

ASSESSMENT OF INCIDENCE OF WORK-RELATED MUSCULOSKELETAL DISORDERS, LUNG FUNCTIONS AND HEALTH RELATED QUALITY OF LIFE AMONG HOSPITAL SANITARY WORKERS IN A RURAL HEALTH CARE SETTING

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Abstract In the backdrop of rural healthcare settings, hospital sanitary workers form the cornerstone of maintaining a sterile and safe environment for both patients and healthcare professionals. Despite their critical role, these workers are often exposed to occupational hazards that can lead to work-related musculoskeletal disorders (WRMSDs), compromised lung functions, and a diminished quality of life. This study delves into the prevalence of WRMSDs among this demographic, evaluates their pulmonary health, and assesses the overall impact on their quality of life. Through this assessment, we aim to highlight the occupational health challenges faced by sanitary workers in rural hospitals and underscore the need for targeted interventions to safeguard their health and well-being. The cross-sectional study engaged 60 sanitary workers from a rural multi-specialty hospital. Following informed consent, participants meeting the inclusion and exclusion criteria were enrolled. We assessed work-related musculoskeletal disorders, quality of life, and lung functions as outcome measures. The data revealed that the majority of workers experienced upper back pain (45%), followed by lower back pain (30%), shoulder pain (25%), and wrist and hand pain (21.7%). Quality of life assessments indicated impacts on physical health, psychological well-being, and social relationships. Pulmonary Function Tests (PFT) showed no significant alterations in lung function parameters such as Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV1), FEV1/FVC ratio, and Peak Expiratory Flow Rate (PEFR) among the workers. In conclusion, hospital sanitary workers exhibit a higher propensity for musculoskeletal disorders and a comparatively lower quality of life, particularly in physical health, psychological state, and social relationships. Nonetheless, lung function remained largely unaffected, likely due to the effective use and awareness of personal protective equipment within the study environment.

Keywords: Occupational exposure; work related musculoskeletal disorder; occupational hazards; health related quality of life and sanitary worker; ergonomics.

1. INTRODUCTION

Healthcare waste has been identified as one of the main issues that have a detrimental effect on the environment and human health within the last 20 years. Hospital garbage has long been considered special waste by the World Health Organization (WHO), and it is now widely accepted that some types of medical waste are among the most toxic and possibly dangerous waste that arises in communities. Hazardous wastes can come in many forms from health care operations. Hazards to the environment and workers' health may arise from improper handling of these waste materials [1].

The working environment has a big impact on employees' health. People who operate in dusty environments are more likely to breathe in particulate matter, which can have a negative impact on

their respiratory systems. Regular workplace exposure to a variety of hazardous substances might negatively impair a hospital sanitary worker's lung function and ultimately lower their quality of life [2,3].

Lung diseases and obstruction of airways resulting from occupational exposures are mostly caused by inhalation of dust, toxic chemicals, burning solid waste [4]. The World Health Organization estimates that between 75 and 90 percent of trash produced in healthcare facilities is not harmful; the remaining 10 to 15 percent waste products may cause hazards to occupational and environmental health [4].

A musculoskeletal disorder is characterized by painful symptoms that affect tendons, muscles, nerves, ligaments, and other structures that are responsible for movements of the upper limb, shoulder, neck, back, and lower limb [5]. One of the most frequent reasons people seek medical attention is for musculoskeletal disorders. It is still musculoskeletal illnesses that cause the majority of disabilities and missed work hours [6].

The roles and responsibilities of hospital sanitation workers are crucial for maintaining a clean and safe healthcare environment. They perform regular cleaning, sanitizing, and maintenance tasks in hospital spaces. This includes patient rooms, corridors, waiting areas, and common areas. They help maintain debris-free, clean, and orderly clinical and surgical areas. Proper sanitation is essential to prevent the spread of infections and maintain patient safety. Sanitation workers ensure that trash, waste, and debris are disposed of properly. This includes handling biohazardous materials, sharps, and general waste. They play a critical role in maintaining a hygienic environment by repetitive mopping surfaces and floors, collection of the garbage from various places in the hospital and proper disposal. Their job includes repetitive tasks, lifting of objects, long standing hours. These factors may pose them to musculoskeletal problems if proper principles of ergonomics are not followed.

