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Original Article

Work-Related Musculoskeletal Discomforts among Nurses at Teaching Hospital Karapitiya, Sri Lanka: A Descriptive Cross-Sectional Study

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Abstract

Introduction: Work-related musculoskeletal discomforts (WMSDs) refer to pain and discomfort affecting the musculoskeletal system, often arising in specific work environments. WMSDs are one of the major occupational concerns among healthcare professionals, especially among nurses, who engage frequently in physically demanding tasks such as handling patients, engaging in repetitive movements, and prolonged standing. Such conditions may cause discomfort and affect job performance. In Sri Lanka, the burden caused by WMSDs remains underexplored.

Objective: This study aims to determine the prevalence and describe the characteristics of work-related musculoskeletal discomforts among nurses at Teaching Hospital Karapitiya, Sri Lanka.

Methods: A descriptive cross-sectional study was conducted, enrolling 350 nurses at Teaching Hospital Karapitiya, Sri Lanka via convenience sampling. Upon obtaining ethical approval and institutional permission, a pre-tested self-administered questionnaire including the Nordic Musculoskeletal Questionnaire (NMQ) was used to assess WMSDs among nurses who voluntarily consented to participate in this study. Analysis of the NMQ was performed according to established standard protocols. The demographic characteristics of nurses were analysed using descriptive statistics, and associations were determined via Pearson Chi-square test.

Results: The majority were married (86%, n=300) females (85%, n=297) with a mean age of 41 ± 8 years. The prevalence of WMSDs among nurses during the past 12 months was 87.4% (n=306; 95% CI: 83.4–90.6%). Lower back (54%, n=188) and knee(s) (51%, n=177) were the most commonly affected body regions for WMSDs. Among female nurses, lower back discomfort was reported most frequently (63%, n=162), whereas knee discomfort was most prevalent among male nurses (65%, n=32). The frequency of WMSDs was significantly associated with work units ($p \leq 0.01$) and working hours per day ($p=0.005$).

Conclusion: A higher prevalence of WMSDs was observed among nurses at Teaching Hospital Karapitiya, Sri Lanka. This implies a need for establishing strategies to reduce WMSDs among nurses.

Keywords: *Nordic Musculoskeletal Questionnaire, Nurses, Occupational discomfort, Sri Lanka, Work-related musculoskeletal discomforts.*

Introduction

Work-related musculoskeletal discomforts (WMSDs) are injuries that affect the musculoskeletal system of the body, especially in muscles, bones, spinal discs, tendons, joints, ligaments, cartilage, nerves, and blood vessels, as a result of repetitive motions, forces, and vibrations acting on the human body in certain working environments, resulting in pain, ache, or discomfort (Crawford, 2007; Punnett & Wegman, 2004; Salik & Özcan, 2004). WMSDs represent a significant global occupational health challenge, accounting for a major portion of workplace injuries across all professions (Jan de Kok et al., 2019). Among healthcare workers, nurses are disproportionately affected, with meta-analyses reporting annual WMSD prevalence of 77.2% globally, predominantly affecting the lower back region (59.5%), neck area (53.0%), and shoulder(s) (46.8%) (Sun et al., 2023; Tinubu et al., 2010). This makes nursing one of the highest-risk professions for WMSDs worldwide, surpassing rates reported among other physically demanding occupations, such as manufacturing workers and physicians (Alnaser & Aljadi, 2019; Mailutha et al., 2008; Sun et al., 2023).

WMSDs among nurses are recognized as a significant occupational health concern, with the World Health Organization (WHO) identifying musculoskeletal conditions as among the leading causes of disability and limitations in gainful employment (WHO, 2021). The burden of WMSDs in nursing is compounded by the physically demanding nature of patient care tasks, including frequent lifting, transferring, and repositioning of patients, all of which impose considerable biomechanical strain on nurses (Menzel et al., 2004; Pompeii et al., 2009). Furthermore, extended working shifts and inadequate nurse-to-patient staffing ratios have been identified as significant organizational risk factors that exacerbate physical fatigue and increase nurses' cumulative exposure to musculoskeletal injury (Rogers et al., 2004). These extrinsic factors may be particularly pronounced in resource-constrained settings such as Sri Lanka, where public hospitals often face staffing shortages and limited access to patient-handling equipment, potentially amplifying the risk of WMSDs among nursing staff (Shammika et al., 2015; Warnakulasuriya et al., 2012).

