

Assessment of Musculoskeletal Discomfort among Cleaning Staff of CCS Haryana Agricultural University, Hisar Using the NIOSH Musculoskeletal Discomfort Survey

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Abstract

Cleaning work involves repetitive movements, prolonged standing, bending, lifting, and awkward postures, which may increase the risk of musculoskeletal discomfort. The present study was conducted to assess musculoskeletal discomfort among cleaning staff working in colleges of CCS Haryana Agricultural University (CCS HAU), Hisar. A total of 25 cleaning workers were selected for the study. Data were collected using the NIOSH Musculoskeletal Discomfort Survey and analyzed using frequency, percentage, and mean scores.

The findings revealed that lower back discomfort was the most commonly reported problem (84%), followed by knee (76%), shoulder (68%), and neck discomfort (60%). Repetitive movements (100%), prolonged standing (92%), and frequent bending (84%) emerged as the major occupational risk factors associated with discomfort. More than half of the respondents experienced symptoms several times a week or daily. Moderate discomfort was reported by 52 percent of the workers, while 28 percent experienced severe discomfort. The highest mean pain score was observed in the lower back (7.2), followed by the knees (6.8) and shoulders (6.3). Musculoskeletal discomfort was found to affect work performance, resulting in increased fatigue, reduced work speed, and difficulty in carrying out routine tasks.

The study highlights the high prevalence of musculoskeletal discomfort among cleaning staff and emphasizes the need for ergonomic improvements in the workplace. Provision of ergonomically designed cleaning tools, training on proper working techniques, and adequate rest breaks may help reduce discomfort and improve workers' health and efficiency.

Keywords: Musculoskeletal Discomfort, Cleaning Staff, Ergonomics, Occupational Health, NIOSH

Introduction:- The NIOSH (National Institute Safety and Health) the United For Occupational an organization in States that conducts on occupational health It has and Safety, Since 1981 developed equations, which help identity risk factors in may Cause injuries Meepradit et al., 2015. the work place that muscles and bones. In 1993, the National Institute For Occupational Safety and Health (NIOSH) published the Revised NOISH lifting equation (RNLE) For evaluating the physical lifting demands of two-handed manual tasks (waters, Putz - Anderson, Garg, & fine 19937. The RNLE is a Useful method for assessing physical risk factor for LBP (Lowen Back Pain) based on research findings from biomechanics, psychophysics, and physiology (waters el al.,1999)

The RNLE consists of two equations, the recommended weight limit (RML) and the lifting Index (LI), which are used to evaluate a specific manual lifting task. The RML is calculated using a simple mathematical equation that requires measuring variable. (Waters et al., 2010) The risk factor for multifactorial, involving personal factors, physical job demands, and workplace psychosocial characteristics (Davis & Heaney, 2000). Only Jew sine approach studies have used a to examine the combined effects of these risk factors (Bigos et al., 1986; kern et al., 2001, Marral, Lavender et al., 1995; Marras lavender & Gang 2010) furthermore, earlier there research has tried to investigate risk factors using questionnaires (Marras, lavender, Ferguson, splittstoesser, and Yang, 2010) or by focusing on a single physical Job exposure variables, such as trunk flexion, lifting, or handling heavy weights (Garg et al., 2013).

Working in industries where proper ergonomic conditions are not maintained can be uncomfortable and tiring for workers. When the workplace is not designed according to the needs of the human body, employees often have to work in awkward positions or perform repetitive tasks, which leads to quick fatigue. This constant tiredness can reduce their efficiency and overall productivity. One of the major effects of such poor working conditions is musculoskeletal problems. These problems refer to pain or discomfort in the muscles, joints, and bones. The level of discomfort can vary from very mild uneasiness to severe pain, depending on the intensity and duration of the work. Over time, these issues

can affect a person's ability to work properly and may also impact their overall health and well-being. (Kalkis H. et al., 2014)

Cleaning work is widely considered to be physically demanding, as highlighted by several researchers (Sogaard et al., 1996; Hagner & Hagberg, 1989). Workers involved in cleaning tasks often experience a high level of physical strain on the body. For example, studies have shown that cleaning work can increase cardiovascular load, meaning it puts extra pressure on the heart and overall physical system (Hagner & Hagberg, 1989). In addition, cleaners frequently have to work in awkward or uncomfortable body positions, such as bending, twisting, or reaching, which further adds to the physical stress (Kumar et al., 2005a; Woods & Buckle, 2005b).

