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Occupational Musculoskeletal Health Among Hospital Service Workers: Anatomical Distribution, Pain Severity, and Associated Factors Running title :Musculoskeletal Health Among Hospital Service Workers

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Abstract

Background

Musculoskeletal disorders (MSDs) are among the most common occupational health problems affecting healthcare workers, particularly hospital service staff who perform physically demanding tasks involving repetitive movements, prolonged standing, manual handling, and awkward postures. This study aimed to investigate the anatomical distribution, severity, and associated factors of musculoskeletal disorders among hospital service workers in western Iran.

Methods

This cross-sectional study was conducted in 2024 among hospital service workers employed at Farshchian Heart Specialty Hospital, Hamadan, Iran. Participants were selected using a stratified random sampling method with proportional allocation across hospital departments. Data were collected using a demographic questionnaire, the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), and the Visual Analog Scale (VAS). Descriptive statistics and inferential analyses, including Pearson's correlation coefficient, eta-squared, multiple linear regression, and appropriate parametric or non-parametric tests, were performed using SPSS version 26. Statistical significance was set at $P < 0.05$.

Results

Sixty hospital service workers were included in the final analysis. The mean age of participants was 34.68 ± 8.18 years, and the mean body mass index was 25.32 ± 2.81 kg/m². Musculoskeletal discomfort was most frequently reported in the neck, lower back, and knees, indicating that axial body regions experienced the greatest burden of symptoms. Most participants reported either no or only slight interference of pain with work activities. Dominant hand was significantly associated with musculoskeletal complaints involving the right upper limb, hip, and right lower limb ($P < 0.05$), whereas no significant associations were observed for sex or work experience.

Conclusions

Musculoskeletal disorders were highly prevalent among hospital service workers, particularly in the neck, lower back, and knees. Although the functional impact of pain on work activities was generally mild, the high prevalence of symptoms highlights the need for occupation-specific ergonomic interventions, routine musculoskeletal surveillance, and workplace strategies aimed at reducing physical workload and preventing work-related musculoskeletal disorders.

Background

Musculoskeletal disorders (MSDs) are among the most prevalent occupational health problems worldwide and constitute one of the leading causes of disability, reduced work capacity, sickness absence, and economic burden (1, 2). These disorders are strongly associated with occupational exposures such as repetitive movements, manual material handling, prolonged standing, awkward postures, forceful exertion, and excessive physical workload (1, 3). Consequently, MSDs adversely affect workers' quality of life, organizational productivity, and healthcare expenditures, making them a major public health and occupational health concern (4). Recent global evidence continues to identify work-related MSDs as one of the most common causes of years lived with disability among working populations.

Healthcare facilities are recognized as ergonomically demanding workplaces where employees are routinely exposed to multiple biomechanical and organizational risk factors (5). Although a substantial body of literature has investigated musculoskeletal disorders among nurses, physicians, and other clinical personnel (6–8), considerably less attention has been directed toward hospital service workers, including housekeeping staff, cleaners, environmental service workers, and sanitation personnel (9, 10). These workers perform repetitive cleaning activities, manual transportation of equipment and waste, prolonged walking, frequent bending and twisting, pushing and pulling heavy carts, and sustained awkward working postures throughout their work shifts, all of which substantially increase the risk of work-related musculoskeletal disorders (10–12).

Hospital service workers play an indispensable role in maintaining environmental hygiene, infection prevention, patient safety, and the overall functionality of healthcare facilities (13). Despite their critical contribution to healthcare delivery, occupational health research has historically focused on clinical staff, leaving the musculoskeletal health of service workers comparatively understudied (9, 14). Recent studies conducted among hospital cleaners have reported a high prevalence of musculoskeletal disorders and identified occupational factors such as repetitive work, heavy physical demands, prolonged standing, inadequate ergonomic training, and poor workplace organization as major contributors to MSD development (11, 15, 16).

Recent systematic reviews have further confirmed that cleaners and housekeeping workers represent one of the occupational groups at highest risk for musculoskeletal disorders, with the lower back, shoulders, neck, wrists, and upper extremities being the most frequently affected anatomical regions (15). Similarly, studies among hospital cleaning workers have demonstrated that inadequate ergonomic conditions, repetitive movements, manual handling tasks, and unfavorable working environments substantially increase the likelihood of developing work-related MSDs (11, 16). These findings indicate that hospital service workers experience occupational exposures that differ from those of nurses and other healthcare professionals and therefore require occupation-specific ergonomic assessment and preventive strategies.

