

Evaluation of body posture for risk of work-related musculoskeletal disorders among the housekeeping staff of Pune malls

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Abstract—

Background: Work-related musculoskeletal disorders, which affect various body parts, are prevalent in housekeepers. Housekeeping employees are more likely to get work-related musculoskeletal diseases because of the uncomfortable posture they adopt when working longer shifts. Furthermore, biomechanical strain aspects such as joint torque, compressive and shear forces, and their influencing factors, including specific muscle activity, body location, the direction of effort, and the workspace are included in push-pull activities. In order to prevent future work-related musculoskeletal problems, this study aimed to examine the posture of housekeeping staff members and assess their risk of developing such disorders. Additionally, the study intends to teach them about proper posture and how to prevent work-related musculoskeletal disorders in the future.

Method: The study enrolled 216 participants (Housekeeping staff). The REBA (Rapid Entire Body Assessment) Scale was used to evaluate the body posture for risk of developing work-related musculoskeletal disorders.

Result: Assessment of body posture using the REBA scale among 216 housekeeping staff showed that nearly half of the participants (48.6%) fell into the medium risk category (scores 4–7), indicating a need for further investigation and timely corrective measures. About 29.2% were in the low risk group (scores 2–3), while 10.6% had a negligible risk (score 1). However, a noteworthy proportion had higher risk: 9.7% were in the high-risk group (scores 8–10), and 1.9% were at very high risk (score 11), requiring urgent ergonomic intervention. Tasks such as dusting, pushing the trolley, and cleaning the washrooms showed particularly medium risk scores. Mopping, the most frequent activity, was associated with both low and medium risk levels, whereas picking up trays showed relatively lower risk, with most workers in the negligible and low categories. On the other hand, the task of sweeping and cleaning the tables was associated with medium and low risk scores.

Conclusion: The study revealed that the majority of the housekeeping staff fell under the medium risk category, followed by low risk, negligible risk, high risk and very high risk categories, respectively. The risk was not found to be uniform across all tasks. Dusting, pushing the trolleys cleaning the washroom were identified as the most hazardous activities.

Index Terms— Housekeeping staff, Work-related musculoskeletal disorders, Awkward posture, REBA (Rapid Entire Body Assessment), Ergonomics, Cleaning the tables, Picking up trays, Pushing the trolley, Cleaning the washroom, Dusting, Sweeping, Mopping, Malls.

I. INTRODUCTION

The number of malls has increased dramatically over the last few years in every Indian metropolis, with Pune city seeing the largest expansion. Malls face fierce competition to remain in the market and attract and retain customers, as they are the commercial shopping and entertainment hubs of cities. Malls have a lot of common cafeterias. There will be a lot of spilling as a result, which means a lot of effort. Additionally, cleaning frequency has risen. Thus, the expense of hiring cleaners and housekeepers has been greatly reduced by the mall management. As a result, housekeepers now have less stable, fulfilling jobs that also coincide with an increase in stress and health issues.⁽¹⁾

An important department in malls is housekeeping. Ensuring cleanliness is the primary responsibility of the housekeeping department. The housekeeping profession is currently the second most popular vocation, employing 26% of the workers across all industries.⁽²⁾ The housekeeping staff's duties, which include pushing and pulling the scrap trolleys, drawing and disinfecting the bathrooms, mopping the bottoms, and clearing the tables, raise physical strain and run the threat of musculoskeletal problems.^(2,3,4)

Work-related musculoskeletal diseases(WRMSDs) are the main cause of physical conditions of workers in the plant.⁽⁵⁾ WMSDs are the most severe consequence of the incorrect use of work-related musculoskeletal loads, which makes them a popular exploration content in the field of ergonomics.⁽⁵⁾ Because of the lack of symptoms and detection of WMSDs in the early stage, they're fluently ignored by people. ⁽⁵⁾When the working posture differs from the neutral posture in which the body is aligned and balanced while placing minimum stress on the muscles, tendons, nerves, and bones, the stress on the body region(i.e., the muscles, tendons, joints, arms, hands, and shoulders) increases, working in awkward postures and/ or movements of the body region of the workers, in turn leading to a negative impact on the safety and health of the workers. ⁽⁶⁾ Musculoskeletal disorder (MSD) is commonly caused by overexertion, muscle strain and repetitive strain. ⁽⁷⁾