The main risks associated with cleaning work are related to poor and unsuitable working conditions. These include improper working postures, work environments that are not designed for easy cleaning, and the use of cleaning tools that require excessive force to operate (Kumar et al., 2005b; Johansson & Ljunggren, 1989; Sogaard et al., 1996). Because of these factors, workers often have to perform repetitive movements for long periods, which can lead to continuous muscle use. Over time, this may cause muscle fatigue and increase the risk of developing musculoskeletal disorders (Kumar et al., 2004).

Apart from physical strain, other factors also contribute to these health problems. These include long working hours, low wages, and inconvenient or irregular work schedules, all of which can negatively affect workers' health and well-being (Kumar & Kumar, 2006). In the same study, the authors further categorized the different factors that contribute to the development of musculoskeletal disorders into specific groups.

Excessive workload can negatively affect workers' health, especially in today's fast-changing labour market where job demands are constantly increasing. When employees are required to work for long hours or perform physically demanding tasks without adequate rest, it can lead to both physical and mental strain. In European Union countries, musculoskeletal disorders (MSDs) affect more than 40 million workers and result in significant economic losses, accounting for about 0.5–2.0% of the gross domestic product (GDP). Additionally, nearly 30% of workers in Latvia have reported an increase in their physical workload, showing how common and widespread this issue has become (Woolfson et al., 2008).

MSDs are considered the most common type of work-related health problem, contributing to around 60–62% of all occupational disorders (Fit for Work, 2012). These disorders mainly develop due to physical risk factors present in the workplace. For instance, working in awkward, repetitive, or extreme body postures—such as bending, twisting, or maintaining the same position for long periods—puts continuous strain on the muscles and joints (Silverstein et al., 1987; Bernard, 1997). Over time, such strain can lead to discomfort, fatigue, and eventually serious health problems.

In addition to posture-related issues, heavy manual labour also plays a major role in the development of MSDs. Jobs that require lifting, pushing, or carrying heavy loads can significantly affect a worker's physical capacity and reduce their ability to perform daily tasks efficiently. This not only impacts their productivity at work but also lowers their overall quality of life (Monteiro et al., 2009; Picavet & Hoeymans, 2004). As a result, workers may experience a variety of health problems, including back pain, slipped discs, upper limb disorders, and conditions like tenosynovitis. Common symptoms associated with these disorders include pain, numbness, swelling, and tingling sensations, particularly in the hands and wrists.

Objectives of the study

1. To assess musculoskeletal discomfort among cleaning staff.
2. To identify the body regions most affected by discomfort.
3. To determine the frequency and severity of musculoskeletal discomfort.

METHADODOLOGY

The present study was conducted using a descriptive and observational approach. The aim of the study was to assess the musculoskeletal discomfort experienced by cleaning staff during their regular work. The workers were observed in their normal working conditions without making any changes to their routine tasks. This helped in understanding the actual physical strain and problems faced by them during daily work.

NIOSH Musculoskeletal Discomfort Survey

The National Institute for Occupational Safety and Health (NIOSH) is a research organization established in the United States for the prevention of work-related injuries, illnesses, and health hazards. NIOSH plays an important role in occupational health research by developing scientific tools and assessment methods for evaluating workplace risks and improving worker safety (NIOSH, 1997). Among its important contributions are ergonomic assessment tools used to identify musculoskeletal discomfort, physical workload, and occupational risk factors associated with repetitive and physically demanding work.