WMSDs not only cause a burden on the individual worker involved but also affect the patients receiving care. WMSDs are responsible for high morbidity among nurses, which results in poor quality of life, lowered productivity, and disability (Punnett & Wegman, 2004). Beyond individual suffering, WMSDs impose a substantial economic burden, accounting for about 40% of work-related injury treatment costs (Karwowski & Marras, 2003; Yasobant & Rajkumar, 2014). These can negatively impact patient care and generally, the entire healthcare system, as most nurses take more sick leaves per year, encounter working restrictions, resulting in job transitions (Hartvigsen et al., 2018; Jakovljević, 2024; Thinkhamrop et al., 2017) and might enter premature retirement due to WMSDs (Muthelo et al., 2023; Narsigan, 2015). In a country like Sri Lanka, where the healthcare system relies heavily on its nursing workforce to deliver services across a large population, such individual-level consequences can translate into systemic challenges affecting healthcare delivery and accessibility.

While these global patterns are well established, the extent to which they are reflected in lower- and middle-income countries, including Sri Lanka, warrants closer examination given the differences in healthcare infrastructure, nurse-to-patient ratios, and available ergonomic resources. In Sri Lankan context, limited studies have documented WMSD prevalence among nurses, with reported rates ranging from 30% to 83%. Warnakulasuriya et al., 2012 reported prevalence of 30% lower back pain in a multi-occupational study conducted among four occupational populations: postal workers, sewing machinists, nurses, and computer operators (Warnakulasuriya et al., 2012), while prevalence of 83% back pain was reported among

emergency and orthopedic nurses at National Hospital of Sri Lanka (Kavindra Masakorala et al., 2017). This substantial variation across different healthcare settings and specialities underscores the need for more studies to capture the true scope of the problem within the local healthcare landscape. Therefore, this study aimed to determine the prevalence and describe the characteristics of WMSDs among nurses at Teaching Hospital Karapitiya, Sri Lanka.

Methods

The study was reported based on the guidelines provided by Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (Vandenbroucke et al., 2007).

Study design and setting

A descriptive-analytical cross-sectional study was conducted at Teaching Hospital Karapitiya, the largest tertiary care center in the southern province, Sri Lanka, with a bed capacity of 2,050 and comprising 69 units. Ethical approval for the study was obtained from the ethics review committee of KIU *(Ref. no: KIU/ERC/21/123)*. Further approval was obtained from the authorities of Teaching Hospital Karapitiya prior to data collection. Furthermore, permission to use the Nordic Musculoskeletal Questionnaire (NMQ) was obtained from the original author before data collection.

Participant recruitment

During the data collection period (from January to June 2022), all nurses working at Teaching Hospital Karapitiya were verbally invited to participate in the study. Information sheets and consent forms were distributed, and additional details about the study were verbally explained to interested nurses. Nurses who were on maternity leave, or on leave due to illness, or had a medical diagnosis of arthritis that affects the musculoskeletal system (e.g., osteoarthritis, rheumatoid arthritis, gout, and psoriatic arthritis) were excluded from the study. Finally, 350 nurses were recruited for the study by convenience sampling technique. Printed questionnaires were distributed to nurses who signed the consent forms and voluntarily agreed to participate in the study. Participants were given one week to return the completed questionnaires to the data collectors at their convenience.