Despite the growing body of evidence, important knowledge gaps remain. Most previous studies have either evaluated mixed populations of healthcare workers or have examined cleaners working outside hospital settings, limiting the generalizability of their findings to hospital service personnel (7, 15). Furthermore, relatively few investigations have simultaneously evaluated the anatomical distribution, pain severity, and associated demographic characteristics of musculoskeletal disorders among hospital service workers using validated ergonomic assessment instruments. This evidence gap is particularly apparent in low- and middle-income countries, where occupational health surveillance systems and workplace ergonomic intervention programs remain limited .(14)

Understanding the burden and pattern of musculoskeletal disorders among hospital service workers is essential for designing evidence-based ergonomic interventions, improving workplace safety, reducing occupational injuries, and maintaining workforce productivity (17, 18). Identifying the body regions most frequently affected, together with associated demographic and occupational characteristics, may assist hospital administrators and occupational health professionals in prioritizing preventive strategies tailored to the specific occupational demands of this often-overlooked workforce.

Therefore, the present study aimed to investigate the anatomical distribution, pain severity, and associated factors of musculoskeletal disorders among hospital service workers employed at a tertiary heart hospital in western Iran using the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) and the Visual Analog Scale (VAS). The findings are expected to provide evidence supporting targeted ergonomic interventions and occupational health policies for hospital service personnel.

Methods

Study design and setting

This cross-sectional study was conducted in 2024 among hospital service workers employed at Farshchian Heart Specialty Hospital, a tertiary referral center affiliated with Hamadan University of Medical Sciences, Hamadan, Iran. The study was approved by the Research and Technology Deputy and the Ethics Committee of Hamadan University of Medical Sciences (Ethics Approval No. IR.UMSHA.REC.1403.120). All methods were performed in accordance with the relevant guidelines and regulations. Written informed consent was obtained from all participants prior to enrollment in the study. The study aimed to determine the prevalence, anatomical distribution, and associated factors of musculoskeletal disorders (MSDs) among hospital service workers. All methods were performed in accordance with the relevant guidelines and regulations.

Participants

Hospital service workers employed in different departments of the hospital were eligible for participation. Inclusion criteria were at least one year of work experience, no history of musculoskeletal surgery or traumatic musculoskeletal injury, no secondary employment, and willingness to participate in the study. Workers who did not meet these criteria or declined participation were excluded.

Sampling procedure and sample size

Participants were selected using a stratified random sampling method with proportional allocation. Each hospital department was considered a separate stratum, and participants were randomly selected from each department in proportion to the number of eligible hospital service workers employed in that department.

The required sample size was estimated using Cochran's formula based on an expected prevalence of musculoskeletal disorders of 42%, a 95% confidence level, and a margin of error of 5%. Considering the finite population of 97 hospital service workers, the minimum required sample size was calculated to be 78 participants.

Initially, 78 eligible workers were selected. However, 18 participants were excluded from the final analysis because of incomplete questionnaire responses or non-response. Consequently, complete data from 60 participants were included in the final statistical analysis.

Data collection

Data were collected using a demographic questionnaire, the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), and the Visual Analog Scale (VAS).

The demographic questionnaire collected information on age, sex, marital status, educational level, work experience, body mass index (BMI), dominant hand, smoking status, and regular physical activity.

Cornell Musculoskeletal Discomfort Questionnaire (CMDQ)

Musculoskeletal discomfort was assessed using the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), developed by Hedge and colleagues at Cornell University. The CMDQ evaluates the frequency and severity of musculoskeletal discomfort and the extent to which the discomfort interferes with work activities during the previous week. The questionnaire assesses discomfort in multiple body regions, including the neck, shoulders, upper arms, forearms, wrists, upper back, lower back, hips, thighs, knees, lower legs, and feet. The CMDQ score for each body region is calculated by multiplying the frequency of discomfort, discomfort severity, and the degree of work interference. The Persian version of the CMDQ has demonstrated excellent validity and reliability. Afifehzadeh Kashani et al. reported Kappa coefficients ranging from 0.828 to 0.960, Spearman correlation coefficients ranging from 0.836 to 0.941,

and an overall Cronbach's alpha coefficient of 0.986. The Cronbach's alpha values for the frequency, severity, and work interference subscales were 0.955, 0.961, and 0.969, respectively (19).