Musculoskeletal disorders (MSDs) are among the most common occupational health problems affecting workers engaged in manual labour. These disorders develop due to repetitive movements, awkward body postures, forceful exertions, prolonged standing, lifting, and insufficient recovery time (Bernard, 1997; Da Costa & Vieira, 2010). Cleaning workers are particularly vulnerable because their routine tasks involve sweeping, mopping, bending, lifting waste, pushing equipment, and repetitive upper limb movements, which place continuous stress on muscles, joints, and connective tissues (Kumar & Kumar, 2006; Sogaard et al., 1996).

The NIOSH Musculoskeletal Discomfort Survey is widely used as an ergonomic assessment tool for identifying pain or discomfort in different body regions caused by occupational activities. The tool helps assess the frequency, severity, and duration of discomfort and identifies body areas most affected by physical work demands. It is considered simple, practical, and suitable for occupational field studies because workers can easily report their discomfort using body maps and structured questions (Dickinson et al., 1992; Corlett & Bishop, 1976).

The survey assesses discomfort in body regions such as the neck, shoulders, upper back, lower back, arms, elbows, wrists/hands, hips/thighs, knees, and ankles/feet. These body parts are commonly affected in occupations involving repetitive physical effort and awkward postures (Silverstein et al., 1987; Monteiro et al., 2009). NIOSH-based ergonomic assessment has been used in several occupational studies to identify musculoskeletal risk factors and recommend workplace improvements for reducing worker discomfort and injury (Waters et al., 1993; Garg et al., 2013).

Research Design

The present study was conducted using a descriptive and observational research design to assess musculoskeletal discomfort among colleges cleaning staff. This design was selected because it allows assessment of workers under their normal working conditions without altering their routine activities. Observational ergonomic studies are useful for understanding actual workplace exposure, posture, and physical strain during occupational tasks (Marras et al., 1995; Kumar et al., 2005a).

Area of Study

The study was conducted in different colleges of Chaudhary Charan Singh Haryana Agricultural University (CCS HAU), Hisar, where colleges cleaning staff are regularly engaged in housekeeping and sanitation work. These workers perform activities such as sweeping, mopping, waste collection, toilet cleaning, movement of cleaning materials, and maintenance of hostel premises. Such activities involve repetitive movements, bending, prolonged standing, and manual physical effort, making the selected area appropriate for ergonomic assessment (Hagner & Hagberg, 1989; Kumar et al., 2005a).

Selection of Respondents

A total of 25 respondents were selected purposely for the study. Purposive sampling was adopted to include workers actively involved in regular Colleges cleaning activities requiring physical effort.

Small sample ergonomic studies are often used for detailed observational workplace assessment where the focus is understanding task-related physical strain rather than large population comparison (Kerr et al., 2001).

Table: 1 Variables and their Measurement:

Independent variables	Measurement
Age	Chronological Age
Gender	
Education	
Work experience	

Daily working hour	Schedule will be developed
Type of cleaning activity	
Repetitive motion	
Bending and twisting	
Lifting and carrying load	
Prolonged standing	

Dependent variables:

Dependent Variables	Parameter	Measurement Tool
Musculoskeletal Discomfort	Frequency of discomfort	NIOSH Musculoskeletal Discomfort Survey
	Severity of pain	
	Duration of discomfort	
	Body regions affected (Neck, Shoulders, Upper Back, Lower Back, Arms/Elbows, Wrists/Hands, Hips/Thighs, Knees, Ankles/Feet)	

Tool for Data Collection

Data were collected using the **NIOSH Musculoskeletal Discomfort Survey**, developed by the National Institute for Occupational Safety and Health.

The survey includes:

- Personal profile of respondents
- Work type and duration
- Frequency of discomfort
- Severity of pain
- Duration of discomfort
- Body map for identifying affected regions
- Impact of discomfort on work performance

Body Regions Assessed in the Survey

The NIOSH Musculoskeletal Discomfort Survey assesses different body regions that are commonly affected by physically demanding work such as cleaning. Hostel cleaning staff perform repetitive activities including sweeping, mopping, bending, lifting, pushing, pulling, and prolonged standing, which can lead to discomfort in various parts of the body. Assessment of these body regions helps in identifying the areas most affected by occupational strain.

