smith *et al.*, 2003; Tinubu *et al.*, 2010; Freimann *et al.*, 2013; Smith *et al.*, 2003) [12, 11, 14, 6, 11] have reported higher prevalence of MSDs with low back being the most reported site. The studies among the nurses of Maharashtra 89.1% (Anap *et al.*, 2017) [3] and Gujarat 89.2% have revealed higher prevalence of WMSDs and concluded lower back as the most affected site. Most of the studies have been conducted in western countries and we did not come across any study in North India, and thus the objective of the study was to determine the prevalence, risk factors, effect on work ability and coping strategies utilized by nurses for MSDs.

Materials and Methods

Nurses working in a private hospital in Haryana, India with more than 12 months of experience, both male and female, aged between 20-60 years of age were included in the study. Nurses who reported any congenital spine deformity, history of inflammatory/ infectious disease/disorder or history of surgery were excluded. Incomplete forms were also excluded. The aim and objectives of this study were clearly elucidated to the subjects who were also assured of the concealment of their responses. Written informed consent was obtained from all subjects after explaining the objectives of the study in an interactive session with them. A web-based self-administered questionnaire was circulated using a link through online platforms. The Nordic musculoskeletal questionnaire (Kuorinka *et al.*, 1987) [17] was used to obtain information about prevalence of MSDs. Work ability was determined using a work ability questionnaire (van Schaaik A *et al.*, 2019). [21] The tool also consisted of the items reporting perceptions of job risk factors and coping strategies utilized by nurses for MSDs

Statistical Analysis

Dant was analysed using SPS windows version 26. Demographic data was analyzed using descriptive statistics. Inferential statistics of the chi-square test were used to

determine the association between variables at an alpha level of $p < 0.05$.

Results

The majority 69% of the participants belonged to the age group of 20-30 years. 72% were female. 53% of subjects under study were married. 74% of the subjects under study had a degree in nursing whereas 2% were diploma holders. The majority (41%) of the participants had a work experience of 1-3 years in the current hospital. 87% of the nurses under study worked as full-time nurses and 12% of the respondents worked as administrative supervisors, 61% of the respondents worked in the intensive care unit and 31% worked in the wards. The majority (74%) of the nurses under study had three-shift rotations (8 hours a day) as a work mode, 88% of the nurses under study worked for more than 8 hours. The work of majority (87%) of the subjects involved standing for the 4-8 hours/ day. 72% of the nurses under study had no habit of exercise. The data on the 7-day prevalence of work-related musculoskeletal disorders revealed that the majority (84%) of the respondents had pain in neck region followed by lower back (75%). Similarly, the 12-month prevalence of IVISOs was higher for neck (79%) followed by the lower back (69%) (Table 1).

Table 1: Distribution of 7 day and 12-month prevalence of MSDs among nurses

Have you had trouble at any time during the past days? (N=100)	7 Days (N %)	12 months (N %)
Region	Yes	Yes
Neck	84	79
One or Both Shoulders	57	46
One or Both Elbow	9	10
One or both wrist and Hand	20	20
Upper Back	56	45
Lower Back	75	67
One or Both Hips/Thighs	19	19
One or both knees	73	20
One or Both ankle/Foot	17	16

Most of the participants (95%) perceived working in the same positions for long periods and bending back awkwardly (84%) as a major factor leading to MSD. Inadequate rest breaks (87%), work schedules such as

overtime and irregular shifts (80%, lifting or transferring heavy patients (78%), treating an excessive number of patients (73%), were some other perceived risk factors for MSDs (Table 2).

Table 2: Perceived risk factors for MSDs among nurses

What according to you has led to your pain? (N=100)	Yes (N %)
Working in the same positions for long periods [Standing, Bend over, Sitting, Kneeling]	95
Lifting or Transferring Dependent Patients	78
Bending or Twisting your Back in an Awkward way	84
Treating an excessive number of patients in one day	73
Carrying, Lifting, or moving heavy materials or equipment (CPM)	25
Performing manual orthopedic techniques	12
Not enough rest breaks or pauses during workday	87
Work Scheduling (Over Time, Irregular shifts, Length of workday)	80
Working in awkward and cramp position	62
Continuing to work while injured or hurt	64
Reaching or working away from your body	55
Unanticipated sudden movement of fall by patient	25
Inadequate training on injury prevention	62
Working near or at your physical limits	61
Working with confused or agitated patients	39
Performing the same task over and over	41
Assisting patients during walking activities	18

Association of Demographic Characteristics with 12-month prevalence of MSD revealed that number of hours worked per day ($X^2=6.085$, $P=0.048$) and exercise habits ($X^2 =$

14.327 and $P=0.0049$) were found to be significantly associated with 12 months prevalence of WMSDs (Table 3).

