



Research

Prevalence and associated factors of musculoskeletal pain among nurses in a tertiary care hospital in Sri Lanka: A cross-sectional study

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ABSTRACT

Introduction: Nurses often experience work-related musculoskeletal pain. This study aims to determine the prevalence, associated factors, and severity of musculoskeletal pain among nurses working at a tertiary care hospital in Sri Lanka. The findings will help to develop strategies to promote occupational safety among nurses.

Methodology: This descriptive, cross-sectional study, conducted over two months from the beginning of May to the end of June 2024, involved 186 registered nurses selected from 21 units using a proportionate stratified random sample at the National Hospital, Kandy, Sri Lanka. A structured, validated, self-administered questionnaire, including the Nordic Musculoskeletal Questionnaire, was used. Significant associations were established using Chi-square tests, t-tests, binary logistic regression, and odds ratios with 95% confidence intervals, with $p < 0.05$ set as the level of significance.

Results: The results revealed that 87.1% of nurses experienced musculoskeletal pain, with the most prevalent sites being the lower back (74.2%) and neck (70.4%). Pain intensity was categorised as mild (22.6%), moderate (75.3%), or severe (2.2%). Significant workplace risk factors included working in the squatting or kneeling position for extended periods (OR = 2.51, 95% CI: 1.17–5.39, $p = 0.018$), and slipping while carrying loads (OR = 3.57, 95% CI: 1.48–8.59, $p = 0.005$). Morning fatigue was also identified as a significant impact of MSP, while job satisfaction demonstrated no association with MSP.

Conclusion: Musculoskeletal pain is highly prevalent among the nurses studied, adversely affecting both their work performance and quality of life. The identified risk factors can be modified through the implementation of standard ergonomic adjustments and workplace adaptations. The generalisability of the findings to the nursing workforce of Sri Lanka requires further investigation through larger, multi-centre studies at the national level.

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Introduction

Musculoskeletal (MSK) disorders are a significant occupational health issue worldwide, particularly among healthcare workers. Nurses are especially at risk due to the physical demands of their role. Musculoskeletal discomfort can affect multiple areas of the body, including the neck, back, shoulders, and lower limbs, often leading to reduced working capacity, pain, and a decreased quality of life.^{1,2}

Awkward postures, heavy lifting, repetitive motions, prolonged standing, and inadequate ergonomic support are among the risk factors for occupational musculoskeletal pain.^{3,4} Musculoskeletal pain significantly affects nurses' well-being, work-related contentment, and productivity, while increasing absenteeism and medical expenses.⁵

Occupational safety and health is a neglected area in Sri Lanka. A national policy document was created for the first time by the Ministry of Health in 2014.⁶ However, there has been no tangible change in occupational health policies across industries, including healthcare institutions under the Ministry of Health.

In rheumatology clinics across the country, patients are frequently identified as having soft-tissue rheumatological conditions directly related to their occupation. Nurses and healthcare attendants are frequent visitors to clinics.

The prevalence, severity, and associated risk factors of musculoskeletal pain (MSP) may vary depending on socio-cultural context, workload, and work demands, all of which are unique to a given population. Sri Lankan healthcare workers face an excessive workload and demand due to an inadequate workforce relative to the population they serve. According to World Bank/WHO data from 2021, Sri Lanka has 2.44 nurses per 1000 population, while WHO recommends an aggregate density of 4.45 per 1000 population.⁷ In high-demand, 24-hour wards in Sri Lanka, the nurse-to-patient ratio is below the internationally accepted standards.⁸

However, published research on the prevalence of MSP among healthcare workers in Sri Lanka, its severity, factors affecting severity, and its impact on work and quality of life is limited. This study aimed to advance work in this unexplored area by assessing the magnitude of the problem and establishing grassroots-level data.

We studied the occurrence of MSK pain among a group of nurses sampled from the National Hospital, Kandy, Sri Lanka, using a questionnaire based on the internationally validated Nordic Questionnaire.⁹ This is a tool developed to assess MSK pain, particularly in occupational health and ergonomics.

