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Dr. Pavana
Associate Professor and HOD,
Department of Community
Health Physiotherapy, R V
College of Physiotherapy
Jayanagar, Bengaluru,
Karnataka, India

Shaonli Das
B.P.T. Intern, R V College of
Physiotherapy, Bengaluru,
Karnataka, India

The prevalence of work-related musculoskeletal disorder, neck and upper limb pain among female house-keeping workers in selected places of Bengaluru

Dr. Pavana and Shaonli Das

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Abstract

Background: Work-related musculoskeletal disorders (WMSD) are a group of painful disorders in which the work circumstance and representation of work contribute significantly to the atmosphere. WMSD is made worse or persists longer due to the work atmosphere when the exposure leading to the case is bodily displacement such as action like bending, stair up-down, crawling, reaching twisting overexertion, or continual motion. Studies showed that housekeepers are exposed to many high-risk factors for neck and upper limb musculoskeletal disorders. It occurs due to repetitive movements to the extremities and spine with extreme motions in the upper limbs; postural problems contribute to musculoskeletal injuries. They maintain the muscles in an abnormal position, tight or rigid, for a longer duration, resulting in muscle injury.

Objectives: To estimate the prevalence of musculoskeletal disorders and neck and upper limb pain among female housekeeping workers and the correlation between N.D.I., N.M.Q., RULA and VAS.

Methods: The study included subjects between the ages of 18 to 60. Subjects were recruited based on inclusion and exclusion criteria. Seventy-five subjects participated in this study after signing the informed consent form. The variables of musculoskeletal discomfort were assessed using the Nordic Musculoskeletal Questionnaire, Neck Disability Index, Rapid Upper Limb Assessment and Visual Analog Scale.

Results: There is a strong positive correlation between N.D.I. and VAS score, an intermediate positive correlation between RULA and VAS score, and a weak positive correlation between RULA and N.D.I. scores.

Keywords: Work-related musculoskeletal disorders, standardized nordic musculoskeletal questionnaire, neck disability index, rapid upper limb assessment, visual analog scale, house-keeping workers

Introduction

Musculoskeletal disorders (M.S.D.) cover a wide range of health problems that commonly affect the body's musculoskeletal system. Musculoskeletal disorders (M.S.D.) are injuries or pain in the human musculoskeletal system, including the muscles, nerves, tendons, joints, cartilage and spinal discs. Work-related musculoskeletal disorders (WMSD) are a group of painful disorders in which the work circumstance and representation of work contribute significantly to the atmosphere. WMSD is made worse or persists longer due to the work atmosphere when the exposure leading to the case is bodily displacement such as action like bending, stair up-down, crawling, reaching twisting overexertion, or continual motion. M.S.D.s are not caused by slips, trips, falls, or similar incidents^[1].

Musculoskeletal disorders (M.S.D.) are a significant public health problem that affects various regions of the body, such as the shoulder, elbow, lower back, hips, knees, wrist, neck, hands, upper back, ankle, and feet and are characterized by symptoms such as pain, aches, and discomfort. Workers working in different working environments, such as health care, driving, manufacturing industry, general labour, maintenance, repair, and cleaning, are potentially at risk of musculoskeletal disorders. According to the Global Burden of Disease report in 2016, M.S.D.s were among the leading causes of disability-adjusted life years with a double burden of economic costs, healthcare service utilization and social problems. Occupational-related health problems such as shoulder and neck pain are among the most common causes of morbidity and absenteeism from work and reduced productivity in many countries and have multifactorial biopsychological origin and socioeconomic costs. Two-thirds of all populations experience neck pain at some point in their lives.

Corresponding Author:
Dr. Pavana
Associate Professor and HOD,
Department of Community
Health Physiotherapy, R V
College of Physiotherapy
Jayanagar, Bengaluru,
Karnataka, India

From 1990 to 2010, the effect of adjusted life years for neck pain increased from 23.9 million to 33.6 million. According to the Global Burden of Diseases reported in 2015, neck pain was among the leading causes of disability in most parts of the country. In developing countries, implementing occupational health and safety practices is often neglected and preventive measures are poor. As a result of lack of adequate training, poor awareness, and under-reporting of problems, M.S.D. related to work have increased in developing countries and remain less prioritized [2].