Table 3: Association of demographic characteristics with 12-month prevalence of MSD

Characteristics	Yes (N %)	Total N (%)	X ²	P-Value
Age (years)				
21-30	63(68.47)	69(69)	0.483	0.785 ^{NS}
31-40	24(26.08)	26		
41-50	5(5.4)	5		
Total	92(100)	100(100)		
Gender				
Male	26(28.26)	28(28)	0.39	0.844 ^{NS}
Female	66(71.7)	72(72)		
Total	92(100)	100(100)		
Years of Experience				
0-5	64(69.5)	70(70)		
5-10	21(22.8)	23(23)	0.655	0.721 ^{NS}
More than 10	7(7.6)	7(7)		
Total	92(100)	100(100)		
Years of experience in present Hospital				
0-1	26(28.26)	28(28)		
1-3	37(40.2)	41(41)	2.467	0.651 ^{NS}
3-5	25(27.17)	26(26)		
More than 5	3(3.26)	4(4)		
Total	92(100)	100(100)		
Work Mode				
Fixed (6 Hours a Day)	13(14.1)	14(14)		
Three shift rotation (8hours a day)	67(72.8)	74(74)	1.272	0.530 ^{NS}
More than 2 work mode	12(13.04)	12(12)		
Total	92(100)	100(100)		
Number of hours worked per day				
Less than 8	9(9.78)	12(12)		
8 and Above	83(90.21)	88(88)	6.085	0.048*
Total	92(100)	100(100)		
Standing (Hours/Day)				
0-4	5(5.43)	10(10)		
4-8	81(88)	84(84)	5.862	0.210 ^{NS}
>8	6(6.5)	6(6)		
Total	92(100)	100(100)		
Department Type				
Wards	36(39.1)	39(39)		
Intensive care units	56(60.9)	61(61)	0.008	0.928 ^{NS}
Total	92(100)	100(100)		
Job Title				
Full time nurses	80(87)	87(87)		
Part time nurses	1(1.1)	1(1)	0.089	0.956 ^{NS}
Administrative supervisor	11(11.9)	12(12)		
Total	92(100)	100(100)		
Body weight (kg)				
<45	1(1.08)	1(1)		
45-55	16(17.39)	18(18)		
55-65	37(40.2)	42(42)	3.543	0.471 ^{NS}
65-75	27(29.34)	27(27)		
>75	11(11.9)	12(12)		
Total	92(100)	100(100)		
Height (cms)				
<154	5(5.43)	6(6)		
155-159	17(18.470)	19(19)		
160-164	23(25)	25(25)		
165-169	28(30.43)	29(29)	3.268	0.659 ^{NS}
170-174	16(17.39)	17(17)		
>175	3(3.26)	4(4)		
Total	92(100)	100(100)		
Exercise Habits				
None	70(76.086)	72(72)		
2-3 Times a Week	8(8.69)	10(10)	14.327	0.0049**
Daily	14(15.2)	18(18)		
Total	92(100)	100(100)		

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ Non-significant ^{NS}

Table 4 depicts the association of demographic variables with work ability. The age ($X^2 = 25.55$, $p = 0.001$), years of

experience ($X^2 = 21.856$, $p = 0.001$), work mode ($X^2 = 19.403$, $p = 0.001$), and hours worked per day ($X^2 = 6.485$, $p = 0.011$)

were found to be significantly associated with work ability and revealed nurses aged between 21-30 years (84.84%), had 0-5 years of experience (84.8%), worked for more than 8 hours (93.9%), and had three shift rotation duty of 8hours

per day (83.3%) had higher work ability. The ($X^2= 3.148$, $=p 0.076$) work ability was not found to be significantly associated with 12-month prevalence of work-related musculoskeletal disorders.

