

Prevalence and Factors Associated with Occupational Musculoskeletal Disorders among the Nurses of a Tertiary Care Center in Nepal

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ABSTRACT

Introduction: Musculoskeletal disorders (MSDs) are injuries or pain in the human musculoskeletal system which could lead to temporary or permanent impairments. The nature of nursing jobs makes nurses vulnerable to MSDs. This study aimed to assess the prevalence and potential risk factors associated with MSDs among nurses.

Methods: In between March to June 2021, a cross-sectional study was conducted among 165 nurses using self-administered questionnaires. A standardized Nordic Questionnaire was used to measure MSDs. Pearson's chi-square test and binary logistic regression at a 5% level of significance were performed to identify factors associated with upper extremities and spinal musculoskeletal disorders (UMSD) and lower extremities musculoskeletal disorders (LMSD). Variables associated with UMSD and LMSD in bivariate analysis were subjected to multiple logistic regression.

Results: The prevalence of UMSD and LMSD experienced by nurses was 86.1% (95% CI: 79.4%-90.9%) and 66.1% (95% CI: 58.9%-74.3%), respectively. Among several factors, working in same position for long periods (AOR: 4.16, 95% CI: 1.2-13.4), not receiving training in injury prevention programs (AOR: 3.15, 95% CI: 1.0-9.2), not enough rest breaks during the day (AOR: 4.65, 95% CI: 1.3-15.9) and moderate to higher job stress (AOR: 3.62, 95% CI: 1.2-10.8) were found to be significantly associated with UMSD. Not having enough rest breaks during the day (AOR: 2.19, 95% CI: 1.0-4.7) was significantly associated with LMSD.

Conclusion: Higher prevalence of MSDs among nurses is a serious concern that threatens individual health as well as the overall healthcare system. Sensitization and capacity enhancement programs on the issue could prevent MSDs among nurses.

Keywords: Ergonomics, Musculoskeletal disorder, Nepal, Nurses Occupational health, Prevalence, Risk factors

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Introduction

Musculoskeletal disorders (MSDs) are injuries or pain in the human musculoskeletal system such as muscles, nerves, tendons, joints, and structures supporting limbs, neck and back resulted due to sudden or sustained exposure to stressors such as external forces, repetitive motions, vibrations, and awkward positions.¹ MSDs are the most serious

public health hazard, which could result in individuals' temporary or permanent impairment.² Globally, MSDs have become a leading cause of disability.^{3,4} The healthcare sector is known to have a significant risk of MSDs.⁵⁻⁷

Healthcare personnel such as physicians, nurses, and paramedics are exposed to repeated stress

and frequent strains while performing daily patient care activities which can lead to chronic sickness and musculoskeletal problems.^{8, 9} Even among healthcare professionals, nurses are suggested to have a higher risk of MSDs.¹⁰⁻¹² The nature of the nursing job requires activities such as manual lifting heavy loads and patients, bending over patients, transporting patients from bed to the floor, pulling and pushing equipment, and sometimes working in confined spaces and awkward postures making them more prone to injury.^{9, 13, 14} The presence of MSDs not only affects the quality of life of the nurses but also could lead to increased work resistance, absenteeism, early retirement, transfer to another job, and even disability which ultimately results in financial hardship on an individual as well as to the family and society in general.¹⁵⁻¹⁷

Studies throughout the world suggest that the 12-month prevalence of MSDs in the nursing population varies between 21.0% and 91.9%.^{6,9,18-20} In South Asia, this prevalence lies between 21.0% and 89.2%.^{19,21,22} In Nepal, limited studies have assessed musculoskeletal pain or disorders in the general population while few have targeted healthcare professionals focusing only on lower back pain. From these limited studies, the prevalence of lower back pain among nurses was observed to be around 60.0%-78.0%.²⁴⁻²⁶ However, there is no evidence illustrating the overall rate of MSDs experienced by nurses in seven days and/or twelve months duration as well as its impact and determinants in these vulnerable populations. The occurrence of MSDs in the nursing population could impact the overall health system of the nation as nurses are one of the major health workforces. Identifying these risk factors is critical for understanding the causative linkages of these disorders and implementing the most effective preventative measures in the workplace. For this reason, this study aimed to measure the prevalence and potential risk factors associated with musculoskeletal disorders among nurses working in a tertiary care center in Nepal.