Methods of assessment

Data were collected from participants using a self-administered questionnaire, which was pretested with 10 nurses employed at the Teaching Hospital Karapitiya. The questionnaire comprised three parts: socio-demographic characteristics, the Nordic Musculoskeletal Questionnaire (NMQ), and work-related factors for musculoskeletal discomfort. Musculoskeletal discomfort was assessed using the NMQ, which has been widely used across various occupational groups, including nursing, to evaluate musculoskeletal issues. The NMQ consists of two sections (Crawford, 2007). Section one includes a general questionnaire of 40 items designed to identify areas of the body causing musculoskeletal problems, supported by a body map indicating nine symptom sites: neck, shoulders, upper back, elbows, lower back, wrists/hands, hips/thighs, knee(s), and ankles/feet. Respondents are asked if they have experienced any musculoskeletal discomfort in the past 12 months. Section two contains additional questions related to the neck, shoulders, and lower back to provide further detail on relevant issues. This section comprises 25 questions that inquire about any accidents affecting these areas, the functional impact at home and work (such as changes in job or duties), the duration of the problem, assessment by a health professional, and musculoskeletal problems experienced in the past 7 days (Crawford, 2007).

Data analysis

Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to describe the variables. Prevalence estimates are reported with 95% confidence

intervals calculated using the Wilson score method. The association between categorical variables was assessed using the Pearson Chi-square test. The IBM SPSS (version 23) was used to analyze the data.

Results

Among the 350 nurses, the majority were married (86%) females (85%) with a mean age of 41 ± 8 years (ranging from 25 to 59 years). Over half of the nurses had attained education up to the diploma level (58%), while 41% were nursing graduates. Nearly one-third (33%) of nurses were working in surgical units. They usually work about 6 hours per day (46%) (modal category), but nearly 40% reported working for 12 hours per day. The demographic characteristics of the participants are represented in Table 1.

Table 1

Demographic characteristics of the participants (n=350)

Demographic characteristics		Frequency (n)	Percentage (%)
Age (years)	≤30	43	12.3
	31-40	**136**	**38.8**
	41-50	113	32.3
	≥50	58	16.6
Gender	Female	**297**	**84.9**
	Male	53	15.1
Marital status	Married	**300**	**85.7**
	Unmarried	50	14.3
Level of education	Diploma	**204**	**58.3**
	Graduate	143	40.8
	Postgraduate	3	0.9
Working Units	Surgical	**116**	**33.1**
	Special units	74	21.1
	Medical	73	20.9
	Operation theater	61	17.5
	Intensive Care Unit (ICU)	26	7.4
Working hours	6 hours/day	**161**	**46.0**
	12 hours/day	139	39.7
	8 hours/day	50	14.3

The prevalence of WMSDs among nurses over the past 12 months was 87.4% (n=306), with a 95% confidence interval of 83.4% to 90.6%, as represented in Figure 1. The findings indicate a high frequency of WMSDs in specific body regions, with the lower back being the most affected (54%), followed by the knee(s) (51%), shoulder (42%), and neck (39%). Due to the discomfort in the lower back (39%) and knee(s) (33%), most of the nurses were prevented from normal work during the last 12 months. The frequency distribution of WMSDs is indicated in Table 2.

Figure 1

Twelve-month prevalence of WMSDs (n=306)

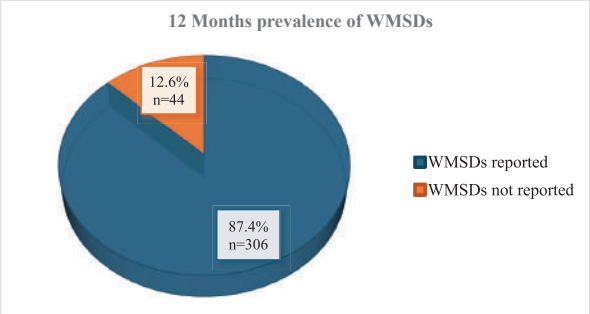


Table 2

Work-related musculoskeletal discomforts among nurses (n=350)