Table 4: Association of demographic characteristics with work ability

Variables Characteristics	Work Ability		Total N (%)	X ²	P-Value
	Low Work ability (N %)	Higher work ability (N %)			
Age (Years)					
21-30	13 (38.23)	56 (84.848)	69 (69)		
31-40	16 (47.05)	10 (15.15)	26 (26)	25.55	0.001**
41-50	5 (14.7)	0 (0)	5 (5)		
Total	34 (100)	66 (100)	100 (100)		
Gender					
Male	8 (23.52)	20 (30.3)	28 (28)	0.511	0.475 ^{NS}
Female	26 (76.47)	46 (69.6)	72 (72)		
Total	34 (100)	66 (100)	100 (100)		
Years of experience					
0-5	14 (41.17)	56 (84.8)	70 (70)		
5-10	14 (41.17)	9 (13.6)	23 (23)	21.856	0.001*
More than 10	6 (17.64)	1 (1.51)	7 (7)		
Total	34 (100)	66 (100)	100 (100)		
Work mode					
Fixed	12 (35.29)	2 (3.03)	14 (14)		
More than two work mode	3 (8.82)	9 (13.6)	12 (12)	19.403	0.001**
Three shift rotation {8 hours a day}	19 (55.88)	55 (83.33)	74 (74)		
Total	34 (100)	66 (100)	100 (100)		
Hours worked per day					
Less than 8	8 (23.52)	4 (6.06)	12 (12)	6.485	0.011*
8 and above	26 (76.47)	62 (93.9)	88 (88)		
Total	34 (100)	66 (100)	100 (100)		
Standing hours per day					
0-4	4 (11.76)	3 (4.5)	7 (7)		
4-8	28 (82.35)	59 (89.39)	87 (87)	1.800	0.407 ^{NS}
>8	2 (5.88)	4 (6.06)	6 (6)		
Total	34 (100)	66 (100)	100 (100)		
Body weight (kg)					
<45	1 (2.9)	0 (0)	1 (1)		
45-55	6 (17.64)	12 (18.18)	18 (18)		
55-65	13 (38.23)	29 (43.9)	42 (42)	2.438	0.656 ^{NS}
65-75	9 (26.47)	18 (27.2)	27 (27)		
>75	5 (14.7)	7 (10.6)	12 (12)		
Total	34 (100)	66 (100)	100 (100)		
Height (cm)					
<154	2 (5.8)	4 (6.06)	6 (6)		
155-159	9 (26.47)	10 (15.15)	19 (19)		
160-164	8 (23.52)	17 (25.7)	25 (25)	2.959	0.706 ^{NS}
165-169	9 (26.4)	20 (30.3)	29 (29)		
170-174	4 (11.7)	13 (19.6)	17 (17)		
>175	2 (5.8)	2 (3.03)	4 (4)		
Total	34 (100)	66 (100)	100 (100)		
Exercise Habit					
None	28 (82.35)	44 (66.6)	72 (72)		
2-3 times a week	2 (5.8)	8 (12.12)	10 (10)	2.753	0.252 ^{NS}
Daily	4 (11.76)	14 (21.2)	18 (18)		
Total	34 (100)	66 (100)	100 (100)		

* $p < 0.005$ ** $p < 0.01$ *** $p < 0.001$ Non-Significant ^{NS}

Table 5 depicts the data for the coping strategies adopted by nurses to prevent MSDs. The majority (92%) of participants under study responded that they got someone to help them to handle a heavy patient. 81% modified their nursing

procedure and those who modified patients' position was 78%. Only a few (35%) warmed up and stretched before performing their nursing duties and only (30%) paused regularly to stretch and change posture.

Table 5: Distribution of coping Strategies adopted by nurses under study

What are the strategies adopted by you to prevent your pain (N=100)	Yes (N %)
I get someone to help me handle a heavy patient	92
I modify my nursing procedure to avoid stressing an injury	81
I modify the patient's position/My position	78
I stop a treatment if it causes or aggravate my discomfort	49
I warm up and stretch before performing my nursing duties	35
I select techniques/procedures that will not aggravate or provoke my discomfort	73
I adjust plinth/bed heights so i can stretch and change posture	72
I use different parts of my body for ease in administering my nursing procedure	74
I pause regularly so i can stretch and change posture	30

Discussion

In this study we documented the prevalence of WMSDs among nurses. The response rate for this study was 100%, which is similar to that found by Jin *et al.*, in 2011. The possible reason being that nurses were well informed about the MSDs prior to the conduct of the study. The 12 month prevalence of MSDs among was found to be higher which corroboration is with the studies performed on the nurses of Lagos state (94.4%), Japan (91.9%), Maharashtra (89.1%) (Akodu *et al.*, 2019; Kondo *et al.*, 2003; Anap *et al.*, 2017) [2, 11, 3] and prevalence was higher than that of Pakistan (31.5%); USA (35.1-47%); Thailand (47.8%) (Rathore *et al.*, 2017; Trinkoff *et al.*, 2002; Thinkhamrop *et al.*, 2017) [10, 15, 13]. These differences may be attributed to ethno cultural variations, variations in workloads, use of lifting shifting devices, and availability of nursing aids as a supporting staff. This study revealed that there were more female than male nurses who experienced WMSDs which is similar to the previous studies. The nurses aged between 21–30 years had a higher prevalence rate of MSDs and least in the age group of 41-50 years. Previous studies reported that the nurses aged 26-30 years had higher prevalence of MSDs (Ajibade *et al.*, 2013; Attar *et al.*, 2014) [1, 4]. The reason might be because younger nurses have less refined nursing skills and less precise care actions, resulting in higher risk of musculoskeletal pain (Lin *et al.*, 2020) [8].