Methods

The cross-sectional study was conducted among the nurses working at Dhulikhel Hospital between March and June 2021. Dhulikhel Hospital situated in Dhulikhel Municipality of Kavre district is one of the biggest tertiary hospitals in Nepal. The hospital provides a wide range of preventive and curative services with a total of 336 nurses working actively in its 22 departments.

The sample size was calculated using the Cochran formula for estimation of proportion, $n = z^2pq / d^2$, using a past prevalence of MSD among

nurses at a 95% confidence interval (CI) and at a 5% margin of error. The MSD prevalence of 89.1% from a past study was taken for the estimation of sample size.²³ The initial sample size was estimated at 149 nurses which was optimized to 165 after adjusting the 10% non-response rate. Nurses were selected randomly using a systematic random sampling technique. For this, every k^{th} ($336/149 = 2.25 \approx 2.25$) i.e. 3rd nurse from the provided sample frame was approached to be enrolled as a participant. The nurses who reported a prior history of medically diagnosed musculoskeletal problems before starting their job and nurses who were pregnant or had a child under two years of age were excluded from the study to control confounding and to assure the observed MSD is associated with the nature of their job.

A self-administered questionnaire was used for data collection. The questionnaire used for data collection consisted of four sections including questions related to the socio-demographic profiles of the nurses, perceived stress scale,²⁷ to measure job stress, questions related to ergonomic factors, and Standardized Nordic Questionnaire (SNQ)²⁸ to measure musculoskeletal disorders.²⁹ SNQ consists of diagrammatic marking of nine anatomical regions for precision. It also reports whether the discomfort has prevented the participants from doing their normal work and if they have consulted a physician during the last 12 months for their condition.²⁸ The Nursing In-charge arranged a private place where the selected nurses were invited for orientation. The questionnaire was distributed and explained to the nurses, and their informed consent was acquired during the orientation. The nurses were allowed to fill out the questionnaire at their time of convenience.

The anthropometric measurements (height and weight) of the selected nurses were also taken at the time of distribution of the questionnaire. It was ensured that the complete response for each of the questions was acquired from the participants before collecting all the questionnaires. Thus, a 100% response rate was achieved from 165 nurses.

The collected data were entered and analyzed through Statistical Package for Social Sciences version 22. The data were summarized in terms of frequency and proportion. Pearson's chi-square tests and binary logistic regression were performed to identify the factors associated with UMSD and LMSD at a 5% level of significance. The variables which were significant in bivariate analysis were subjected to multivariate analysis to assess the adjusted odds ratio. Crude odds ratio

(COR) has also been reported along with the adjusted odds ratio for those variables which were significant in bivariate analysis for each model. For the multivariate analysis, the Variance Inflation Factor (VIF) test was performed to check multi-collinearity among independent variables.^{30,31} The Hosmer-Lemeshow test (HL test) for goodness-of-fit was performed and Nagelkerke R square was reported.

The study was ethically approved by the Institutional Review Committee of Manmohan Memorial Institute of Health Science (Registration no: MMIHS-IR 580) and the Institutional Review Committee of Kathmandu University School of

Medical Sciences (Approval No: 33/2020). Written informed consent was obtained from all the participants before conducting the study and all the information was kept confidential.

Results

The prevalence of UMSD and LMSD experienced by the nurses in the past 12 months was found to be 86.1% and 66.1% respectively. Likewise, in the context of MSD experienced by nurses in the past week, 53.9% reported having UMSD, and 33.3% reported having LMSD. Lower back pain was the predominant MSD in the last 12 months at 75.8% followed by neck pain and upper back pain at 60.0% and 51.5% respectively (Table 1).