Frequency of WMSDs	Trouble with the musculoskeletal regions	Yes n (%)	No n (%)
Ache, pain, and discomfort during the last 12 months	Low back	**188 (53.7%)**	162 (46.3%)
	One or both knee (s)	177 (50.6%)	173 (49.4%)
	Shoulders	146 (41.7%)	204 (58.3%)
	Neck	137 (39.1%)	213 (60.9%)
	Upper back	120 (34.3%)	230 (65.7%)
	Wrist/hand	118 (33.7%)	232 (66.3%)
	One or both ankles/feet	114 (32.6%)	236 (67.4%)
	Elbows	61 (17.4%)	289 (82.6%)
	One or both hip/thighs	61 (17.4%)	289 (82.6%)
Prevented from doing normal work (at home or away from home) during the last 12 months	Low back	**135 (38.6%)**	215 (61.4%)
	One or both knee (s)	116 (33.1%)	234 (66.9%)
	Neck	91 (26.0%)	259 (74.0%)
	Shoulders	89 (25.4%)	261 (74.6%)
	Upper back	83 (23.7%)	267 (76.3%)
	One or both ankles/feet	71 (20.3%)	279 (79.7%)
	Wrist/hand	66 (18.9%)	284 (81.1%)
	One or both hip/thighs	44 (12.6%)	306 (87.4%)
	Elbows	41 (11.7%)	309 (88.3%)
Ache, pain, and discomfort during the last 7 days	One or both knee (s)	**57 (16.3%)**	293 (83.7%)
	Low back	50 (14.3%)	300 (85.7%)
	Shoulders	46 (13.1%)	304 (86.9%)
	Neck	35 (10.0%)	315 (90.0%)
	Elbows	25 (7.1%)	325 (92.9%)
	Wrist/hand	24 (6.9%)	326 (93.1%)
	One or both hip/thighs	21 (6.0%)	329 (94.0%)
	Upper back	20 (5.7%)	330 (94.3%)
	One or both ankles/feet	19 (5.4%)	331 (94.6%)

Note: (n) represents the frequency, while (%) represents the percentage.

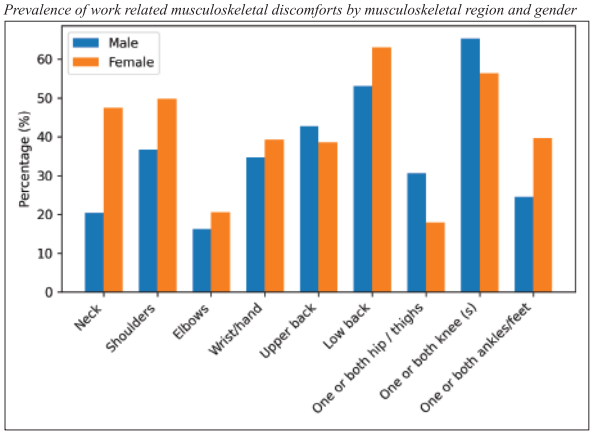
Among female nurses, ~87% (n=257) and among male nurses ~92% (n=49) reported WMSDs. When it comes to gender, the most affected body region among male nurses were the knee(s) (65%), while the female nurses mostly complained about the lower back region (63%), as depicted in Figure 2.

Among the nurses who reported WMSDs, a considerable proportion were employed in surgical wards (34%), followed by medical

wards (20%), operating theatres (19%), special units (19%), and the Intensive Care Units (ICU) (9%). A significant association was identified between the frequency of WMSDs among nurses and their assigned work units ($p \leq 0.01$) and their daily working hours ($p=0.005$).

Figure 2

Prevalence of work related musculoskeletal discomforts by musculoskeletal region and gender



Discussion

The findings of this study revealed a significantly higher prevalence (87%) of WMSDs among nursing staff, with pain in the lower back region being the predominant complaint, followed by pain in the knee(s) and shoulders. This pattern reflects the biomechanical stresses associated with patient care activities, particularly given that a significant proportion of participants worked prolonged shifts that spanned more than 12 hours per day.

WMSDs are one of the most common occupational injuries among healthcare professionals (Dehdashti et al., 2017). The incidence of WMSDs among nurses varies significantly across different regions and countries. The notable burden of WMSDs observed among nurses in this study is consistent with patterns reported in other developing countries, where prevalence rates typically exceed 85%. For example, a study conducted in Turkey reported a rate of 87.3% (Kalkim et al., 2019); while a study in Nigeria reported a similar rate of 85% (Tinubu et al., 2010). In contrast, the study findings from developed countries like Japan (70%) (Smith et al., 2006); Canada (66%) (Yassi et al., 2005) and the United States (U.S.) (60%) (Trinkoff et al., 2002) reported significantly lower incidences of WMSDs among nurses.