Neck:

Neck discomfort is common among cleaning workers due to prolonged forward bending, looking downward during sweeping and mopping, and repetitive head movements. Sustained awkward neck posture can lead to pain and stiffness (Kumar et al., 2005a; Da Costa & Vieira, 2010; Bernard, 1997).

Shoulders:

Shoulder pain is often associated with repetitive arm movements, reaching, forceful scrubbing, and handling cleaning tools. Continuous overuse of shoulder muscles may result in fatigue and musculoskeletal discomfort (Silverstein et al., 1987; Kumar & Kumar, 2006; Woods & Buckle, 2005).

Upperback:

Upper back discomfort may occur due to prolonged standing, repetitive movements, and awkward working postures while cleaning surfaces and furniture. Such strain can cause muscular fatigue and stiffness (Hagner & Hagberg, 1989; Sogaard et al., 1996; Jørgensen et al., 2011).

Lowerback:

The lower back is one of the most affected body regions in cleaning occupations because workers frequently bend, twist, lift loads, and maintain awkward postures. These factors significantly increase the risk of low back pain (Waters et al., 1993; Marras et al., 1995; Hoogendoorn et al., 2000; Garg et al., 2013).

Arms and elbow:

Repetitive arm use during sweeping, scrubbing, wiping, and lifting can lead to discomfort in the arms and elbows. Continuous muscle use and repetitive joint movements may result in fatigue and strain (Da Costa & Vieira, 2010; Silverstein et al., 1987; Kumar et al., 2004).

Wrists/Hands:

Wrists and hands are heavily involved in gripping tools, squeezing cloths, scrubbing, and carrying cleaning materials. Repetitive hand movements and awkward wrist positions increase the risk of pain, numbness, and tendon-related disorders (Bernard, 1997; Silverstein et al., 1987; Choobineh et al., 2012).

Hips/Thighs:

Frequent bending, squatting, walking, and prolonged standing can place strain on the hips and thighs, leading to discomfort and muscular fatigue (Monteiro et al., 2009; Jablonska et al., 2006; Kumar & Kumar, 2006).

Knees:

Cleaning work often requires repeated kneeling, squatting, and movement, which can create pressure on knee joints and increase the risk of pain and stiffness (Sogaard et al., 1996; Kumar et al., 2005a; Palmer et al., 2003).

Ankles/Feet:

Prolonged standing and continuous walking during cleaning activities can cause discomfort, fatigue, and swelling in the ankles and feet. Lower limb discomfort is common in occupations involving long hours of standing work (Hagner & Hagberg, 1989; Monteiro et al., 2009; Reid et al., 2010).

Procedure of Data Collection

Permission was obtained from the concerned authorities of CCS HAU, Hisar before conducting the study. The purpose of the research was explained clearly to the selected workers in simple language, and informed consent was obtained. Each respondent was approached individually, and the NIOSH questionnaire was administered through personal interaction. Workers were asked to indicate the body regions where discomfort was experienced and provide details regarding frequency, severity, and duration.

Simultaneously, direct observation was carried out while workers performed daily tasks such as sweeping, mopping, bending, lifting waste, and moving cleaning equipment. Work posture, repetitive actions, and physical exertion were carefully observed and recorded (Da Costa & Vieira, 2010; Kumar et al., 2004).

Method of Analysis

The collected data were analyzed using descriptive statistical methods.

Discomfort assessment was based on:

- Frequency of discomfort
- Severity of pain
- Duration of discomfort
- Body regions affected

The data were summarized using:

- Frequency
- Percentage
- Mean values

This analysis helped identify commonly affected body regions and major musculoskeletal problems among hostel cleaning workers (Waters et al., 1999; Monteiro et al., 2009).

Result

The results of the present study in agreement with the objective contingent through the use of prescribed methodology and standard tools. Systematic research technique was applied and results have been presented and discussed.