Table 1: Prevalence of musculoskeletal disorders (n=165)

Body region	MSD in 12 months		MSD in 7 days	
	n (%)	95% CI	n (%)	95% CI
Neck				
Yes	99(60.0)	52.8-67.3	41(24.8)	20.0-31.4
No	66 (40.0)	32.7-47.2	124(75.2)	68.6-80.0
Shoulder				
Yes	75(45.5)	38.3-54.4	31(18.8)	12.2-26.1
No	90(54.5)	45.6-61.7	134(81.2)	73.9-87.8
Elbows				
Yes	12(7.3)	4.2-12.0	4(2.4)	0.6-4.8
No	153(92.7)	88.0-95.8	161(97.6)	95.2-99.4
Wrists/hands				
Yes	71(43.0)	36.4-50.3	27(16.4)	11.5-21.2
No	94(57.0)	49.7-63.6	138(83.6)	78.8-88.5
Upper back				
Yes	85(51.5)	44.9-59.8	37(22.4)	15.9-29.1
No	80(48.5)	40.2-55.1	128(77.6)	70.9-84.1
Lower back				
Yes	125(75.8)	68.6-81.8	69(41.8)	33.9-49.6
No	40(24.2)	18.2-31.4	96(58.2)	50.4-66.1
Hips/Thighs				
Yes	58(35.2)	27.5-42.9	26(15.8)	10.4-21.7
No	107(64.8)	57.1-72.5	139(84.2)	78.3-89.6
Knees				
Yes	64(38.8)	31.5-47.9	30(18.2)	13.3-24.8
No	101(61.2)	52.1-68.5	135 (81.8)	75.2-86.7
Ankles/Feet				
Yes	61(37.0)	29.2-44.2	32(19.4)	13.9-26.6
No	104(63.0)	55.8-70.8	133(80.6)	73.4-86.1
Overall UMSD				
Yes	142(86.1)	79.4-90.9	89(53.9)	45.6-61.7
No	23(13.9)	9.1-20.6	76(46.1)	38.3-54.4
Overall LMSD				
Yes	109(66.1)	58.9-74.3	55(33.3)	26.1-41.1
No	56(33.9)	25.7-41.1	110(66.7)	58.9-73.9

Out of the total nurses who experienced low back pain in the past 12 months, a majority (62.4%) reported the pain has affected their daily activities, whereas, only less than a quarter (20.0%) consulted physicians for treatment. Likewise, only 16.1% of the nurses with chronic neck pain were consulting a physician for their condition while almost half (44.4%) reported that chronic neck pain has impacted their daily

activities (Table 2).

In bivariate analysis, general characteristics of the participants such as age, marital status, education, and BMI were not found to be significantly associated with UMSD. However, the participant's age was found to be significantly associated with LMSD at a 5% level of significance ($p < 0.05$) (Table 3).

Table 2: Impact on daily activities due to MSDs in 12 months and physician consultation (n=165)

Body regions	Limit normal activities		Consulted Physician	
	Yes (%)	No (%)	Yes (%)	No (%)
Neck (n=99)	44 (44.4)	55 (55.6)	16 (16.1)	83 (83.9)
Shoulder (n=75)	34 (45.3)	41 (54.7)	9 (12.0)	66 (88.0)
Elbows (n=12)	6 (50.0)	6 (50.0)	0 (0.0%)	12 (100.0)
Wrists/Hands (n=71)	32 (45.1)	39 (54.9)	5 (7.0)	66 (93.0)
Upper back (n=85)	48 (56.5)	37 (43.5)	11 (13.0)	74 (87.0)
Low back (n=125)	78 (62.4)	47 (37.6)	25 (20.0)	100 (80.0)
Hips/thighs (n=58)	33 (56.9)	25(43.1)	6 (10.3)	52 (89.7)
Knees (n=64)	31 (48.4)	33 (51.6)	11 (17.2)	53 (82.8)
Ankles/Feet (n=61)	44 (44.4)	55 (55.6)	16 (16.1)	83 (83.9)