Nordic group has created a standardized questionnaire for the investigation of musculoskeletal system problems in response to these factors. The Nordic Musculoskeletal Questionnaire is a publicly available, freely accessible tool that was created as part of a Nordic Council of Ministers initiative. The Nordic Musculoskeletal Questionnaire has two potential uses: (i) As an evaluation tool for MSD screening in an ergonomic setting; and (ii) as a worker health tool [5]. In these settings, sanitary workers are exposed to a variety of occupational dangers that can cause illnesses or impairments [7].

The indoor air quality and respiratory health of hospital staff can be affected by a variety of biological and chemical exposures found in the sanitary work environment. Tests for pulmonary function can yield critical insights into these crucial, unique mechanisms that underpin gas exchange. Tests for pulmonary function provide precise, repeatable evaluation of the respiratory system's functioning status. It is important to emphasize that tests of lung function do not identify particular illnesses. The patterns of abnormalities in a battery of pulmonary function tests vary depending on the condition. By quantifying the severity of respiratory diseases, these patterns help us identify the disease at an early stage and describe its course and response to therapy [8].

The present study was aimed to assess the prevalence of work-related musculoskeletal disorders (WRMSDs), lung functions, and quality of life (QoL) among hospital sanitation workers since it is important for several reasons:

1. *Occupational Health Surveillance*: Sanitation workers are often exposed to physical strains and biohazards that can lead to WRMSDs and respiratory issues. Regular assessment helps in monitoring the occupational health risks associated with their work.
2. *Preventive Measures*: Understanding the prevalence and factors contributing to these conditions can guide the development of targeted interventions, such as ergonomic adjustments and protective equipment, to prevent injuries and illnesses.
3. *Quality of Life Enhancement*: Assessing QoL can reveal the broader impact of occupational hazards on workers' physical, mental, and well-being, leading to comprehensive support programs.
4. *Research and Education*: Such assessments contribute to the body of knowledge necessary for educational programs that train workers on safe practices and self-care strategies.
5. *Healthcare Resource Planning*: Understanding the health status of sanitation workers aids hospitals in planning for appropriate healthcare services to address the specific needs of this workforce.

To summarise, these assessments are essential for safeguarding the health and well-being of hospital sanitation workers, ensuring they have a safe working environment, and maintaining their ability to perform their critical role in healthcare settings effectively.

2. METHODOLOGY

This observational crosssectional study was conducted at Rural Hospital located in Maharashtra, India which focused on the hospital's sanitary workforce. Institutional ethics committee approval was secured from the institutional Ethical committee prior to participant screening based on defined inclusion and exclusion criteria stated as following:

Inclusion criteria for group A:

- Hospital sanitary workers
- Working more than 4 hours
- Work experience more than 5 years
- Age 35 to 50

Exclusion criteria:

- Cigarette smokers
- Worker with a known case of any respiratory diseases (pulmonary tuberculosis, bronchial asthma, chronic bronchitis, emphysema, etc.)
- Worker with clinical abnormalities of vertebral column and thoracic cage
- Worker with undergone recent surgery

Participants were selected using a purposive sampling method. Prospective participants were thoroughly briefed on the study's objectives in their preferred language, ensuring comprehension, and written informed consent was obtained thereafter.

Initially, 80 workers were screened for the study; however, 20 were subsequently excluded based on the stipulated criteria. The remaining 60 participants underwent an evaluation for musculoskeletal disorders was done using Nordic Musculoskeletal questionnaire. Lung functions were assessed by

Pulmonary Function Tests (PFT, RMS Helios 401), the values of Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV1), FEV1/FVC ratio, and Peak Expiratory Flow Rate (PEFR) were considered for analysis. Furthermore, participants completed the WHOQoL-BREF questionnaire in regional language, reflecting their current day-to-day life performance. Prior to initiating the study, formal authorization to employ the WHOQoL-BREF was granted by the World Health Organization. Additionally, we obtained the necessary permissions from the hospital authorities. These approvals ensured that the study was conducted in compliance with both international guidelines and local institutional policies. Further the data was collected and analysed.

3. STATISTICAL ANALYSIS AND RESULTS

Data was collected and analysed using Microsoft Excel software. Descriptive statistics was used to determine percentages. Furthermore, the data was presented in tabular and graphical formats. The Demographic characteristics are tabulated in table 1 shows full time sanitary workers as per age criteria which was shown in criteria (30-40) 25 participants, (41-50) 35 participants. The average age was 41.116 ± 5.9614 .