Upper-limb musculoskeletal disorders (M.S.D.s) include both peripheral nerve entrapments, mainly carpal tunnel syndrome (C.T.S.) and ulnar tunnel syndrome, and peripheral enthesopathies, mainly shoulder tendinitis, lateral epicondylitis, and hand-wrist tendinitis. Numerous nonspecific musculoskeletal pain disorders can also be included under this umbrella term [3]. Musculoskeletal disorders constitute a significant source of disability, accounting for considerable economic loss globally. Studies showed that housekeepers are exposed to many high-risk factors for neck and upper limb musculoskeletal disorders [4]. The housekeeping profession is considered to be the primary workforce in any industry. It ranks as the second largest occupation, comprising 26% of all employment. Housekeeping workers do various tasks, including cleaning, washing, disposing of waste materials, shifting the tables and itineraries, and standing longer. Most women were employed in the housekeeping area in the colleges compared to the males. Occupation-related Musculoskeletal Disorder (ORMD) occurs as a result of repetitive movements to the extremities and spine with extreme motions in the upper limbs; postural problems contribute to various musculoskeletal injuries. Maintaining the muscles in an abnormal position, tight or rigid, for a longer duration results in muscle injury. The damage will be minimal in the initial stage of injury. Later, it will develop injuries that affect the function later. Tightness in the muscles causes blood flow restriction to the body parts and diminished oxygen supply to the muscle region, which causes waste and metabolite accumulation, resulting in pain and further injury. Exposure to rapid, repetitive and forceful movement continues, which may lead to localized muscle fatigue with ischemia and metabolic changes that impair muscle enzyme function [5].

Almost 60% of the working population in developing countries are engaged in jobs in unorganized or informal sectors mainly because of the frequently changing economic scenario and ample availability of low-cost workers. Work-related musculoskeletal disorders and physiological risk factors affect WMSDs, resulting in discomfort and pain. Most of these problems are generated due to repeated stress, economic hazards and infrastructural insufficiency of manual material handling (M.M.H.), which causes injuries, pain, suffering, disability, fatalities, as well as loss in efficiency and production for workers and their families with concomitant societal economic losses. Various research revealed that M.M.H. is the most frequent and expensive aetiology of WMSDs in informal sector workers whose individual factors, e.g., age, gender, weight, height, body mass index (B.M.I.), etc., also contribute much towards this disorder [6].

This study aims to investigate the prevalence of musculoskeletal disorders among female housekeeping workers in specific locations in Bengaluru. The primary objectives involve assessing the extent of musculoskeletal disorders, particularly neck discomfort and disabilities resulting from awkward postures and tool usage.

Additionally, the study aims to evaluate upper limb discomfort caused by awkward postures and tool usage through the Rapid Upper Limb Assessment (RULA). Furthermore, the research endeavors to establish a correlation between upper limb discomfort, as assessed by RULA, and neck disabilities using the Neck Disability Index (N.D.I.). The scope of the study encompasses a comprehensive examination of musculoskeletal issues, identification of risk factors, and a thorough assessment of neck and upper limb pain among female housekeeping workers in the selected areas of Bengaluru.

Methodology

This research gathered data from female housekeeping workers employed in various commercial establishments in Bengaluru. The study adopted a cross-sectional design, with data collected from a specific group of commercial females housekeeping workers in South Bengaluru using a convenience sampling technique. The sample size was determined based on a previous study, with 75 participants selected. The recruitment process took place within the community setup, and inclusion criteria were established to include those willing to participate, employed as housekeeping workers in commercial structures, female, and within the age group of 18 to 60 years. Exclusion criteria were applied to exclude individuals with recent fractures or ongoing healing, neurological impairments, musculoskeletal deformities, spinal deformities, a history of recurrent shoulder dislocation, or recent surgeries.

The data collection methods involved utilizing various materials, including stationery items, a weighing scale, inch tape, consent form printouts, screening form printouts, and questionnaire printouts. The questionnaires employed for data collection comprised the Nordic Musculoskeletal Questionnaire (N.M.Q.), Neck Disability Index (N.D.I.), Rapid Upper Limb Assessment (RULA), and Visual Analog Scale (VAS). The study spanned approximately three months for the comprehensive data collection from the identified female housekeeping workers in the specified commercial setups in Bengaluru.