Table 3: Association between general characteristics with UMSD and LMSD (n=165)

Variable	UMSD		χ^2 (p-value)	LMSD		χ^2 (p-value)
	Yes (%)	No (%)		Yes (%)	No (%)	
Age(years)						
<25	58(90.6)	6(9.4)	3.048 (0.218)	48(75.0)	16(25.0)	9.891 (0.007)
25 -30	65(85.5)	11(14.5)		51(67.1)	25(32.9)	
>30	19(76.0)	6(24.0)		10(40.0)	15(60.0)	
Marital status						
Married	62(86.1)	10(13.9)	0.000 (0.987)	42(58.3)	30(41.7)	3.402 (0.065)
Single	80(86.0)	13(14.0)		67(72.0)	26(28.0)	
Education						
PCL nursing	124(86.1)	20(13.9)	0.002 (0.961)	96(66.7)	48(33.3)	0.185 (0.667)
BSc nursing	18(85.7)	3(14.3)		13(61.9)	8(38.1)	
BMI						
Normal	93(86.1)	15(13.9)	0.413 (0.813)	76(70.4)	32(29.6)	4.575 (0.102)
Underweight	13(81.2)	3(18.8)		7(43.8)	9(56.2)	
Overweight/Obese	36(87.8)	5(12.2)		26(63.4)	15(36.6)	

In the context of work-related factors, rest breaks during the day and work schedules were found to be associated with both UMSD and LMSD at $p < 0.05$. Moreover, training in injury prevention, treating a large number of patients in a day, and job stress were found to have a statistically significant relationship with UMSD. Similarly, participants' work experience was found to be associated with LMSD (Table 4).

In context of ergonomic factors, working in awkward or cramped positions, carrying/lifting/moving heavy materials or equipment, performing same task repeatedly, and working in same position for long periods were found to be associated with UMSD at $p < 0.05$. However, no association was found between LMSD and ergonomic factors (Table 5).

Table 4: Association between work-related factors with UMSD and LMSD (n=165)

Variable	UMSD		χ^2 (p-value)	LMSD		χ^2 (p-value)
	Yes (%)	No (%)		Yes (%)	No (%)	
Work experience						
< 5 years	91(85.0)	16(15.0)	0.261	79(73.8)	28(26.2)	8.199
≥ 5 years	51(87.9)	7(12.1)	(0.610)	30(51.7)	28(48.3)	(0.004)
Work shift						
Rotation	121(85.8)	20(14.2)	0.049	97(68.8)	44(31.2)	3.231
Fixed	21(87.5)	3(12.5)	(0.826)	12(50.0)	12(50.0)	(0.072)
Training in injury prevention						
Yes	37(74.0)	13(26.0)	8.699	29(58.0)	21(42.0)	2.079
No	105(91.3)	10(8.7)	(0.003)	80(69.6)	35(30.4)	(0.149)
Treat large number of patients in a day						
No	26(74.3)	9(25.7)	5.134	20(57.1)	15(42.9)	1.576
Yes	116(89.2)	14(10.8)	(0.023)	89(68.5)	41(31.5)	(0.209)
Rest breaks during the day^a						
Enough	31(72.1)	12(27.9)	9.458	21(48.8)	22(51.2)	7.695
Not enough	111(91.0)	11(9.0)	(0.002)	88(72.1)	34(27.9)	(0.006)
Assist patients at gait activities						
Rarely	47(82.5)	10(17.5)	0.943	37(64.9)	20(35.1)	0.051
Frequently	95(88.0)	13(12.0)	(0.331)	72(66.7)	36(33.3)	(0.821)
Work at or near your physical limits						
Rarely	57(85.1)	10(14.9)	0.091	43(64.2)	24(35.8)	0.178
Frequently	85(86.7)	13(13.3)	(0.762)	66(67.3)	32(32.7)	(0.673)
Work with confused/agitated patients						
Rarely	34(79.1)	9(20.9)	2.369	24(55.8)	19(44.2)	2.723
Frequently	108(88.5)	14(11.5)	(0.124)	85(69.7)	37(30.3)	(0.099)
Work schedule^b						
Normal	18(72.0)	7(28.0)	4.856	12(48.0)	13(52.0)	4.287
Overtime	124(88.6)	16(11.4)	(0.028)	97(69.3)	43(30.7)	(0.038)
Job Satisfaction						
Satisfied	76(81.7)	17(18.3)	3.347	56(60.2)	37(39.8)	3.248
Dissatisfied	66(91.7)	6(8.3)	(0.067)	53(73.6)	19(26.4)	(0.072)
Job Stress						
Low stress	44(75.9)	14(24.1)	7.755	35(60.3)	23(39.7)	1.303
Moderate/High Stress	98(91.6)	9(91.6)	(0.005)	74(69.2)	33(30.8)	(0.254)