Visual Analog Scale (VAS)

Pain intensity was assessed using the Visual Analog Scale (VAS), which consists of a 100-mm horizontal line anchored by two endpoints representing "no pain" and "worst imaginable pain." Participants indicated their perceived pain intensity by marking a point on the line. The measured distance from the left endpoint to the participant's mark was recorded as a score ranging from 0 to 10, with higher scores indicating greater pain intensity (20).

Statistical analysis

Data were analyzed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were summarized using mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Pearson's correlation coefficient was used to assess associations between continuous variables. Eta-squared (η^2) was calculated to estimate effect sizes where appropriate. Multiple linear regression analysis was performed to identify factors associated with musculoskeletal discomfort while controlling for potential confounding variables. A two-sided *P* value < 0.05 was considered statistically significant.

Results

Participant characteristics

A total of 78 hospital service workers were initially assessed for eligibility. Of these, 18 individuals were excluded because they did not meet the inclusion criteria or returned incomplete questionnaires. Consequently, 60 participants were included in the final analysis (Fig. 1).

The demographic and occupational characteristics of the participants are presented in Tables 1 and 2. Participants ranged in age from 23 to 65 years, with a mean age of 39.47 ± 9.36 years. The mean work experience was 11.35 ± 6.03 years, while the mean body mass index (BMI) was 25.62 ± 4.19 kg/m². On average, participants reported 3.18 ± 2.53 hours of weekly physical activity.

Table 1
Frequency Distribution of Demographic Variables

Variable	Category	Frequency	Percentage (%)
Gender	Female	6	10.0
	Male	54	90.0
Hospital Ward	Kitchen	6	10.0
	ICU	7	11.7
	Inpatient	5	8.3
	Services	9	15.0
	Special Care	12	20.0
	Other Wards	21	35.0
Dominant Hand	Left	0	0.0
	Right	60	100.0

Table 2
Frequency of musculoskeletal discomfort

Variable	Minimum	Maximum	Mean (Standard Deviation)
Age (years)	23	65	39.47 (9.36)
Work Experience (years)	1	28	11.35 (6.03)
Physical Activity	0	7	3.18 (2.53)
Body Mass Index (BMI)	18.52	41.67	25.62 (4.19)

Frequency of musculoskeletal discomfort

The frequency of musculoskeletal discomfort across different anatomical regions is summarized in Table 3. Overall, discomfort was unevenly distributed across body regions, with symptoms occurring predominantly in the lower back and lower extremities. The lowest proportion of participants reporting no discomfort ("never") was observed in the lower back, indicating that this region experienced the greatest burden of musculoskeletal complaints during the previous week. Comparatively high frequencies of discomfort were also observed in the left shoulder and left arm, whereas the forearms, wrists, calves, and feet generally showed lower frequencies of reported symptoms. Daily discomfort (once or several times per day) was most frequently reported in the lower back and both knees, suggesting that these anatomical regions were subjected to greater occupational loading than other body regions. Overall, the

distribution of symptoms indicates that musculoskeletal complaints among hospital service workers were primarily concentrated in weight-bearing joints and spinal structures.