The majority of housekeeping staff suffer from pain at the small joints, especially the wrist, hand, bases, etc. So, to estimate the trouble of WRMS conditions, there are many different scales like RULA, REBA, Nordic Questionnaire, OWAS, etc., out of

which REBA is designed for easy use without the need for an advanced degree in ergonomics or expensive equipments. The REBA is a postural analysis tool sensitive to musculoskeletal risks in a variety of tasks and assessment of working postures set up in health care and other service industriousness, REBA was used to assess body postures that are considered trouble factors for work related musculoskeletal conditions during work. The REBA method's primary benefits are the ratio of cost-effectiveness is favourable, applying it is simple. Data collecting can be done with just pen and paper, but computer programs can speed it or make it easier. After evaluating each body area, the individual score is used to determine the ergonomic characteristics that are the most conflicting.

II. MATERIALS AND METHODOLOGY

216 housekeeping staff aged 20 to 40 years participated in a cross-sectional observational study. The subjects were recruited on the basis of inclusion and exclusion criteria. The study was explained, and consent was taken from the participants. The body postures acquired while performing various tasks like dusting, mopping, sweeping, pushing the trolley, cleaning the table, cleaning the washroom, and picking up trays were evaluated using Rapid Entire Body Assessment (REBA). The study was analysed and categorised according to the risk of work-related musculoskeletal disorders.

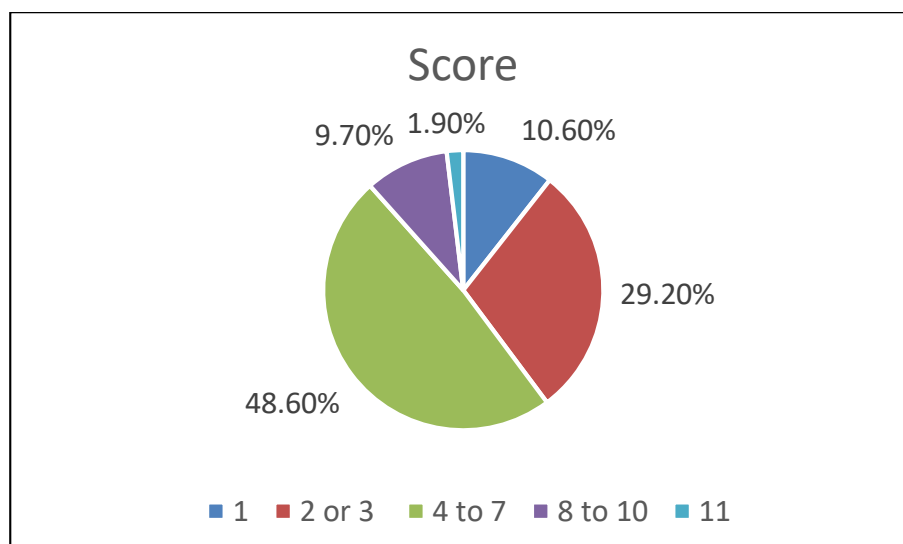
III. RESULTS

The research conducted aimed to evaluate the body posture for risk of work related musculoskeletal disorder among the housekeeping staff of pune malls. The study included 216 housekeeping staff aged between 20 and 40 years. The majority of participants were in the older age brackets, with the highest representation at 40 years (18.76%) and 35 years (16.89%), followed by 38 years (11.53%) and 39 years (8.07%). Relatively fewer participants were observed in the younger age groups (20–25 years), accounting for less than 10% of the total sample. The study suggested that a large proportion of the housekeeping workforce in Pune malls consists of individuals in their mid to late 30s and early 40s. Out of the 216-housekeeping staff, the majority were female (58.80%), while males constituted 41.20% of the workforce.