^aRest breaks during the day: Enough ≥30 minutes, Not enough < 30 minutes

^bWork schedule: Normal ≤8 hours a day, Overtime >8 hours a day

Table 5: Association between Ergonomic Factors with UMSD and LMSD (n=165)

Variable	UMSD		χ^2 (p-value)	LMSD		χ^2 (p-value)
	Yes (%)	No (%)		Yes (%)	No (%)	
Work in awkward or cramped positions						
Rarely	53(79.1)	14(20.9)	4.550 (0.033)	41(61.2)	26(38.8)	1.192 (0.275)
Frequently	89(90.8)	9(9.2)		68(69.4)	30(30.6)	
Lift or transfer dependent patients						
Rarely	53(81.5)	12(18.5)	1.828 (0.176)	41(63.1)	24(36.9)	0.426 (0.514)
Frequently	89(89.0)	11(11.0)		68(68.0)	32(32.0)	
Carry, lift, or move heavy materials or equipment						
Rarely	32(74.4)	11(25.6)	6.571 (0.010)	26(60.5)	17(39.5)	0.812 (0.367)
Frequently	110(90.2)	12(9.8)		83(68.0)	39(32.0)	
Repeated task						
Rarely	19(73.1)	7(26.9)	4.337 (0.037)	13(50.0)	13(50.0)	3.551 (0.060)
Frequently	123(88.5)	16(11.5)		96(69.1)	43(30.9)	
Perform manual orthopedic techniques						
Rarely	38(79.2)	10(20.8)	2.682 (0.102)	29(60.4)	19(39.6)	0.962 (0.327)
Frequently	104(88.9)	13(11.1)		80(68.4)	37(31.6)	
Work in the same position for long periods						
Rarely	45(77.6)	13(22.4)	5.354 (0.021)	39(67.2)	19(32.8)	0.056 (0.814)
Frequently	97(90.7)	10(9.3)		70(65.4)	37(34.6)	

For multivariate analysis, the Variance Inflation Factor (VIF) test among the independent variables was performed where the highest reported VIF was 1.793 so there was no issue of multicollinearity.

Nurses reporting moderate to higher job stress were found to have three times more odds (AOR: 3.621, 95% CI: 1.2-10.8) of experiencing UMSD as compared to nurses who reported lower job stress. Likewise, nurses reporting not having enough rest breaks had a four-fold increase in odds of UMSD (AOR: 4.657, 95% CI: 1.3-15.9) as compared to nurses who reported having enough rest breaks. The odds of UMSD were found 4.16 times higher

(AOR: 4.163, 95% CI: 1.2-13.4) among nurses who reported working in the same position for a long duration of time. Similarly, nurses who did not receive training in injury prevention were thrice more likely to have UMSDs (AOR: 3.150, 95% CI: 1.0-9.2) in comparison to those who had received training. (Table 6).