Table 3
Frequency and Percentage of Musculoskeletal Discomfort by Body Region

Body Parts	Frequency of discomfort in last work					The severity of discomfort			Work interference			Weighted scores Mean (SD)
	Never	1–2 times	3–4 times	Once every day	Several times every day	slightly	moderately	very	Not at all	slightly	substantially	
Right Neck	33 (55.0%)	9 (15.0%)	4 (6.7%)	3 (5.0%)	5 (8.3%)	25 (41.7%)	17 (28.3%)	5 (8.3%)	25 (41.7%)	17 (28.3%)	6 (10.0%)	9.77 (22.64)
Shoulder	35 (58.3%)	8 (13.3%)	3 (5.0%)	1 (1.7%)	4 (6.7%)	30 (50.0%)	9 (15.0%)	4 (6.7%)	29 (48.3%)	5 (8.3%)	8 (13.3%)	8.57 (22.63)
Left Shoulder	28 (46.7%)	9 (15.0%)	3 (5.0%)	0 (0.0%)	2 (3.3%)	33 (55.0%)	4 (6.7%)	3 (5.0%)	31 (51.7%)	3 (5.0%)	4 (6.7%)	5.26 (19.28)
Upper Back	33 (55.0%)	4 (6.7%)	5 (8.3%)	2 (3.3%)	7 (11.7%)	28 (46.7%)	5 (8.3%)	8 (13.3%)	25 (41.7%)	10 (16.7%)	6 (10.0%)	12.96 (28.59)
Right Arm	34 (56.7%)	6 (10.0%)	4 (6.7%)	0 (0.0%)	4 (6.7%)	28 (46.7%)	7 (11.7%)	6 (10.0%)	29 (48.3%)	9 (15.0%)	4 (6.7%)	9.07 (24.98)
Left Arm	29 (48.3%)	6 (10.0%)	3 (5.0%)	0 (0.0%)	2 (3.3%)	27 (45.0%)	4 (6.7%)	5 (8.3%)	25 (41.7%)	7 (11.7%)	3 (5.0%)	6.12 (20.08)
Lower Back	25 (41.7%)	8 (13.3%)	12 (20.0%)	6 (10.0%)	6 (10.0%)	24 (40.0%)	18 (30.0%)	8 (13.3%)	26 (43.3%)	17 (28.3%)	8 (13.3%)	14.26 (25.61)
Right Forearm	36 (60.0%)	4 (6.7%)	4 (6.7%)	3 (5.0%)	3 (5.0%)	29 (48.3%)	7 (11.7%)	2 (3.3%)	27 (45.0%)	6 (10.0%)	5 (8.3%)	7.37 (20.22)
Left Forearm	33 (55.0%)	2 (3.3%)	2 (3.3%)	2 (3.3%)	3 (5.0%)	26 (43.3%)	5 (8.3%)	2 (3.3%)	26 (43.3%)	6 (10.0%)	3 (5.0%)	7.11 (21.56)
Right Wrist	37 (61.7%)	2 (3.3%)	4 (6.7%)	2 (3.3%)	4 (6.7%)	27 (45.0%)	8 (13.3%)	4 (6.7%)	28 (46.7%)	4 (6.7%)	7 (11.7%)	9.87 (25.15)
Left Wrist	34 (56.7%)	2 (3.3%)	3 (5.0%)	1 (1.7%)	5 (8.3%)	28 (46.7%)	5 (8.3%)	3 (5.0%)	27 (45.0%)	4 (6.7%)	5 (8.3%)	9.34 (24.37)
Hip	37 (61.7%)	5 (8.3%)	1 (1.7%)	3 (5.0%)	2 (3.3%)	29 (48.3%)	5 (8.3%)	3 (5.0%)	29 (48.3%)	6 (10.0%)	2 (3.3%)	4.78 (15.80)
Right Thigh	36 (60.0%)	2 (3.3%)	3 (5.0%)	3 (5.0%)	3 (5.0%)	26 (43.3%)	8 (13.3%)	3 (5.0%)	27 (45.0%)	7 (11.7%)	4 (6.7%)	7.50 (20.01)
Left Thigh	33 (55.0%)	3 (5.0%)	2 (3.3%)	5 (8.3%)	2 (3.3%)	28 (46.7%)	5 (8.3%)	3 (5.0%)	25 (41.7%)	7 (11.7%)	3 (5.0%)	7.17 (19.85)
Right Knee	31 (51.7%)	4 (6.7%)	6 (10.0%)	2 (3.3%)	9 (15.0%)	25 (41.7%)	10 (16.7%)	9 (15.0%)	26 (43.3%)	6 (10.0%)	12 (20.0%)	17.05 (32.05)
Left Knee	32 (53.3%)	3 (5.0%)	2 (3.3%)	3 (5.0%)	9 (15.0%)	24 (40.0%)	8 (13.3%)	9 (15.0%)	24 (40.0%)	5 (8.3%)	11 (18.3%)	18.49 (33.72)
Right Foot	36 (60.0%)	2 (3.3%)	3 (5.0%)	1 (1.7%)	7 (11.7%)	25 (41.7%)	6 (10.0%)	7 (11.7%)	27 (45.0%)	2 (3.3%)	8 (13.3%)	12.92 (29.94)
Left Foot	35 (58.3%)	2 (3.3%)	2 (3.3%)	1 (1.7%)	6 (10.0%)	25 (41.7%)	4 (6.7%)	8 (13.3%)	28 (46.7%)	2 (3.3%)	8 (13.3%)	12.90 (30.74)

Severity of musculoskeletal discomfort

The severity of musculoskeletal discomfort in different body regions is presented in Table 4. Moderate to severe discomfort was reported most frequently in the lower back, neck, and knees, whereas discomfort in the upper extremities was generally of lower intensity.