Table 1. Demographic characteristics.

Age (years)	Numbers of people	Percentage
30-40	25	41.66%
41-50	35	58.33%
Gender		
Male	36	60%
Female	24	40%
Higher education		
Primary school	28	46.7%
Secondary school	27	45%
Tertiary/ graduation	5	8.3%
Marital status		
Married	54	90%
Unmarried	6	10%

Presence of various addictions except cigarette smoking (as it was excluded already) are depicted in Figure 1.

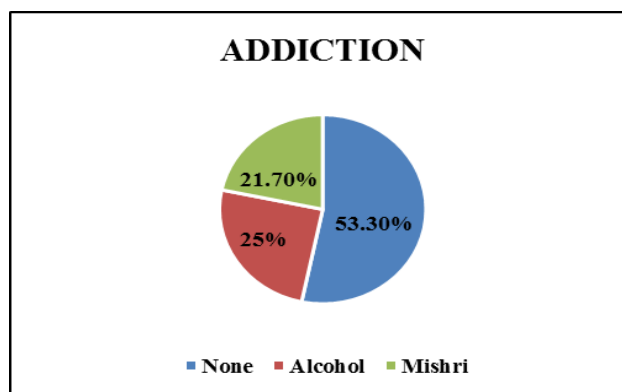


Figure 1. Presence of addictions among the participants.

Table 2. Assessment of WRMSDs.

Region	Have you at any time during the last 12 months had trouble (ache, pain, discomfort, numbness) in:		Have you at any time during the last 12 months been prevented from doing your normal work (at home or away from home) because of the trouble		Have you had trouble at any time during last 7 days?	
	No	Percentage	No	Percentage	No	Percentage
Neck	9	15%	2	3.3%	2	3.3%
Shoulder	15	25%	0	0%	0	0%
Elbow	5	8.3%	3	5%	0	0%
Wrist/hands	13	21.7%	6	10%	6	10%
Upper back	27	45%	14	23.3%	8	13.3%
Lower back	18	30%	6	10%	6	10%
One or both hips	0	0%	0	0%	0	0%
One or both knees	8	13.3%	4	6.7%	4	6.7%
One or both ankles/feet	7	11.7%	3	5%	3	5%

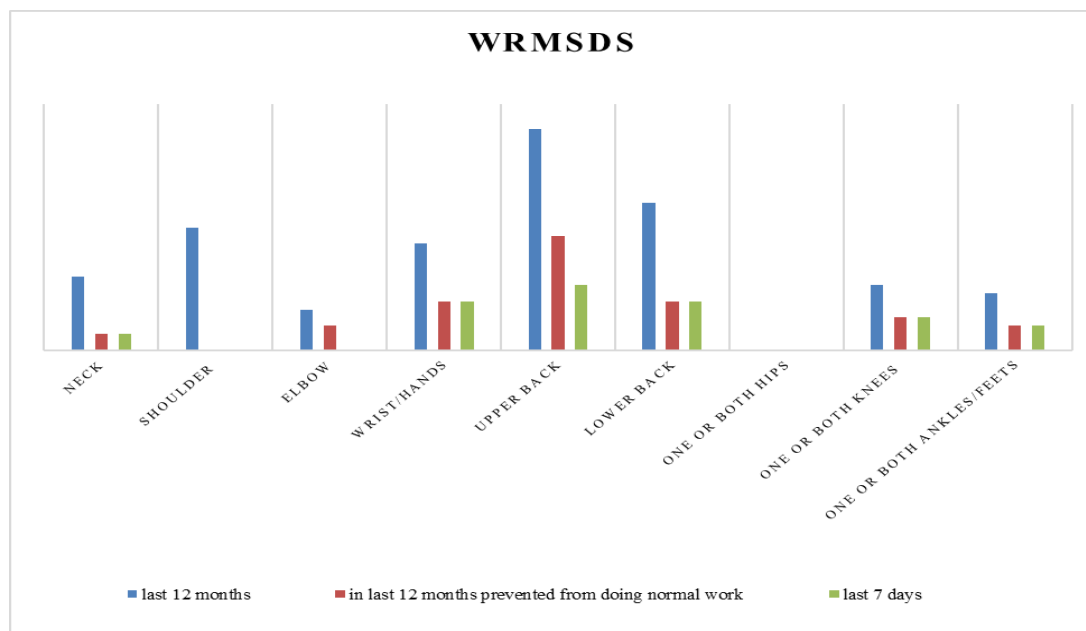


Figure 2: Assessment of WRMSDs.