TABLE 1: RISK-WISE DISTRIBUTION OF HOUSEKEEPING STAFF

SCORE	INTERPRETATION	COUNT	PERCENTAGE
1	Negligible risk	23	10.6%
2 or 3	Low risk, change may be needed	63	29.2%
4 to 7	Medium risk, further investigation,change soon	105	48.6%
8 to 10	High risk, investigate and implement change	21	9.7%
11	Very high risk, implement change	4	1.9%
Grand Total		216	100%

GRAPH 1: RISK-WISE DISTRIBUTION OF HOUSEKEEPING STAFF

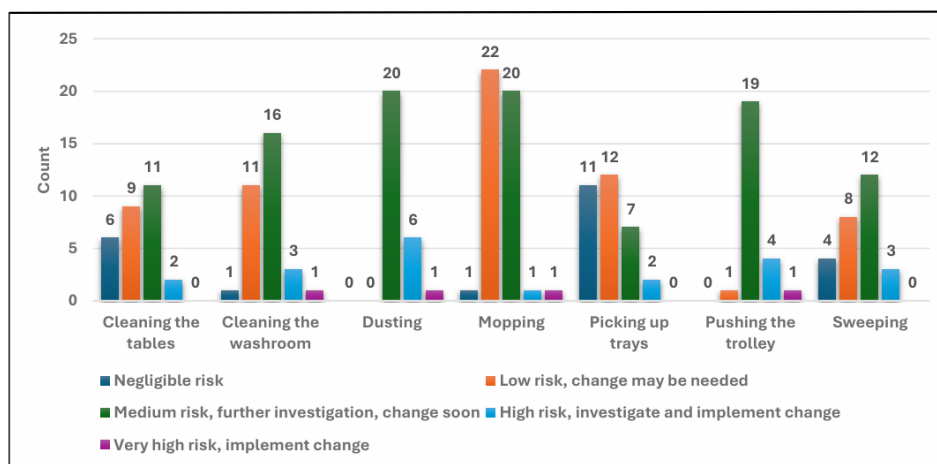


Interpretation: Assessment of body posture using the REBA scale among 216 housekeeping staff showed that nearly half of the participants (48.6%) fell into the medium risk category (scores 4–7), indicating a need for further investigation and timely corrective measures. About 29.2% were in the low risk group (scores 2–3), while 10.6% had a negligible risk (score 1). However, a noteworthy proportion had a higher risk: 9.7% were in the high-risk group (scores 8–10), and 1.9% were at very high risk (score 11), requiring urgent ergonomic intervention.

TABLE 2 : TASK WISE SCORE OF HOUSEKEEPING STAFF

Task	Negligible risk	Low risk, change may be needed	Medium risk, further investigation, Change soon	High risk, investigate and implement change	Very high risk, implement change	Grand Total
Cleaning the table	6	9	11	2	0	28
Cleaning the washroom	1	11	16	3	1	32
Dusting	0	0	20	6	1	27
Mopping	1	22	20	1	1	45
Picking up trays	11	12	7	2	0	32
Pushing the trolley	0	1	19	4	1	25
Sweeping	4	8	12	3	0	27
Grand Total	23	63	105	21	4	216

GRAPH 2: TASK-WISE SCORE OF HOUSEKEEPING STAFF



INTERPRETATION: When REBA scores were analysed according to specific housekeeping tasks, it was observed that the majority of activities fell within the medium-risk category. Tasks such as dusting, pushing the trolley, and cleaning the washrooms showed particularly medium risk scores. Mopping, the most frequent activity, was associated with both low and medium risk levels, whereas picking up trays showed relatively lower risk, with most workers in the negligible and low categories. On the other hand the task of sweeping and cleaning the tables were associated with medium and low risk scores.

IV. DISCUSSION

This study aimed to assess the body posture of Pune Mall housekeeping employees in relation to their risk of developing musculoskeletal problems at work. Dusting, mopping, sweeping, cleaning the restroom, picking up trays, wiping down the table, and pushing the trolley are all part of the job.

The Pune Mall cleaning staff's body posture was assessed for the threat of WRMSDs using the REBA scale. About 29.2% of the people were categorised as low risk, while 48.6% of the individuals were classified as medium risk. 9.7% were in the high-risk group, 1.9% were at very high risk, and 10.6% were at negligible risk. This could be because of the bad posture people have when doing various chores.