Although mild discomfort was reported across several anatomical regions, relatively few participants experienced severe pain in distal upper-limb regions such as the wrists and forearms. These findings indicate that the greatest pain burden was concentrated in body regions directly involved in prolonged standing, repetitive bending, and manual handling activities.

Table 4
Distribution of Musculoskeletal Discomfort by Body Region Based on Frequency, Severity, and Work Interference

Body parts	Frequency of discomfort	Severity of discomfort	Interference in work	Discomfort	Discomfort (%)
Neck	92.5	74.0	77.0	527065	9.80
Shoulder Right	67.5	60.0	63.0	255150	4.74
Shoulder Left	44.0	50.0	49.0	107800	2.00
Upper Back	103.5	62.0	63.0	404271	7.51
Upper arm Right	63.0	60.0	59.0	223020	4.14
Upper arm Left	39.5	50.0	48.0	94800	1.76
Lower back	144.0	84.0	84.0	1016064	18.88
Forearm Right	65.0	49.0	54.0	171990	3.20
Forearm Left	50.0	42.0	47.0	98700	1.83
Wrist Right	67.0	55.0	57.0	210045	3.90
Wrist Left	68.5	47.0	50.0	160975	2.99
Hip	46.0	48.0	47.0	103776	1.93
Thigh Right	58.5	51.0	53.0	158125.5	2.94
Thigh Left	56.5	47.0	48.0	127464	2.37
Knee Right	127.0	72.0	74.0	676656	12.58
Knee Left	116.5	67.0	67.0	522968.5	9.72
Foot Right	88.5	58.0	55.0	282315	5.25
Foot Left	75.0	57.0	56.0	239400	4.45

Interference of discomfort with work activities

Participants were also asked to report the extent to which musculoskeletal discomfort interfered with their routine work activities (Table 5). Overall, discomfort in the lower back and knees resulted in the greatest work interference compared with other anatomical regions.

Most participants reported either no interference or only slight interference in upper-extremity regions. However, symptoms affecting the lumbar region and lower extremities were more likely to interfere with occupational performance, suggesting that these complaints may have greater functional consequences during routine hospital service activities.

Table 5
Total Musculoskeletal Discomfort Scores and Percentage Distribution by Body Region

Body Parts	Total discomfort score	Total discomfort score (%)
Neck	518.00	5.99
Shoulder Right	437.00	5.05
Shoulder Left	221.00	2.55
Upper Back	648.00	7.49
Upper arm Right	435.50	5.03
Upper arm Left	238.50	2.76
Lower back	748.50	8.65
Forearm Right	361.00	4.17
Forearm Left	291.50	3.37
Wrist Right	483.50	5.59
Wrist Left	411.00	4.75
Hip	220.00	2.54
Thigh Right	345.00	3.99
Thigh Left	315.50	3.65
Knee Right	869.50	10.05
Knee Left	**906.00**	**10.47**
Foot Right	620.00	7.17
Foot Left	580.50	6.71

Overall musculoskeletal burden

The overall musculoskeletal burden, calculated using the composite CMDQ score, is presented in Table 6 and illustrated in Fig. 2.

Among all anatomical regions, the left knee demonstrated the highest cumulative discomfort score, followed by the right knee and lower back. Axial body regions, including the lower back, upper back, and neck, collectively accounted for a substantial proportion of the total discomfort burden. In contrast, the forearms, wrists, and calves contributed relatively little to the overall CMDQ score.

The heat map shown in Fig. 2 further illustrates the anatomical distribution of discomfort. Higher CMDQ scores were predominantly observed in the knees, lumbar region, and cervical region, whereas upper-extremity regions exhibited comparatively lower scores. The relatively symmetrical distribution between the right and left sides suggests similar occupational loading patterns during routine service activities.