Methods

Registered nurses employed at the National Hospital, Kandy, Sri Lanka, at the time of the study who had been on active duty for 6 months or longer were considered eligible to participate. Nurses who were pregnant or had a diagnosis of inflammatory arthritis were excluded from the study because of the high risk of confounding factors for MSK pain. Sample size was calculated using Cochran's formula with finite population correction,¹⁰ assuming the population size to be 1953, a margin of error of 0.05,

and a 95% confidence interval. The estimated population prevalence was set at 86%, based on data from a prior study conducted in Egypt.¹¹ Of a total population of 1,953 nurses, the calculated sample was 186.

The 1953 nurses worked in 21 units of the hospital. To ensure representation of different work environments, a proportionate stratified random sampling method was used, with each unit considered a stratum. The sample size for each unit was determined in proportion to the number of nurses in that unit. The required number of nurses from each unit was selected randomly by assigning a number to each employed nurse and using a lottery method.

A self-administered questionnaire was developed by the research team in English, based mostly on the Nordic Questionnaire⁹, but with additional questions and cultural adaptations. The content validation of the questionnaire was conducted by two rheumatology consultants. It was subsequently translated into Sinhala and Tamil and back-translated into English by linguistic experts. Subsequently, the same two rheumatology consultants scrutinised the initial and back-translated versions for any discrepancies. To ensure clarity and cultural appropriateness of the final questionnaire, it was pretested with 10 nurses to modify any questions deemed ambiguous. Ethics approval was obtained from the Faculty Ethics Review Committee of the Faculty of Allied Health Sciences, University of Peradeniya (AHS/ERC/2024/098).

The study was conducted over two months, from the first week of May to the last week of June 2024. Informed written consent was obtained from participants before administering the questionnaire. Collected data included sociodemographic information, the presence of musculoskeletal discomfort, pain severity, risk factors, and the impact on work and quality of life. Data were analysed using SPSS version 26. Descriptive statistics summarised demographic characteristics and the prevalence of musculoskeletal pain. Associations between categorical variables were assessed using chi-square tests, while independent-samples t-tests were used for continuous variables. For regression analysis, pain severity was dichotomised into mild and moderate-to-severe categories, given the small number of participants with severe pain. Binary logistic regression was performed to identify factors associated with moderate-to-severe musculoskeletal pain. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated, and $p < 0.05$ was considered statistically significant.

Results

Of the 186 participants, the majority were female (90.9%). The largest age groups were 30–39 years (41.9%) and 40–49 years (34.9%). 70.4% had more than seven years of nursing experience. 80.1% were married, and 59.7% had caregiving responsibilities at home. The average BMI was 23.9 kg/m² (SD=2.83). Participants worked an average of 48 hours per week. A summary of the demographic characteristics of the sample is presented in Table 1.

Overall, 87.1% reported musculoskeletal pain. The lower back (74.2%), neck (70.4%), and foot/ankle (65.1%) were the most affected. Pain intensity was mostly moderate (75.3%).

For assessment of associations between pain severity categories and demographic factors, binary logistic regression analysis was performed. In the analysis, pain severity was categorised as mild or moderate-to-severe. Increasing age was associated with greater pain severity, with nurses aged 50–59 years showing sixfold higher odds of moderate-to-severe pain than those aged 20–29 years (OR=6.00, 95% CI: 1.13–31.88, $p=0.036$). Similarly, increasing work experience was associated with more severe MSP. For example, nurses with more than 7 years of work experience had approximately fourfold higher odds of moderate-to-severe pain than those with 1–3 years of experience (OR=4.53, 95% CI: 1.95–10.54, $p < 0.001$).