Procedure

Following the approval from the Institutional Ethics Committee (I.E.C.), the researcher sought permission from commercial housekeeping agencies in South Bengaluru to recruit female housekeeping workers across various sectors. Once approval was secured from the agencies, data collection commenced, and subjects were recruited based on predefined inclusion and exclusion criteria. Baseline data were meticulously gathered, encompassing parameters such as height, weight, years of work experience, daily working hours, and socioeconomic status, documented through the Standard Living Index (SLI).

A standardized questionnaire was employed for the initial screening of subjects, and subsequent assessments involved recording the Neck Disability Index and Rapid Upper Limb Assessment. The intensity of pain experienced by the subjects was documented using the Visual Analogue Scale (VAS). The collected data underwent thorough analysis using appropriate statistical tools to draw meaningful insights and conclusions. This structured approach ensured a systematic and ethical process in the study's recruitment, data collection, and analysis phases.

The study employed standardized outcome-measuring tools to assess various aspects of musculoskeletal health among female housekeeping workers. The Standardized Nordic

Musculoskeletal Questionnaire, characterized by forced-choice variants, was a reliable instrument for analyzing musculoskeletal symptoms encountered in occupational settings. Additionally, the Rapid Upper Limb Assessment (RULA), designed by McAtamney in 2005, was utilized as a survey method for ergonomic investigations related to work-related upper limb disorders. The Neck Disability Index (N.D.I.) provided insights into how neck discomfort impacted daily activities, with its 10 components scored from 0 to 5, resulting in a documented score out of 50. The Visual Analog Scale (VAS) for pain, represented by a straight line indicating varying pain levels, allowed participants to mark their perceived pain intensity, aiding in determining appropriate pain management strategies. These standardized tools collectively facilitated a comprehensive evaluation of musculoskeletal issues, work-related strain, and the impact on daily activities among the female housekeeping workers in the study.

The study utilized statistical tools for data analysis, employing descriptive statistics for categorical variables and mean ± standard deviation for quantitative variables with a 95% confidence interval. Inferential statistics, including Pearson's or Spearman's Rank correlation, assessed relationships between variables, considering significance at $p < 0.05$. Data entry was performed using R Version 4.1.0, with Microsoft Excel 2016 and Microsoft Word 2016 used to create tables and graphs.

Results analysis

The data obtained from the study were analyzed statistically and presented as follows.

Table 1: Age Distribution of Female House-keeping Workers

Age (Years)	Number (n= 75)	Percentage (%)
21-30	22	29.33
31-40	26	34.67
41-50	19	25.33
51-60	8	10.67

Table 2: Distribution of Body Mass Index of Female House-keeping workers

B.M.I.	Number (n =75)	Percentage (%)
Underweight (<18.5)	1	1.33
Normal Weight (18.5 – 24.9)	24	32
Pre-Obesity (25.0 – 29.9)	39	52
Obesity Class I (30.0 – 34.9)	9	12
Obesity Class II (35.0 -39.9)	2	2.67

Table 3: The Prevalence of Musculoskeletal Disorders in housekeeping workers during the last 12 months

Pain in body parts	Number (n=75)	Prevalence (%)
Neck	28	37.3
Shoulder	Right	10
	Left	7
	Both	14
Elbow	Right	9
	Left	3
	Both	6
Wrist	Right	6
	Left	1
	Both	8
Upper Back	11	14.6
Lower Back	36	48
Hips	14	18.6
Knee	21	28
Ankle	6	8

Table 4: The Prevalence of Musculoskeletal disorders in housekeeping workers during the last 7 days

Pain in body parts	Number (n=75)	Prevalence (%)
Neck	30	40
Shoulder	Right	8
	Left	3
	Both	10
Elbow	Right	2
	Left	1
	Both	4
Wrist	Right	9
	Left	2
	Both	6
Upper Back	11	14.6
Lower Back	34	45.3
Hips	11	14.6
Knee	16	21.3
Ankle	7	9.3