In the context of lower extremities musculoskeletal disorders, not having enough rest breaks during the day was found to increase the odds of LMSD among nurses by two folds (AOR: 2.193, 95% CI: 1.0-4.7) as compared to nurses reporting enough rest breaks while adjusting with all the associated factors (Table 7).

Table 6: Multivariate analysis for UMSD among the nurses (n=165)

Variables	COR	95%CI	p-value	AOR	95%CI	p-value
Work in awkward/ cramped positions						
Rarely	Ref			Ref		
Frequently	2.612	1.0-6.4	0.037	1.399	0.4-4.6	0.582
Carry/lift/ move heavy materials/ equipment						
Rarely	Ref			Ref		
Frequently	3.151	1.2-7.8	0.013	2.276	0.7-6.6	0.132
Repeated task						
Rarely	Ref			Ref		
Frequently	2.382	1.0-7.7	0.044	1.557	0.3-6.2	0.530
Work in the same position for long periods						
Rarely	Ref			Ref		
Frequently	2.802	1.1-6.8	0.024	4.163	1.2-13.4	0.017
Training in injury prevention						
Yes	Ref			Ref		
No	3.689	1.4-9.1	0.005	3.150	1.0-9.2	0.036
Treat large number of patients in a day						
Yes	2.868	1.1-7.3	0.028	1.155	0.3-3.8	0.815
No	Ref			Ref		
Work schedule^a						
Normal	Ref			Ref		
Overtime	3.014	1.0-8.3	0.033	0.718	0.1-2.7	0.632
Rest breaks during the day^b						
Enough	Ref			Ref		
Not enough	3.906	1.5-9.7	0.003	4.657	1.3-15.9	0.014
Job Stress						
Low	Ref			Ref		
Moderate/High	3.465	1.3-8.6	0.007	3.621	1.2-10.8	0.022

Nagelkerker R Square 0.332; Hosmer Lemeshow Chi-square 5.449, p=0.709

CI: confidence interval, COR: Crude odds ratio, AOR: Adjusted odds ratio

Table 7: Multivariate analysis for LMSD among the nurses (n=165)

Variables	COR	95%CI	p-value	AOR	95%CI	p-value
Age						
<25	4.500	1.6-11.9	0.003	2.100	0.6-7.1	0.234
25-30	3.060	1.2-7.7	0.019	1.943	0.6-5.4	0.210
>30	Ref					
Work experience						
<5 years	2.633	1.3-5.1	0.005	1.993	0.8-4.6	0.108
≥5 years	Ref			Ref		
Work schedule^a						
Normal	Ref			Ref		
Overtime	2.444	1.0-5.7	0.042	2.007	0.7-5.0	0.140
Rest breaks during the day^b						
Enough	Ref			Ref		
Not enough	2.711	1.3-5.5	0.006	2.193	1.0-4.7	0.048

Nagelkerker R Square 0.149; Hosmer Lemeshow Chi-square 6.411, p=0.379

CI: confidence interval, COR: Crude odds ratio, AOR: Adjusted odds ratio

Discussions

A higher rate of UMSD and LMSD were observed among the nurses at 86.1% and 66.1% respectively. The finding is in line with the studies from India where the 12 months MSD among nurses was found to range between 81% to 89.2%.^{19,20} Similarly, a higher rate of MSDs was observed among nurses of both developing as well as developed nations such as Nigeria, Zimbabwe, Vietnam, and China where more than three-fourths of the nurses were found to have experienced any form of MSD in the past 12 months.^{9, 32-34} Furthermore, lower back pain, neck pain and upper back pain were the major forms of MSDs among nurses. The past studies from two of the major tertiary hospitals of Nepal; Sahid Gangal National Heart Centre and Tribhuvan University Teaching Hospital revealed that 78% and 64.5% of the nurses experienced lower back pain.^{24,25}

Despite a higher prevalence of these disorders among the nurses which has affected their daily activities, only a few of them sought treatment. A similar observation was seen in the study from Bangladesh where out of all nurses who experienced lower back pain only 36.2% reported seeking medical care for their condition.³⁵ This indicates many of the nurses are troubled by musculoskeletal pain and discomfort which has heavily impacted their work efficiency but very few are seeking proper medical attention. The reason behind this poor health-seeking behavior among healthcare professionals needs to be further studied. These findings point to a significant and under-researched occupational health problem among Nepalese nurses.