Binary logistic regression analysis was performed using similar pain categories to assess associations with various workplace factors. Frequent work in squatting or kneeling positions (OR=2.51, 95% CI: 1.17–5.39, $p=0.018$) and

slipping or falling during transport of heavy loads (OR = 3.57, 95% CI: 1.48–8.59, $p=0.005$) were significantly associated with higher odds of moderate-to-severe musculoskeletal pain. Surprisingly, frequent standing for extended periods (OR=0.32, 95% CI: 0.13–0.78, $p=0.012$), frequent walking for extended periods (OR=0.33, 95% CI: 0.16–0.68, $p=0.003$), and night shift work (OR = 0.30, 95% CI: 0.14–0.65, $p=0.002$) were associated with lower odds of moderate-to-severe pain. This is an unexpected finding, and its interpretation should be approached with caution. It is important to note that regression analysis establishes associations rather than causal relationships. Therefore, work distribution patterns may involve the delegation of work involving prolonged standing, prolonged walking, and night shift work to nurses who suffer less frequently or less severely from MSP. A summary of the results of the regression analysis is given in Tables 2 and 3.

Table 1
Demographic characteristics of study participants (n = 186)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	20–29	27	14.5
	30–39	78	41.9
	40–49	65	34.9
	50–59	16	8.6
Gender	Female	169	90.9
	Male	17	9.1
Marital status	Married	149	80.1
	Unmarried	35	18.8
	Separated	1	0.5
	Divorced	1	0.5
Children or dependents at home	No	74	39.8
	Yes	111	59.7
Education level	BSc in Nursing	33	17.7
	Diploma in Nursing	149	80.1
	Postgraduate degree	4	2.2
Work experience (years)	1–3	31	16.7
	4–6	23	12.4
	≥7	131	70.4

Table 2
Binary logistic regression analysis of demographic factors associated with moderate-to-severe musculoskeletal pain among nurses

Reference category for dependent variable: mild pain

Reference age group: 20–29 years

Reference work experience category: 1–3 years

Variable	Category	B	Odds Ratio (OR)	95% CI	p-value
Age group	30–39 years	1.200	3.32	1.29–8.56	0.013
	40–49 years	1.437	4.21	1.54–11.52	0.005
	50–59 years	1.792	6.00	1.13–31.88	0.036
Work experience	4–6 years	0.842	2.32	0.93–5.82	0.073
	More than 7 years	1.510	4.53	1.95–10.54	<0.001

Table 3

Binary logistic regression analysis of workplace factors associated with moderate-to-severe musculoskeletal pain among nurses

*Outcome: Moderate/severe pain vs mild pain**Reference category for all workplace factors: Seldom or Never*

Workplace factor	OR	95% CI	p-value
Standing for extended periods	0.32	0.13–0.78	0.012
Sitting for extended periods	1.00	0.48–2.07	0.989
Long periods of computer use	0.44	0.18–1.10	0.079
Walking for extended periods	0.33	0.16–0.68	0.003
Working in squatting/kneeling position	2.51	1.17–5.39	0.018
Working with hands above shoulder level	0.84	0.38–1.86	0.672
Working with hands below knee height	1.36	0.63–2.95	0.432
Lifting or carrying loads	0.60	0.28–1.26	0.177
Slipping/falling during transport of heavy loads	3.57	1.48–8.59	0.005
Bending/twisting the upper body multiple times per hour	0.81	0.39–1.65	0.555
Prolonged working in the same posture	1.24	0.62–2.50	0.539
Repetitive movements of the arms and hands	0.88	0.44–1.76	0.708
Working more than 6 hours per day	0.69	0.33–1.46	0.333
Night shift work	0.30	0.14–0.65	0.002

The effect of MSP on various aspects of quality of life and job satisfaction was assessed using binary logistic regression. The presence of MSP was associated with a greater degree of morning fatigue. None of the other impacts assessed, including job dissatisfaction, work-related stress, and poor sleep quality, showed significant associations.

Discussion

This study demonstrates a high prevalence of musculoskeletal pain (MSP) among hospital nurses, with 87.1% of participants reporting discomfort in one or more anatomical regions. Consistent with prior research, the lower back, neck, and foot/ankle were the most affected regions, mirroring global trends.^{1,2} The demographic profile, predominantly female and middle-aged, reflects the typical nursing workforce.¹² Age and duration of nursing experience were significant predictors of MSP. These factors were associated with the presence of MSP, most likely due to cumulative strain.⁴ Comparisons with Nigeria show a similar pattern.¹³

Interestingly, BMI, gender, or marital status did not show a significant association with MSP in the studied sample. The literature describes a significant association of MSP in weight-bearing regions such as the low back, hips, knees, and ankles with higher BMI values.² It is possible that this was not observed in the study sample because the mean BMI in the group was 23.9 kg/m² (SD = 2.83). Similarly, a gender difference in the prevalence and severity of pain may not have been demonstrable in the present study due to the marked gender imbalance within the sample, in which females constituted nearly 87% of participants, potentially limiting the validity of comparative statistical analyses.