Figure 2: CMDQ scores across different body regions

Interference of musculoskeletal pain with work activities

Figure 2 presents the extent to which musculoskeletal pain interfered with participants' work activities across different body regions. Overall, the majority of participants reported that pain did not interfere with their work, with the proportion of "no interference" responses exceeding 40% in all anatomical regions.

Nevertheless, the degree of work interference varied by body region. The lower back and neck exhibited relatively higher proportions of slight pain interference than other anatomical sites, indicating a greater functional impact of pain in these axial regions. Although substantial interference was generally uncommon (< 15%), it occurred more frequently in the lower back, knees, and upper back than in the upper extremities.

The anatomical distribution of musculoskeletal pain varied considerably across body regions (Fig. 4). The lower back represented the most frequently affected site, followed by the left knee and neck. Upper back pain was also commonly reported, whereas symptoms involving the shoulders, forearms, wrists, hips, and thighs were relatively infrequent. Overall, pain was concentrated primarily in axial body regions, while distal upper-limb complaints accounted for a smaller proportion of reported symptoms.

Discussion

The present cross-sectional study investigated the prevalence and distribution of musculoskeletal disorders (MSDs) among hospital service staff in western Iran. The findings demonstrated that MSDs were highly prevalent in this occupational group, with the neck, lower back, and knees representing the most commonly affected body regions. Although pain-related work interference was generally mild, the high frequency of reported symptoms indicates that hospital service workers are routinely exposed to physical demands that may increase their risk of developing work-related MSDs. Similar findings have been reported among hospital cleaning personnel and environmental service workers in several countries, emphasizing that these occupations remain among the

highest-risk groups for musculoskeletal disorders because of repetitive manual tasks, awkward postures, prolonged standing, and manual material handling (9).

The lower back was one of the most frequently affected body regions in the present study. This finding is consistent with previous studies among hospital cleaning workers, nurses, and other physically demanding occupations, where low back pain has consistently been identified as the leading musculoskeletal complaint (9, 11). Frequent bending, prolonged standing, pushing cleaning equipment, transporting waste, and repetitive lifting are likely contributors to lumbar discomfort. Likewise, the high prevalence of knee symptoms probably reflects prolonged walking, stair climbing, squatting, and sustained weight-bearing activities that characterize hospital service work. Similar anatomical distributions have recently been reported in studies conducted in Ethiopia, Turkey, and Brazil (9, 10, 14).

Neck discomfort was also highly prevalent in this study. Hospital service staff commonly perform cleaning tasks requiring prolonged neck flexion, repetitive reaching, and sustained static postures, which may contribute to cervical musculoskeletal symptoms. Comparable findings have been observed among hospital housekeeping workers in different healthcare settings, although differences in prevalence across studies may reflect variations in workload, staffing levels, ergonomic conditions, and assessment methods(10–12) .

Although musculoskeletal symptoms were common, most participants reported that pain caused either no interference or only slight interference with their work activities. This finding may reflect presentism, a phenomenon in which employees continue working despite experiencing pain or discomfort because of professional commitment, organizational expectations, or concerns regarding job security (21). Nevertheless, persistent mild symptoms should not be underestimated, as longitudinal studies have shown that untreated low-grade musculoskeletal pain may progress to chronic disorders, reduced work ability, and increased sickness absence (22).

An interesting finding was that dominant hand was significantly associated with musculoskeletal complaints in the right arm, hip, and right leg, whereas no significant associations were observed for sex or work experience. The association with dominant hand is biologically plausible because repetitive unilateral movements increase cumulative biomechanical loading on the dominant side. Conversely, the absence of significant associations for sex and work experience may be explained by the predominantly male study population and the relatively limited sample size, which reduced the statistical power to detect small differences. Similar inconsistencies regarding demographic risk factors have been reported in previous occupational health studies(11, 16) .

The present study has several strengths. It specifically focused on hospital service staff, an occupational group that has received considerably less research attention than nurses or physicians despite experiencing substantial physical workloads. Furthermore, the use of the validated Persian version of the Cornell Musculoskeletal Discomfort Questionnaire enabled a comprehensive assessment of discomfort across multiple anatomical regions.