Table 1. Demographic Characteristics of Respondents (n = 25)

Variable	Category	Frequency	Percentage (%)
Gender	Female	18	72
	Male	7	28
Age (Years)	25–35	5	20
	36–45	9	36
	46–55	8	32
	Above 55	3	12
Qualification	Illiterate	4	16
	Primary School	8	32
	Middle School	7	28
	Secondary School	6	24
Work Experience	1–5 Years	6	24
	6–10 Years	10	40
	11–15 Years	6	24
	Above 15 Years	3	12

Table one shows that the majority of respondents were female (**72%**), while males constituted (**28%**). Most workers belonged to the 36–45 years age group (**36%**), followed by 46–55 years (**32%**). Regarding education, primary school education was most common (**32%**), followed by middle school (**28%**) and secondary school (**24%**), while (**16%**) were illiterate. In terms of work experience, (**40%**) of respondents had 6–10 years of experience, whereas (**24%**) each had 1–5 years and 11–15 years of experience, and (**12%**) had more than 15 years of experience.

Table 2. Average Working Hours per Day (n=25)

Working Hours	Frequency	Percentage (%)
Less than 4 Hours	2	8
4–6 Hours	8	32
6–8 Hours	15	60
Total	25	100

Table 2 shows that the Most respondents (**60%**) worked between 6–8 hours daily, while (**32%**) worked for 4–6 hours. Longer working duration may contribute to physical fatigue and musculoskeletal discomfort.

Table 3. Daily Cleaning Activities Performed by Respondents

Activity	Frequency	Percentage
Sweeping	25	100
Mopping	25	100
Waste Collection	23	92
Carrying Cleaning Supplies	21	84
Furniture Movement	15	60
Stair Cleaning	18	72
Toilet Cleaning	20	80

Table 3 shows the daily cleaning activities performed by the respondents. Sweeping and mopping were carried out by all workers (**100.0%**), indicating that these tasks form the core of their routine duties. A large proportion of respondents were also involved in waste collection (**92.0%**) and carrying cleaning supplies (**84.0%**). In addition, toilet cleaning (**80.0%**), stair cleaning (**72.0%**), and furniture movement (**60.0%**) were commonly reported.

Table 4. Distribution of Musculoskeletal Discomfort by Body Region

Body Region	Frequency	Percentage (%)	Rank
Lower Back	21	84	I
Knees	19	76	II
Shoulders	17	68	III
Neck	15	60	IV
Wrists/Hands	13	52	V
Upper Back	12	48	VI
Ankles/Feet	11	44	VII
Hips/Thighs	9	36	VIII
Elbows	6	24	IX

Table 4 shows that lower back discomfort (**84.0%**) was the most commonly reported problem, followed by knee discomfort (**76.0%**) and shoulder discomfort (**68.0%**). Neck pain (**60.0%**) and wrist/hand discomfort (**52.0%**) were also reported by a considerable number of workers.

Table 5. Frequency of Exposure to Occupational Risk Factors (n=25)

Risk Factor	Never	Sometimes	Often	Always
Repetitive Movements	0	0	5	20
Prolonged Standing	0	2	7	16
Frequent Bending	1	3	8	13
Awkward Postures	1	4	10	10

Manual Lifting	2	5	8	10
Inadequate Rest Breaks	4	5	8	8

Table 5 shows that the Repetitive movements were the most frequently reported occupational risk factor, with 80% of workers reporting constant exposure. Prolonged standing and frequent bending were also common ergonomic hazards experienced during cleaning activities.

Table 6. Frequency of Musculoskeletal Symptoms

Frequency of Symptoms	Respondents	Percentage(%)
Occasionally	4	16
Weekly	6	24
Several Times per Week	8	32
Daily	7	28

Table 6 shows that **(16.0%)** of the respondents experienced musculoskeletal symptoms occasionally, while **(24.0%)** reported symptoms on a weekly basis. A larger proportion experienced discomfort several times per week **(32.0%)** or daily **(28.0%)**. Overall, **(60.0%)** of the workers reported symptoms several times per week or every day.

Table 7. Severity of Musculoskeletal Discomfort

Severity Level	Frequency	Percentage (%)
Mild	5	20
Moderate	13	52
Severe	7	28

Table 7 shows that the majority of respondents reported moderate discomfort **(52.0%)**, followed by severe discomfort **(28.0%)**. A smaller proportion of workers experienced mild discomfort **(20.0%)**.