The workplace risk factors found to be significantly associated with MSP severity are consistent with the

available literature.^{1,2} Notably, lifting and carrying heavy loads, longer work shifts, prolonged standing or walking, and night shift work were not associated with higher MSP severity. To determine whether this is truly a negative association, further assessment with a larger sample size and more detailed information on specific workplace exposures is needed, preferably using a prospective study design. For example, this might reflect a shift in the workplace of nurses who suffer from moderate to severe MSP, from job roles requiring lifting and carrying heavy loads, prolonged walking or standing, frequent night shifts, and longer shift duration, to roles with less exposure to these.

Because this is a cross-sectional study, the regression analysis can only predict associations between variables, not cause-and-effect relationships. The presence of MSP was associated with greater morning fatigue, consistent with the effect of chronic pain on recovery.⁴ However, MSP was not associated with job dissatisfaction or work-related stress in the study group. It is important to note that such outcomes are likely to be determined by multiple factors, rather than by MSP alone.

Overall, the results show that factors associated with cumulative repetitive strain (age, number of years in the nursing workforce) and certain workplace exposures (frequent squatting/kneeling postures, slipping while carrying loads, etc.) are significantly associated with the severity of MSP in the study group. Although MSP severity correlated with higher morning fatigue, there is no demonstrable association with job dissatisfaction.

This highlights the modifiable factors for MSP in the nursing workforce and the need for well-planned preventive strategies. Ergonomic interventions, education on posture management during manual tasks, and personalised workload management may reduce the prevalence of MSP. Nationally benchmarked occupational health policies are

needed, and management-level employees must ensure their timely application. A mechanism needs to be in place to address workers' occupational health concerns, providing suitable work arrangements, occupational health assessments, access to physical therapy, and, where relevant, compensation for occupational health hazards. Early identification and intervention can reduce absenteeism, improve job satisfaction, and sustain a healthy nursing workforce. The Manual Handling Guideline issued by the Health and Safety Executive (HSE) of the United Kingdom as its national standard provides an excellent model.¹⁶ In contrast to the currently available policy document in Sri Lanka,⁶ linking the HSE guidelines to established UK legislation gives employers a strict legal framework to operate within, thereby ensuring the safety and rights of employees.¹⁶

Limitations

This study has several limitations. It was conducted in a busy tertiary care hospital, which may limit the generalisability of the findings to nurses elsewhere of the country. The cross-sectional design captures data at a single point in time, preventing assessment of changes in MSP over time and limiting the ability to draw causal conclusions. The use of self-reported data is prone to recall bias, and response bias may have occurred due to the hierarchical nature of the nursing profession, despite assurances of anonymity and confidentiality. Nevertheless, the study provides a foundation for future large-scale prospective research with broader national representation.

Conclusion

This study highlights the high burden of musculoskeletal pain among nurses in Sri Lanka. Musculoskeletal pain is highly prevalent among the nurses studied, significantly affecting their ability to work and their quality of life. The identified risk factors may be addressed through targeted ergonomic and workplace interventions. Such interventions are under-recognised, but much needed to create a supportive workplace that safeguards nurses' health and improves their productivity.

Author Declaration

Conflict of interests

The authors declare that they have no known competing interests.

Ethics declaration

Ethics approval was obtained from the ethics review committee of the Faculty of Allied Health Sciences, University of Peradeniya (AHS/ERC/2024/098)

Criteria for authorship

SM conceived the study and designed it under the direct supervision of CD. SM also conducted the data collection. CD oversaw the data analysis and manuscript drafting.

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The authors declare that AI was used for spelling and grammar correction and of formatting the tables of the final draft.

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