Several limitations should also be acknowledged. First, the cross-sectional design precludes causal inference between occupational exposures and musculoskeletal symptoms. Second, the study relied on self-reported questionnaires, which are susceptible to recall bias and symptom misclassification. Third, the study was conducted in a single specialized hospital with a relatively small sample size, potentially limiting the generalizability of the findings. Finally, ergonomic exposures, psychosocial work factors, and objective clinical assessments were not evaluated and should be incorporated into future investigations.

These findings have important implications for occupational health practice. Hospitals should prioritize ergonomic interventions aimed at reducing repetitive physical loading among service staff. Regular ergonomic training, safe lifting techniques, task rotation, scheduled recovery breaks, and the availability of appropriate cleaning equipment may reduce musculoskeletal strain. Periodic musculoskeletal screening and early referral to occupational health services may also facilitate early detection and management of MSDs before symptoms become chronic.

Future multicenter longitudinal studies involving larger and more diverse populations are recommended to clarify causal relationships between occupational risk factors and musculoskeletal disorders. Combining self-reported questionnaires with observational ergonomic assessments and objective physical examinations would provide a more comprehensive understanding of MSDs among hospital service workers.

Conclusion

In conclusion, musculoskeletal disorders were highly prevalent among hospital service staff, particularly in the neck, lower back, and knees. Although pain generally had a limited impact on work performance, the high prevalence of symptoms highlights the need for proactive ergonomic interventions and occupational health programs. Improving workplace ergonomics, promoting safe work practices, and implementing routine musculoskeletal surveillance may help reduce the burden of MSDs and improve the health and productivity of hospital service workers.

Abbreviations

MSDs
Musculoskeletal disorders
CMDQ
Cornell Musculoskeletal Discomfort Questionnaire
VAS
Visual Analog Scale
BMI
Body Mass Index

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Hamadan University of Medical Sciences (IR.UMSHA.REC.1403.120). All participants were informed about the objectives of the study, and written informed consent was obtained from all participants prior to data collection. Participation in the study was voluntary, and the confidentiality and anonymity of participants were strictly maintained throughout the research process.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to ethical and institutional restrictions related to participant confidentiality but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Mehrane Shabani contributed to the study conception and design, data collection, and manuscript drafting.

Alireza Jamali contributed to the study design, data interpretation, and critical revision of the manuscript.

Zahra Shaghaghi contributed to the study methodology and data analysis.

Maryam Alvandi contributed to data collection and literature review.

Maryam Mohammadian Khoshnood contributed to statistical analysis and interpretation of the findings.

Fatemeh Kholoosi Taher contributed to manuscript review and editing.

Jalal Rezai contributed to supervision and scientific consultation.

Lobat Majidi contributed to the study conception, supervision, and final approval of the manuscript.

All authors read and approved the final manuscript.

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Figures

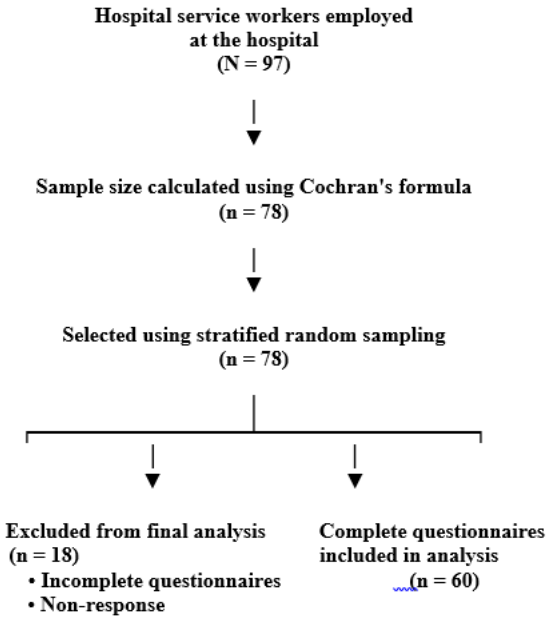


Figure 1

Flow diagram of participant selection.