The ergonomic factors such as working in awkward/cramped positions, carrying heavy material and/or equipment, performing repeated actions, and working in the same positions for a long period were found to be associated with UMSDs in bivariate analysis. This is in line with the findings from past studies suggesting that working in the same position for a long time duration has been perceived to be a major contributor to work-related MSDs among the nursing population.^{9,36,37} Findings from past studies showed that working in awkward/cramped positions is significantly associated with MSDs among nurses.^{34,38} It was also noted that nurses not receiving enough rest during the day were four times more likely to experience UMSD and twice times more likely to experience LMSD as compared to nurses having enough rest. Similar to this finding, rest breaks were found to be a protective factor for MSDs in

the studies from Saudi Arabia and China.^{34, 38} The positive association between rest breaks and MSDs has been observed in other occupations as well. For instance, a randomized control trial performed among agriculture workers noted the nature of rest breaks could significantly result in the alleviation of musculoskeletal pain in the neck, shoulder, back, and upper limbs.³⁹ The continuous exertion of force and repeated movements could lead to inflammation and pain in body tissues resulting in reduced motor function, or muscle/bone discomfort and inducing risk of injuries. Thus, proper rest breaks during work should be ensured among nurses to prevent them from such discomforts and assure their efficiency. Training in injury prevention can be another crucial intervention to prevent MSD as the nurses who did not receive training in injury prevention were found to have three-fold higher odds of MSD. Similar observations were made by the study from Zimbabwe where ergonomic training was significantly associated with work-related musculoskeletal disorders among nurses ($p<0.05$).³³ In line with current findings, studies suggest education and training on ergonomics and MSDs could be an effective intervention for MSD prevention among nurses.⁴⁰⁻⁴² This finding emphasizes the importance of ergonomic training and MSD education. Hospitals should provide training for their employees to improve their injury prevention abilities and thereby lower the risk of MSDs. Thus, providing proper training and educational programs on MSDs targeting nurses and other health professionals might be a crucial strategy to reduce the risk of MSD in this vital health workforce.

The nurses who reported experiencing moderate or high stress were thrice more at odds of experiencing UMSD as compared to nurses with a low level of stress. This is in line with past studies from China, Thailand, Uganda and Canada where a significant association between mental stress and musculoskeletal discomfort was observed among the nurses.^{14,21,34,43} Tension and stress cause muscle strain and hardness. Furthermore, anxious nurses are more likely to notice any form of discomfort that occurs in their body as a result of attending to negative thoughts when they self-report their MSDs.²¹ This finding suggests that hospitals should arrange recreational activities to reduce stress and anxiety among nurses to reduce the risk of experiencing MSDs.

Despite being one of the few studies examining the prevalence and risk factors for MSDs among nursing population this study is not free from its

limitations. The information of MSDs is self-reported by the participants rather than medical diagnosis thus there are some chances of reporting bias though the study population was nurses. The study was conducted in one of the major tertiary hospitals of Nepal which might not provide a complete representation of all Nepalese nurses working in primary healthcare centers and/or small health units. However, the nurses selected in this study were working at different departments and wards of Dhulikhel Hospital so the diversity of the selected participants aids in the generalizability of the results. The findings of this study are expected to provide fruitful insights to the concerned stakeholders to focus on occupational health.

Conclusion

There is a high prevalence of MSDs among nurses which could impact the overall healthcare system. Working in the same position for a long duration, not receiving training in injury prevention, not having enough rest breaks, and job stress were the major factors found to be associated factors with musculoskeletal disorders among nurses. Thus, providing healthcare professionals with training related to injury prevention and educating them about ergonomics and posture could reduce their risk of MSDs.

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