Table 2 and figure 2 shows assessment of WRMSDs among the sanitary workers assessed by Nordic Musculoskeletal Questionnaire. The results show high percentage of workers had upper back pain with 45% in last 12 months with prevented them from doing normal. In comparison to the upper back, the lower back had lesser involvement, with 30% experiencing issues. Of these, 10% reported

problems in the last 12 months, and another 10% had troubles in the past 7 days. After that shoulder 25%, wrist/hands 21.7%, neck 15%, one or both the knees 13.3% after that 11.7% of one or both ankle/feet with 0% of chances of affected one or both hips.

Table 3. Assessment of Health-Related Quality of Life (HRQoL).

Domain	Mean value	SD value
Overall health related quality of life and general health	7.73	1.35
Physical health	27.56	3.99
Psychological	22.51	3.14
Social relationship	11.8	1.76
Environmental	30.38	4.76

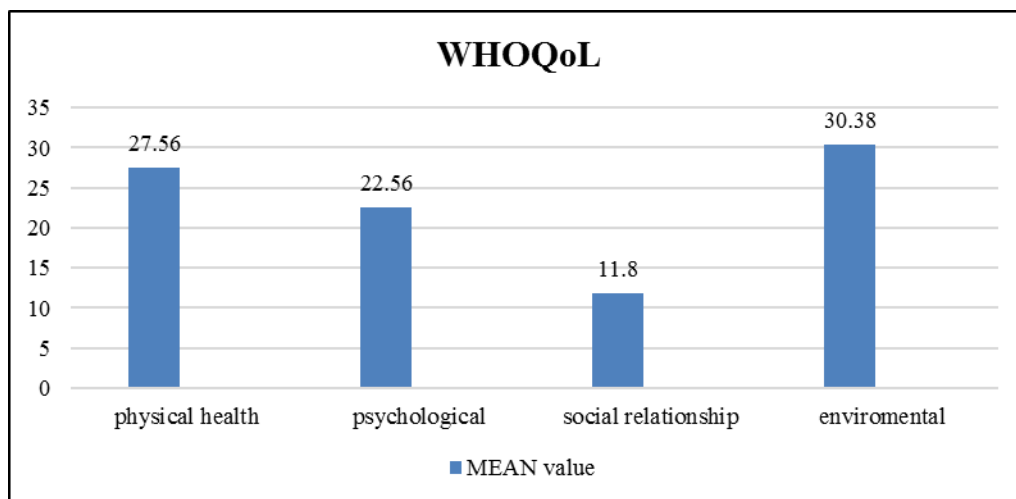


Figure 3. Assessment of Health Related Quality of Life (HRQoL).

Table 3 and Figure 3 depicts the assessment of Health-related quality of life among the sanitary workers which shows lower quality of life in Social, Psychological and Physical health domains. Assessment of Lung function tests values are reported in table 5.

Table 5. Assessment of Lung Function Tests.

	MEAN value	SD value
FVC	79.95	14.629
FEV1	75.8	14.508
FEV1/FVC	97	20
PEFR	71.38	16.82

4. DISCUSSION

This study was undertaken to ascertain the prevalence of work-related musculoskeletal disorders (WRMSDs), health-related quality of life, and lung function among sanitary workers in a hospital

setting. Historical accounts trace the recognition of occupational factors contributing to musculoskeletal disorders back to the 18th century. The World Health Organization characterizes WRMSDs as a spectrum of inflammatory and degenerative conditions causing pain and functional impairment, often exacerbated by certain work environments and activities [10].

In our study, the Nordic Musculoskeletal Questionnaire was employed to evaluate WRMSDs. Notably, the most severe cases of WRMSDs were reported by participants over the age of 35. Within the past year, 45% of participants reported experiencing upper back pain, with 30% reporting lower back pain. Additionally, 23.3% indicated that upper back pain hindered their normal activities. Contributory factors may include tasks such as sweeping, prolonged object handling, repetitive shoulder and neck movements, and sustained postural strain, predominantly affecting the upper back. Lower back discomfort, affecting 30% of workers, was primarily attributed to prolonged standing, heavy lifting, and constant bending, potentially leading to reduced job productivity and satisfaction.