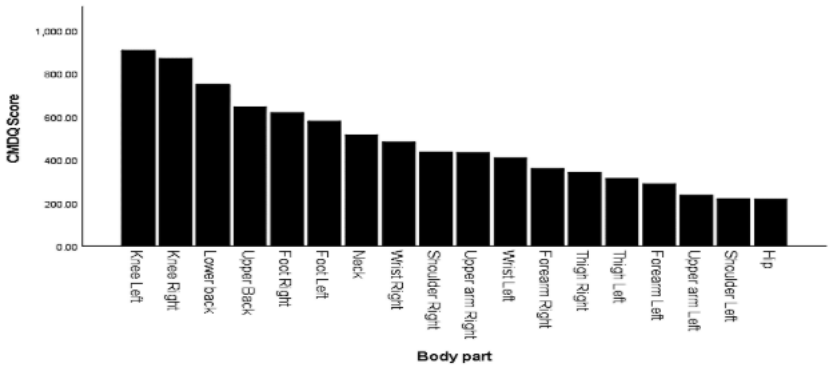


Figure 2

CMDQ scores across different body regions

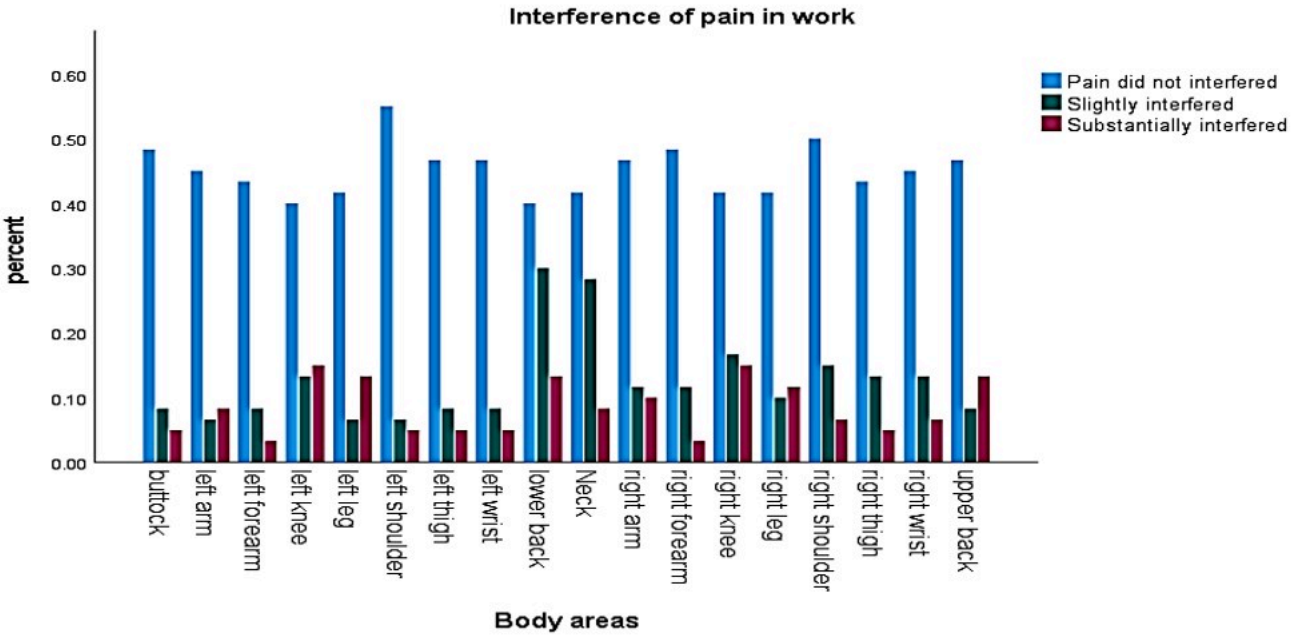


Figure 3

pain interference

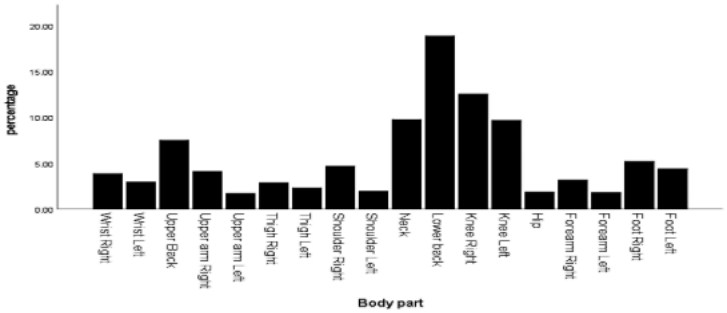


Figure 4

distribution of musculoskeletal pain across body regions