Despite the methodological differences of the studies, the persistent pattern of higher WMSD prevalence in developing countries compared to developed nations likely reflects fundamental differences in healthcare infrastructure and occupational safety frameworks. Developing countries often face challenges, including a lack of ergonomic practices (Bernal et al., 2015), staffing shortages leading to high workload (Roghayeh Abedini et al., 2015), limited resources for safety equipment (Stanchev & Vangelova, 2022), inadequate safety regulations (Stanchev & Vangelova, 2022), along with economic pressures, and exacerbated physical demand on nurses in such settings (Bernal et al., 2015; Roghayeh Abedini et al., 2015; Stanchev & Vangelova, 2022). Conversely, advanced healthcare infrastructure, strong health and safety practices, shift work regulations, and a diverse workforce are prevalent in the hospital settings of developed countries (Schultz et al., 2022). These similarities highlight the need for effective ways to prevent the negative consequences of WMSDs among nurses worldwide, hence promoting a safe and healthy working environment.

Lower back pain emerged as the predominant musculoskeletal complaint, consistent with the global literature identifying this as the most common WMSD among nursing professionals (Alexopoulos et al., 2011; Lin et al., 2020). However, the prevalence of lower back problems observed in this study (54%) appears more pronounced than the rates reported by more developed countries, where prevalence typically ranged from 25-49%. For instance, lower back discomfort was the most common, yet showed a lower incidence in countries like Italy (49%) (Carugno et al., 2012); Canada (48%) (Vieira et al., 2016); England (40%) (Smedley et al., 2003); Hong Kong (40.6%) (Yip, 2001) and the U.S. (29%) (Lipscomb et al., 2004). This disparity likely reflects critical differences in workplace ergonomics and patient handling practices, where

ergonomics practices in developed countries tend to have better ergonomics, thus reporting lower levels of lower back discomfort (Lin et al., 2020). Healthcare systems in developed countries have increasingly adopted mechanical lifting aids, adjustable equipment, and comprehensive ergonomic training programs that significantly reduce biomechanical stress on nurses' spines (Lin et al., 2020; Schultz et al., 2022). In contrast, limited resources in developing healthcare settings like Sri Lanka, often necessitate manual patient handling, prolonged standing, and suboptimal working postures (Schultz et al., 2022; Warnakulasuriya et al., 2012). The higher prevalence observed in this study highlights the urgent need for ergonomic interventions and mechanical aids to protect the spinal health of nurses in resource-limited environments.

The prominence of knee complaints among the nursing staff represents a notable finding, as knee disorders are often underemphasized in occupational health discussions despite their significant impact on mobility and function. Although some studies from developed countries report substantially lower rates of knee problems among nurses, ranging from 19–21% (Attar, 2014; Freimann et al., 2013; Santos et al., 2017), our findings align more closely with recent research highlighting the growing recognition of knee-related WMSDs in nursing practice reported by Stanchev and Vangelova in a study conducted in Bulgaria (Stanchev & Vangelova, 2022). The high prevalence of knee disorders likely reflects the cumulative impact of prolonged weight-bearing activities inherent in nursing care. Extended periods of standing, frequent walking between patient rooms, and repetitive movements such as squatting to access low supplies or assist patients create sustained mechanical stress on knee joints.

The demanding nature of 12-hour shifts, as commonly experienced by nurses in this study, may exacerbate these biomechanical stresses, leading to accelerated wear and inflammatory responses in knee structures. This pattern suggests that knee health should be prioritized alongside spinal health in occupational safety programs for nursing personnel.

The distinct patterns of musculoskeletal complaints between male and female nurses reveal important insights into how gender-related task allocation and physiological differences influence the risk of occupational injury. As seen in this study, male nurses predominantly experienced knee-related disorders, while female nurses more commonly reported lower back problems, suggesting that workplace task distribution may inadvertently create gender-specific injury patterns. This difference likely reflects both the variation in occupational roles of male and female nurses and other biomechanical factors. In most of the health care settings, we see that male nurses are often assigned physically demanding tasks such as lifting and transferring patients, which require more physical strength, leading to an increased rate of knee-related musculoskeletal discomfort (Gauci et al., 2023).