Comparatively, a study by Pradeep Salve et al. (2017) found a higher incidence of WMSDs and related disabilities among waste loaders, with the most common afflictions occurring in the lower back (39%), followed by the hips/thighs (34%), upper back (32%), shoulders (26%), and neck (13%) [15].

Abou-Elwafa HS et al. (2012) conducted a study revealing that 60.8% of Municipal Solid Waste (MSW) collectors reported musculoskeletal complaints, with the lower back being the most commonly affected area. The study identified several independent risk factors for these symptoms, including the duration of employment, decision-making autonomy, and physically demanding tasks such as lifting heavy loads and prolonged walking. Among the MSW collectors, the prevalence of musculoskeletal complaints was 22.5% for the lower back, 15.8% for the shoulders, 7.5% for the neck, 6.7% for the knees, and 5.8% for both hips/thighs and elbows. Notably, the incidence of complaints in the neck and hips/thighs was significantly higher among MSW collectors compared to a control group. The study suggests that the high volume of manual waste handling and lack of ergonomic practices, particularly among illiterate workers who may not be aware of proper safety techniques, are key contributing factors to these disorders [13].

Our study revealed that within the past year, 25% of sanitary workers reported shoulder pain, which impeded their ability to perform tasks. Neck pain was reported by 15% of workers, causing significant disruption to work, with 3.3% experiencing this pain in the last week. Elbow pain was noted by 8.3% of participants over the year, with 5% finding it restrictive to their work.

Wrist and hand pain were also prevalent, with 21.7% of workers experiencing pain that interfered with daily life over the past year. Additionally, 10% reported pain that affected their work, and another 10% experienced pain in the last week. Knee pain was reported by 13.3% of workers, causing difficulty in performing work-related activities, and 6.7% experienced knee pain in the preceding week.

Ankle/foot pain was reported by 11.7% of workers over the year, posing challenges to manage, and 5% found it restrictive to both normal and work activities, with another 5% reporting pain in the last week. Notably, no instances of hip pain were reported by any participants in the last year or week.

The study by Kanjanar Pintakham et al. (2016) aligns with our findings, indicating a high incidence of musculoskeletal discomfort among workers, particularly affecting the wrists/hands (86.7%), shoulders (84%), and neck (76%). Similarly, street sweepers, who often engage in prolonged work with long-handle brooms and wheelbarrows, exhibit an increased risk of musculoskeletal disorders (MSDs) due to the repetitive and strenuous nature of their tasks [14].

Pradeep Salve et al. (2017) further corroborate these observations, noting that street sweepers have a significantly higher prevalence of MSDs in the shoulders, wrists/hands, and elbows compared to non-sweeping employees extensive of the Greater Mumbai Municipal Corporation. This disparity is attributed to the constant physical demands of sweeping and manual waste transportation, which necessitate sustained, unvaried postures [15].

Moreover, the prevalence of MSDs among street sweepers extends to the lower back, wrists/hands, shoulders, elbows, and hips/thighs, surpassing that of employees not involved in sweeping. Propensity score matching analysis suggests that exposure to street sweeping markedly elevates the risk of developing MSDs and associated disabilities. The duration of employment in street sweeping, job satisfaction, and work location have emerged as significant predictors of MSDs, emphasizing the need for ergonomic interventions and preventive measures.

Sanitary workers represent a highly vulnerable occupational group when it comes to musculoskeletal disorders (MSDs). Factors such as prolonged employment, limited autonomy in job roles, and the physically intensive nature of their duties—including lifting, pulling, pushing substantial loads, frequent bending, twisting, and walking—are likely contributors to the elevated incidence of MSDs in this demographic. Moreover, the educational level of workers, particularly those who are illiterate or possess only primary education, seems to correlate with a lower awareness of health risks and the potential adverse effects of their collection methods [11].

In terms of health-related quality of life, the physical health domain scored at 27.56, reflecting the impact of extended working hours, insufficient rest, and the presence of musculoskeletal disorders. The psychological domain, with a score of 22.51, is influenced by factors such as inadequate compensation, job dissatisfaction, and the consequent inability to concentrate. Social relationships also suffer, scoring 11.8, due to limited family time and challenges in maintaining friendships, attributed to the demanding nature of their work. Conversely, the environmental domain scored 30.38, indicating minimal impact, likely due to the benefits of residing in rural areas characterized by lower pollution levels and a cleaner natural environment.