Table 5: The Prevalence of Musculoskeletal disorders affecting A.D.L. during the last 12 months in housekeeping workers

Pain in body parts	Number (n=75)	Prevalence (%)
Neck	19	25.3
Shoulders	14	18.6
Elbows	7	9.3
Wrist	7	9.35
Upper Back	9	12
Lower Back	23	30.6
Hips	11	14.6
Knee	14	18.6
Ankle	6	8

Table 6: Correlations between VAS, N.D.I., and RULA score

Correlations		VAS score	N.D.I. score	RULA score
VAS score	Pearson Correlation	1		
	Sig. (2-tailed)			
N.D.I. score	Pearson Correlation	0.766**	1	
	Sig. (2-tailed)	< 0.001		
RULA score	Pearson Correlation	0.389**	0.222	1
	Sig. (2-tailed)	0.001	0.056	

**Correlation is significant at the 0.01 level (2-tailed)

This study has shown

- A highly significant positive correlation between N.D.I. and VAS scores ($r = 0.766, p < 0.001$).
- There is a significant intermediate positive correlation between RULA and VAS scores ($r = 0.389, P = 0.001$).
- However, a weak positive correlation between RULA and N.D.I. scores ($r = 0.222, P = 0.056$) is not statistically significant.

Discussion

The study aimed to assess the prevalence and correlation of work-related musculoskeletal disorders (MSDs) and neck and upper limb pain among female housekeeping workers. The findings revealed that MSDs pose a significant burden, aligning with global reports that highlight MSDs as a leading cause of disability-adjusted life years and substantial economic and social impacts. 1, 2 Housekeepers are vulnerable due to the nature of their tasks, which often involve prolonged standing, incorrect postures, and repetitive overhead activities [3].

The present study found that among the 75 female housekeeping workers, 18.67% were illiterate, 9.33% had attended primary school (1st-4th grade), 26.67% had attended high school (5th-9th grade), 33.33% had completed SSLC,

and 12% had completed PUC. Additionally, 96% of the workers were right-handed and 4% were left-handed. In terms of working hours, 58.67% worked 5-7 hours a day, while 39.74% worked 8-10 hours a day. Regarding the Standard of Living Index (SLI), 28% had a low SLI, 69.33% had a middle SLI, and 2.67% had a high SLI.

Low back pain was identified as the primary complaint among the participants (48%), followed by neck pain (37.3%), knee pain (28%), and bilateral shoulder pain (18.6%). These results are consistent with previous studies that also reported high incidences of MSDs among housekeeping personnel due to similar occupational risk factors [4, 5]. The Global Burden of Disease report (2016) underscores the significant global disability and economic burdens posed by MSDs, especially in occupations like housekeeping [1].

Strong positive correlations were found between the Neck Disability Index (NDI) and Visual Analog Scale (VAS) scores ($r=0.766$, $p<0.001$), indicating that higher pain levels significantly impact neck posture. This finding aligns with other studies that have established a strong relationship between neck disability and perceived pain levels [6, 7]. The intermediate positive correlation between Rapid Upper Limb Assessment (RULA) and VAS scores ($r=0.389$, $P=0.001$) further suggests that pain adversely affects upper limb function during tasks such as cleaning and lifting.⁸ The weak correlation between RULA and NDI scores ($r=0.222$, $P=0.056$) suggests that while upper limb ergonomics play a role, other factors might also contribute to neck disability.

Addressing these concerns necessitates prioritizing occupational health and safety practices, especially in developing countries where preventive measures are often inadequate. Implementing ergonomic interventions could mitigate the risk of MSDs, reduce physical exhaustion, and prevent injuries [9]. For instance, previous research has shown that ergonomic analysis and intervention can significantly reduce the incidence of MSDs [10]. Future research should focus on broader demographics and explore intervention strategies that could alleviate the physical strain experienced by housekeeping workers.

Conclusion

The study concludes that there is negligible risk among null respondents, with varying risk levels among others, underscoring the need for targeted ergonomic interventions. However, the study's limitations, including gender imbalance and an incomplete assessment of upper limb dysfunction, highlight the need for further research. Future studies should involve more diverse demographics, particularly among female housekeeping workers, and employ cross-sectional methods for deeper insights [11, 12].

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