Conversely, female nurses are more likely to engage in tasks that include patient assessments, administering medications, retrieving supplies, and other bedside care responsibilities, which require prolonged standing and load bearing, leading to muscle fatigue and strains in the lower back (Dehdashti et al., 2017). These findings highlight the need for gender-sensitive ergonomic interventions and suggest that injury prevention programs should account for how task allocation patterns may create differential risk profiles between male and female nursing staff.

The multifactorial nature of WMSDs among nurses reflects the complex interplay between individual, occupational, and organizational factors that characterise modern healthcare delivery (Hou & Shiao, 2006; Lin et al., 2020; Stanchev & Vangelova, 2022). The relationship between working units, musculoskeletal disorder patterns and WMSDs among nurses reveals important insights into how specific healthcare environments create distinct occupational hazards. Surgical units present unique

biomechanical challenges that may amplify injury risk through several mechanisms: prolonged static positioning during procedures, frequent heavy lifting during patient positioning and transfers, and sustained awkward postures required for sterile technique maintenance (Chambers & Gill, 2020). However, the relationship between surgical work and musculoskeletal injury appears more complex than simple duration exposure. While some research suggests that shorter surgical procedures (under three hours) may not significantly increase injury risk (Yizengaw et al., 2021), this finding may reflect the multifaceted nature of surgical nursing work, which extends far beyond operative time to include pre-operative preparation, post-operative monitoring, and patient transfer activities.

This study presents several notable strengths that enhance the validity and relevance of its findings. The substantial sample size of 350 nurses provides adequate statistical power to detect meaningful associations and patterns within the nursing population. Comprehensive assessment of multiple body regions allows for a holistic understanding of WMSD distribution rather than focusing on isolated anatomical sites. Additionally, the inclusion of both male and female nurses enables gender-specific analysis, revealing important differences in injury patterns that have practical implications for targeted interventions.

Limitations and future recommendations

This study has several limitations that should be acknowledged when interpreting these findings. The single-center design, while allowing for detailed institutional analysis, may limit generalizability to other healthcare settings with different organizational structures, patient populations, or resource availability. Furthermore, the use of convenience sampling and voluntary participation may have introduced self-selection bias, whereby nurses experiencing musculoskeletal discomfort may have been more motivated to participate than their asymptomatic counterparts, potentially leading to an overestimation of WMSD prevalence. Conversely, nurses with severe symptoms may have been absent from work due to sick leave or job transitions, resulting in their underrepresentation in the sample.

Future studies incorporating objective measures and comprehensive risk factor assessment would strengthen our understanding of WMSD development and prevention in nursing populations.

Conclusion

The study revealed a high prevalence of work-related musculoskeletal discomfort among the nurses in the past 12 months. The commonly affected body regions were the lower back and knees. Lower back pain was prevalent among female nurses, while male nurses predominantly reported discomfort in the knee(s). The findings indicate a significant association between the frequency of WMSDs and the working units of the nurses and daily working hours, underscoring the need for targeted interventions to address these occupational health risks.

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Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Contributorship

Conceptualization: Jayamaha AR; Formal analysis: Nisansala DWD, Widyarathna ODS, Madushani WPL, Chathurani JDG, Kumarasena M; Methodology: Jayamaha AR; Supervision: Fernando CA, Dharmarathna HHND; Writing – Original Draft Preparation: Fernando AMF,

Fernando CA, Dharmarathna HHND; Writing – Review & Editing: Fernando AMF, Fernando CA, Dharmarathna HHND, and Jayamaha AR.

Ethical approval

Ethical approval was granted by the Ethics Review Committee of KAATSU International University (KIU), Sri Lanka *(KIU/ERC/21/123)* and the administrative clearance was obtained from the Teaching Hospital Karapitiya, Sri Lanka.

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