The study by Kulkarni MS et al. (2019) highlighted a significant disparity in the Physical domain (Domain 1) for garbage workers when compared to a control group of normal individuals. However, no statistical significance was found in the Psychological, Social, and Environmental domains (Domains 2, 3, and 4) for garbage workers versus normal individuals [2].

In our research, Pulmonary Function Test (PFT) values indicated no significant decline in lung function parameters among hospital sanitary workers. The values were recorded as follows: Forced Vital Capacity (FVC) at 79.95 ± 14.629 , Forced Expiratory Volume in one second (FEV1) at 75 ± 14.508 , FEV1/FVC ratio at 97 ± 20 , and Peak Expiratory Flow Rate (PEFR) at 71.38 ± 16.82 .

In our investigation, it was noted that a minority of participants, accounting for 10%, experienced airway obstruction, while the vast majority, 90%, maintained normal Pulmonary Function Test (PFT) values. The favourable outcomes can largely be attributed to the diligent use of personal protective equipment (PPE) and the educational initiatives promoting its correct application, which have been instrumental in fostering respiratory health among workers. However, the instances of airway obstruction observed could potentially be linked to factors such as exposure to toxic substances, suboptimal PPE usage, inadequate living conditions, and agricultural environmental influences.

In contrast, the research conducted by Kulkarni MS et al. (2019) revealed a notable decline in lung function parameters—such as Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV1), FEV1/FVC ratio, and Peak Expiratory Flow Rate (PEFR)—among garbage workers when compared to a normative population. The study attributes this reduction to prolonged exposure to dust, which is considered a primary agent affecting respiratory health and is known to cause both acute and chronic impairment of lung function [2].

The research by Mustajbegovic J, et al. (1994) posits that sanitation workers are susceptible to developing chronic respiratory symptoms and alterations in lung function, particularly in Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV1). This suggests a significant occupational health concern for those in the sanitation sector [16].

Further supporting this notion, Heldal et al. (2003) identified garbage workers as being particularly at risk due to exposure to bioaerosols produced during the decomposition of organic waste. The modern practices of waste sorting, collection, and recycling have introduced new occupational hazards for these workers. The inhalation of bioaerosols, a byproduct of organic waste decomposition, is a significant contributor to these risks [17].

The study done by Getahun et al. (2019) found that cleaners had significantly lower mean actual and percent predicted values for Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV1), FEV1/FVC ratio, Peak Expiratory Flow Rate (PEFR), and Forced Expiratory Flow at 25–75% (FEF25–75%). This indicated both obstructive and restrictive patterns of pulmonary function impairment among the cleaners, with no mixed patterns observed in either group. Specifically, 24.3% of cleaners ($n=17$) and 8.6% of controls ($n=6$) exhibited an obstructive pattern, characterized by actual FEV1/FVC ratios less than 70% and FEV1 percent predicted values below 80%. Additionally, 22.9% of cleaners ($n=16$) and 4.3% of controls ($n=3$) showed a restrictive pattern, with actual FEV1/FVC ratios above 70% and FVC percent predicted values under 80%. Consequently, the prevalence of both obstructive and restrictive pulmonary impairments was notably higher among cleaners. The study suggests that the increased risk for these pulmonary function impairments among cleaners may be linked to prolonged exposure to various sensitizing and irritating cleaning chemicals, as well as dust accumulation from floor surfaces. These findings underscore the occupational health risks faced by cleaners due to their work environment [18].

In conclusion, the present research underscores the significant occupational health risks faced by sanitation and garbage workers in hospital settings. The consistent findings across various studies reveal that these workers are at a heightened risk for developing WRMSDs. The studies collectively highlight the critical need for improved safety measures, periodic ergonomics assessments and awareness and the implementation of educational programs to mitigate these risks. Ensuring the health and safety of these essential workers is not only a matter of occupational health but also a broader public health concern. Indeed, the scope of this study is confined to sanitary workers within a single hospital, which may limit the generalizability of the findings to other settings. Future research could benefit from a multicenter approach, encompassing a broader demographic and a variety of work environments to enhance the applicability of the results across different contexts.

5. CONCLUSION

The study's findings indicate that hospital sanitation workers are more susceptible to musculoskeletal disorders, leading to a relatively lower quality of life, particularly in the domains of physical health, psychological well-being, and social relationships. However, due to the effective use of personal protective equipment, the impact on lung functions is minimal.

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