Table 8. Occupational Factors Associated with Discomfort

Risk Factor	Respondents Reporting Exposure	Percentage (%)
Repetitive Movements	25	100
Prolonged Standing	23	92
Frequent Bending	21	84
Awkward Postures	20	80
Manual Lifting	18	72
Inadequate Rest Breaks	16	64

Table 8 shows that repetitive movements were reported by all respondents **(100.0%)**, making it the most common occupational risk factor. Prolonged standing **(92.0%)** and frequent bending **(84.0%)** were also reported by a large proportion of workers. In addition, awkward postures **(80.0%)**, manual lifting **(72.0%)**, and inadequate rest breaks **(64.0%)** were commonly experienced during cleaning work.

Table 9. Duration of Musculoskeletal Discomfort (n=25)

Duration	Frequency	Percentage(%)
Less than 1 Month	3	12
1–3 Months	5	20
3–6 Months	7	28
More than 6 Months	10	40

This table 9 shows that the A large proportion of workers **(40%)** reported experiencing discomfort for more than six months, indicating chronic musculoskeletal problems among cleaning staff.

Table 10. Impact of Musculoskeletal Discomfort on Work Performance

Impact on Work Performance	Frequency	Percentage (%)
Increased Fatigue	21	84
Reduced Work Speed	18	72
Difficulty Performing Tasks	16	64
Reduced Productivity	15	60
Need for Frequent Rest	13	52
Missed Workdays	5	20

Table 10 shows that increased fatigue **(84.0%)** was the most common effect of musculoskeletal discomfort, followed by reduced work speed **(72.0%)**. Difficulty in performing routine tasks **(64.0%)** and reduced productivity **(60.0%)** were also reported by many respondents.

Table 11. Mean Pain Severity Score by Body Region (0–10 Scale)

Body Region	Mean Score
Lower Back	7.2
Knees	6.8
Shoulders	6.3
Neck	5.9
Wrists/Hands	5.4
Upper Back	5.1
Ankles/Feet	4.8
Hips/Thighs	4.3
Elbows	3.7

Table 11 presents the mean pain severity scores for different body regions on a scale of 0–10. The lower back recorded the highest mean pain score **(7.2)**, indicating that it was the most severely affected body region among the respondents.

This was followed by the knees (6.8) and shoulders (6.3), suggesting a high level of discomfort in these areas. Neck pain (5.9) and wrist/hand discomfort (5.4) were also reported with moderate severity.

DISCUSSION

The present study was undertaken to assess musculoskeletal discomfort among cleaning staff working in different colleges of CCS Haryana Agricultural University, Hisar. The findings obtained from the study are discussed under different sections and compared with the results of earlier studies conducted on cleaning workers and other occupational groups exposed to similar physical work demands.

Demographic Characteristics of Respondents

The findings revealed that the majority of cleaning workers were female (72%), while males constituted only 28% of the respondents. Most workers belonged to the age group of 36–45 years (36%), followed by 46–55 years (32%). In terms of work experience, 40% of the respondents had 6–10 years of experience in cleaning work. Similar workforce characteristics among cleaning employees have been reported by Kumar and Kumar (2006), who observed that cleaning occupations are largely dominated by middle-aged female workers. The higher proportion of experienced workers indicates prolonged exposure to occupational risk factors, which may contribute to the development of musculoskeletal discomfort.

Daily Cleaning Activities Performed by Respondents

All respondents reported performing sweeping and mopping activities (100%), while waste collection (92%), carrying cleaning supplies (84%), and toilet cleaning (80%) were also common tasks. These activities involve repetitive movements, bending, lifting, and prolonged standing. Hagner and Hagberg (1989) reported that floor cleaning activities impose considerable physical demands on workers due to repetitive motions and awkward postures. Similarly, Kumar et al. (2005) found that cleaning tasks expose workers to continuous biomechanical stress, increasing the risk of musculoskeletal disorders.