The REBA scale frequently evaluates various body postures by nearly examining each body part used to do that specific task. REBA allows one to concertedly assay the postures of the upper branches (arm, forearm, wrist), trunk, neck and lower extremities. In addition, it discriminates the type of grip and muscle exertion performed. It identifies five situations of threat, from negligible to very high.⁽⁸⁾ The legs and trunk of the Reba were the areas most impacted out of all the corridors. We estimated a range of tasks as well as the body positions needed for each job. For illustration, picking up trays substantially affected the wrist, arms, and legs. While pushing the trolley needed hand factors, mopping required arm factors, cleaning the bathroom required trunk, lower arm, and wrist factors, dusting required neck, arm, and leg factors, and sweeping needed trunk and arm factors. In an analogous tone, REBA evaluates the use of fresh force. Pushing the trolley was the primary task involved in this. Also, it evaluates grip in certain tasks, which vary depending on the kind of outfit employed. Nearly all of the chores had a mid-range power grip and a handle that suited well. In line with this, REBA evaluates the exertion score by looking at the presence of repeated movements, static posture, and significant posture differences. Cleaning the table and mopping required repetitious stir, dusting and cleaning the restroom needed static body position, and pulling the trolley, picking up servers and sweeping needed significant posture adaptations.

The most common task performed was mopping (20%), followed by cleaning the washroom (15%) and picking up trays (15%). Tasks such as clearing tables (13%), dusting (13%), sweeping (13%) and pushing the trolley (11%). Dusting, pushing the trolley and cleaning the restroom fall under medium threat orders still, when compared to various other tasks, more prone to developing WRMSDs are dusting and pushing the trolley. Applying homemade force stresses the muscles and tendons of the arms, which is needed to push the trolley.⁽⁹⁾ Dusting, still, necessitates frequent stretching, reaching, and minor repeated movements. While cleaning the restroom requires maintaining a static awkward posture for a dragged quantum of time. While all the other tasks bear moving the whole body, shifting weight from one leg to another and using large arm and box movements. This reduces static muscle loading, hence falling under low risk scores for acquiring WRMSDs.

Various threat factors are assumed to be associated with MSDs. These include repetitious and/or heavy lifting, bending, and twisting, repeating an action too constantly, uncomfortable working position, applying too much force, working too long without a break, adverse working terrain (e.g. hot or cold), psychosocial factors (e.g. high job demands, time pressures and lack of control), awkward posture, and poor health habits.⁽¹⁰⁾ Ergonomics is essential to ensuring the safety of cleaning workers, whose jobs constantly bear repetitious physical duties. Regular training sessions on safe lifting techniques, appropriate postures and body mechanics, stretching and warm-up exercises before shifts, and the use of visual aids and hands-on demonstrations can help them integrate ergonomics into their daily work.

WRMSDs are conditions that are brought on by or aggravated by a person's line of work and impact the muscles, nerves, tendons, joints, and cartilage. Musculoskeletal disorders are an injury or complaint of the musculoskeletal system performing from repeated exposure to various hazards and/or threat factors in the plant and the musculoskeletal system includes all muscles, bones, tendons, tendon pods, ligaments, bursa, blood vessels, joints, intervertebral discs, etc.⁽¹¹⁾ There are numerous kinds of biomechanical threat factors, for illustration: high force, awkward posture, reiteration, dragged standing, static postures and manual handling⁽¹¹⁾. Repetitious work, awkward postures, forceful movements, and manual materials handling (lifting, carrying or moving heavy loads) are the most important physical threat factors for musculoskeletal disorders⁽¹²⁾.

V. CONCLUSION

The key finding is that the majority of workers (48.6%) are operating at a medium risk level, necessitating further investigation and change soon, followed by (29.2%) low risk category, indicating that a change may be needed. Although minimal but a concerning number of individuals were in the high (9.7%) or very high-risk (1.9%) categories, suggesting investigation and implementing change, while (10.6%) falling under negligible risk. The risk is not uniform across all tasks. Dusting, pushing the trolleys, and cleaning the washrooms were identified as the most hazardous activities. Most affected people were in their 35 -40 years of age and predominantly female. Regular training sessions on safe lifting techniques, appropriate postures and body mechanics, stretching and warm-up exercises before shifts, and the use of visual aids and hands-on demonstrations can help them integrate ergonomics into their daily work.

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