The present study revealed that most of the nurses experienced initial symptoms of MSDs in the first five years of their clinical practice and this result was in line with the results of Tinubu *et al.*, 2010 [14]. According to the present study, working time for more than 8 hours is statistically significant for developing MSDs. There is a significant association of exercise habits with the development of WMSDs and the study revealed that the prevalence was higher among the nurses who were not having habit of doing exercise. This study observed no significant association of age, gender, years of experience, standing hours, body weight and height with WMSDs which is similar with the findings of Munabi *et al.*, 2014 [9]. In a similar context Akodu *et al.*, 2019 [2] identified no significant association of demographic characteristics with development of WMSDs. Concerning the 12-month prevalence of MSDs, the present study reported that most of the nurses had neck pain followed by lower back pain, shoulder pain, upper back pain, knee pain, wrist pain, wrist/hand pain, hip/thigh pain, ankle/foot pain, elbow pain. Like the study, the higher prevalence of neck pain, lower back and shoulder pain was reported in previous studies (Lee *et al.*, 2013; Lin *et al.*, 2020) [7, 8]. Most of the studies reported low back as the most affected region followed by the neck (Tinubu *et al.*, 2010; Moreira *et al.*, 2014; Rathore *et al.*, 2017) [14, 18, 10]. It

might be due to their excessive lifting of the patients and higher workloads and to our population. In addition, the nurses had physical burden all the time, affecting prolonged static postures, and upper extremity strain.

Job related risk factors

Some of the previous studies reported that working in the same positions for prolonged periods, lifting or transferring dependent patients, and treating an excessive number of patients per day were the most perceived job risk factors precipitating WMSDs among the nurses (Tinubu *et al.*, 2010) [14]. Similarly, the current study also highlights working in the same position for prolonged period, inadequate breaks during the working hours, work scheduling such as overtime and irregular shifts, and bending the back in an awkward way as the most perceived risk factors precipitating WMSDs. Overtime, irregular length of the day, and inadequate breaks as the most perceived factors leading to WMSDs among nurses. 3" Inadequate breaks, work scheduling such as overtime and irregular shifts, working near or at physical limits, and performing manual orthopedics techniques were the risk factors closely related to the development of WMSDs. In the previous study, Wang *et al.* in 2011 revealed that the rest periods of 15 min could assure the recovery of the erector muscle of the spine and heart rate into the normal range. Therefore, adequate rest intervals are recommended for prevention of MSDs in nurses.

Work Ability of the nurses

The age, years of experience, work mode, working hours per day, and exercise habits are the variables that influence the WAI in this study, 46% of the WAI score obtained (>37 points) of the subjects. The total WAI score found in this study was parallel to the former study on the nurses of Lagos state (47.40%). (Akodu *et al.*, 2019) [2] The present study revealed that most of the subjects perceived their work to be both physically and psychologically demanding and only few perceived it to be only psychologically demanding. Similar results were concluded in the study conducted on the nurses of Lagos state (Akodu *et al.*, 2019) [2]. Furthermore, the outcomes of this study concluded that around one third of the respondents had very good work ability. On further analysis we found that there was no significant relationship of gender, department type, standing hours per day, body weight, height, exercise habits with work ability. In this study, a significant association between age, years of experience, work mode, hours worked per day, and work ability was observed. The work ability of the nurses was observed to decrease with the increase in age and years of experience. None of the subjects above 40 years of

age and more than 10 years of experience had excellent work ability. On the contrary, the study conducted on the nurses of Lagos state concluded that age and years of experience did not influence work ability. The work ability was observed to be excellent in those who worked for more than 8 hours a day, it might be due to their excellent work ability because of which they were able to do work for longer durations.

Coping strategies adopted by the nurses

The study revealed that getting help from someone to handle heavy patients, modifying nursing procedures to avoid stressing an injury, modifying patient's position, and using different parts of body in case of administering nursing procedure were the major coping strategies adopted by the nurses. These coping strategies seems similar to previous findings which concluded that getting assistance, modifying the nursing procedures modifying patient's position as the top three coping strategies used to reduce the risk of WMSDs (Akodu *et al.*, 2019; Tinubu *et al.*, in 2010) [2, 14]. Inadequate warmup and lack of adequate pauses may some of other factors lead to MSDs. This lack of warmup and pauses may be due to an overburdened health care system or lack of awareness for proper warmup and brakes for prevention of MSDs. Thus, appropriate preventive programs need to be organized that can contribute to the work ability of nurses.

Conclusion

The prevalence of musculoskeletal disorders among nurses was more in females than males. Neck and lower back were the most affected body parts and simultaneously at higher risk to develop MSDs. So, the nurses should be educated about the various risk factors and appropriate training should be given for prevention of WMSDs.

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