Distribution of Musculoskeletal Discomfort by Body Region

Lower back discomfort was the most frequently reported problem (84%), followed by knees (76%), shoulders (68%), and neck (60%). These findings are consistent with those of Marras et al. (1995) and Hoogendoorn et al. (2000), who identified lifting, bending, and trunk flexion as major contributors to low back disorders. The high prevalence of knee and shoulder discomfort may be associated with prolonged standing, squatting, repetitive arm movements, and manual handling activities commonly performed during cleaning work. Similar observations were reported by Sogaard et al. (1996) among cleaning workers.

Frequency of Musculoskeletal Symptoms

The results indicated that 32% of respondents experienced discomfort several times per week, while 28% reported daily symptoms. Only 16% reported occasional discomfort. The frequent occurrence of symptoms suggests continuous exposure to occupational stressors. Da Costa and Vieira (2010) reported that repetitive physical workload and awkward postures are strongly associated with persistent musculoskeletal symptoms among workers engaged in manual occupations.

Severity of Musculoskeletal Discomfort

More than half of the respondents (52%) reported moderate discomfort, whereas 28% experienced severe discomfort. The findings indicate that musculoskeletal problems among cleaning staff are not limited to mild symptoms but may interfere with daily work activities. Monteiro et al. (2009) similarly reported that prolonged exposure to physically demanding work results in moderate to severe musculoskeletal symptoms and reduced work ability.

Occupational Factors Associated with Discomfort

Repetitive movements were reported by all respondents (100%), followed by prolonged standing (92%), frequent bending (84%), awkward postures (80%), and manual lifting (72%). These factors are well-established ergonomic risk factors for musculoskeletal disorders. Silverstein et al. (1987) identified repetitive motion as a significant contributor to upper limb disorders, while Hoogendoorn et al. (2000) reported that bending and lifting are strongly associated with low back pain. The findings suggest that cleaning staff are exposed to multiple ergonomic hazards simultaneously.

Impact of Musculoskeletal Discomfort on Work Performance

The majority of respondents reported increased fatigue (84%) and reduced work speed (72%) due to musculoskeletal discomfort. Difficulty in performing routine tasks (64%) and reduced productivity (60%) were also commonly reported. Similar findings were reported by Monteiro et al. (2009), who observed that musculoskeletal disorders negatively affect workers' functional capacity and work performance. These findings indicate that discomfort has a direct impact on both worker well-being and productivity.

Discussion of Table 8: Mean Pain Severity Score by Body Region

The lower back recorded the highest mean pain score (7.2), followed by knees (6.8) and shoulders (6.3). This indicates that these body regions were not only frequently affected but also experienced greater pain intensity. Waters et al. (1993) reported that repetitive lifting, bending, and manual material handling place substantial stress on the lumbar region, leading to increased pain severity. Similar findings regarding knee and shoulder discomfort have been reported among cleaning workers by Sogaard et al. (1996) and Kumar et al. (2005).

Conclusion

The present study concludes that musculoskeletal discomfort is highly prevalent among cleaning staff working in colleges of CCS Haryana Agricultural University, Hisar. The findings revealed that the lower back, knees, shoulders, and neck were the most affected body regions, with lower back discomfort showing the highest prevalence and severity. Most respondents experienced symptoms frequently, with many reporting discomfort several times per week or daily. The major occupational factors contributing to musculoskeletal discomfort included repetitive movements, prolonged standing, frequent bending, awkward working postures, manual lifting, and insufficient rest breaks. These ergonomic risk factors are inherent in routine cleaning activities such as sweeping, mopping, waste collection, stair cleaning, and carrying cleaning supplies.

Musculoskeletal discomfort significantly affected work performance by increasing fatigue, reducing work speed, creating difficulty in performing routine tasks, and lowering productivity. Therefore, cleaning staff represent an occupational group requiring immediate ergonomic attention.

It is recommended that institutions introduce ergonomically designed cleaning tools, provide training on proper working postures and safe manual handling techniques, ensure adequate rest breaks, and promote ergonomic awareness among workers. Such interventions can help reduce musculoskeletal discomfort, improve worker health, and enhance overall productivity and job satisfaction.

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