Research Article

Musculoskeletal Disorder and Their Predisposing Factors Among Garment Workers in Bangladesh: A Clinical Study

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Abstract

Background: Musculoskeletal Disorders (MSDs) are a significant health issue among garment workers, primarily due to prolonged periods of sitting, standing and engaging in physical labour. These disorders can result in discomfort, decreased productivity and long-term health complications. The purpose of this study was to assess the prevalence of MSDs and identify the factors that contribute to these conditions among garment workers in the Sreepur area of Gazipur District, Bangladesh.

Methodology: Using a semi-structured questionnaire, a cross-sectional study was conducted among 110 garment workers (38% male, 62% female). The study assessed demographic characteristics, work environment factors (such as working hours and physical tasks) and the presence of MSD-related pain. Statistical analyses were performed to identify correlations between work conditions and the occurrence of MSDs.

Results: The mean age of respondents was 21.89 years (SD ± 3.899). The majority of workers reported MSD pain with common areas of pain being the lower back (29.1%), neck (23.6%), shoulder 12.7% and knees (10.9%). A significant correlation was found between hours spent sitting, standing and lifting during work and the risk of MSDs. Additionally, a relationship was identified between BMI and lifting tasks (χ^2 = 6.366, p < 0.05). The majority of respondents (93.6%) received medical treatment, though some workers reported financial barriers.

Conclusion: This study shows a high rate of MSDs among Bangladeshi garment workers, mainly due to prolonged standing, sitting and physical work. Improving ergonomics, reducing strain and enhancing healthcare are crucial to lessen MSD pain and boost workers' health and productivity.

Keywords: Musculoskeletal Disorders; Garment Workers

Introduction

Bangladesh has over 7,000 factories employing more than 4 million workers [1]. In the financial year from 2022 to 2023, the export value of Ready-Made Garments (RMG) in Bangladesh reached approximately 47 billion U.S. dollars. The story of economic growth in Bangladesh revolves around two key elements: Ready-Made Garments (RMG) and remittances. Their contributions to the GDP in the fiscal year 2023 were significant, with the RMG sector accounting for 10.35% and remittances contributing 4.76%. This shows that both sectors are essential components of the economy. The popularity of this garment is increasing day by day, creating more job opportunities across the country. However, the health effects associated with this work are also rising, primarily due to long working hours, age, gender, ethnicity, low quality of life, cigarette smoking, economic conditions, dietary habits and nutrition. These factors can negatively impact the musculoskeletal system. According to the Workplace Safety and Health Council (WSHC), an Occupational Disease (OD) is defined as "any disease contracted as a result of exposure to risk factors arising from work activity." These risk factors can lead to symptoms such as aching pain, numbness and limitations in the musculoskeletal system [2]. Globally, Work-Related Musculoskeletal Disorders (WMSDs) account for approximately 40% of the total compensated costs associated with occupation-related diseases due to rapid movements, awkward or prolonged

postures and forceful exertion [3]. Researchers found most prominent and highly prevalent musculoskeletal symptoms found among garment and textile industry workers were neck, shoulder and back problems [4].

In Bangladesh, the garment sector is a major contributor to the country's economy, with millions of workers employed in the industry. However, the physical demands of garment work such as prolonged sitting, standing, bending, lifting and repetitive motions place workers at an increased risk for developing MSDs [5]. These disorders can result in severe pain, disability and a decrease in productivity, impacting both the workers' well-being and the industry's overall efficiency [6].

Garment workers are often exposed to hazardous working conditions, including poor ergonomics, long working hours, inadequate rest periods and high job demands, all of which can contribute to the development of MSDs [8]. Studies indicate that workers in the garment sector experience a high prevalence of conditions such as lower back pain, neck pain and musculoskeletal discomfort in the upper limbs [8]. These disorders can be exacerbated by various predisposing factors, including age, gender, Body Mass Index (BMI) and lack of proper ergonomic interventions [9].

In developing countries, there is a strong push to promote small-scale industries as key drivers of economic growth. The World Health Organization (WHO) reports that more than 1 billion people globally are employed in small-scale industries. Workers in these industries, particularly those with high physical demands, face an increased risk of poor workability, musculoskeletal disorders, cardiovascular diseases, premature death, long-term sickness absence and early retirement. High-risk physical activities such as prolonged standing, repetitive tasks, heavy lifting, overhead work and bending or twisting the back are known to contribute to these issues. Workers in jobs that involve these physical risks need focused health initiatives to preserve or enhance their workability [10]. In addition to the physical demands of the job, socio-economic factors such as low wages, long working hours and lack of access to healthcare services further exacerbate the risk of developing these disorders [11].

The study aim was to explore to evaluate the prevalence of Musculoskeletal Disorders (MSDs) among garment workers in Bangladesh and identify the major contributing factors that lead to these disorders, to propose measures for enhancing worker health and safety.

The specific objectives of the study were (1) to determine the prevalence of Musculoskeletal Disorders (MSDs) among garment workers in different roles and working conditions, (2) to identify physical, ergonomic and psychosocial risk factors that contribute to the development of MSDs in the garment industry, (3) to assess the impact of MSDs on the health, productivity and quality of life of garment workers, (4) to evaluate the existing preventive measures and health interventions currently in place for managing MSDs in the workplace and (5) to propose recommendations for improving workplace ergonomics, health and safety practices and policies to reduce the risk of MSDs in the garment sector.

Methodology of the Study

Study Design
The research was conducted using a descriptive cross-sectional study design, which involved collecting and analysing data at a single point in time. This approach allowed for a comprehensive assessment of the population's characteristics, behaviours and outcomes, providing valuable insights into the specific factors being investigated. By gathering data from participants across various demographics, the study aimed to identify patterns and associations that could inform future research and interventions.

Target Population
Male and female workers who attended the medical centre of the Fakhruddin Textile Mills due to suffering various musculoskeletal problems.

Study Period
The study was conducted from September 2024 to January 2025.

Sampling and Size
A total of 110 participants were selected for the study. Convenience sampling was utilized for this study.

Inclusion Criteria
- Participants between the ages of 18 to 45 years
- Both male and female participants
- The employees who worked mainly in a sitting and standing and heavy lifting environment
- The participants who were willing to participate in this study
- Workers who have been employed for at least 6 months to account for chronic exposure to work conditions

Exclusion Criteria
- Workers employed for less than 6 months, as they may not have experienced sufficient exposure to the risk factors for musculoskeletal disorders
- This study excluded those who have severe musculoskeletal problems

Data Collection Method
Data was collected through face-to-face interviews using a structured questionnaire. The purpose of pre-testing was to determine if the questions would be well understood and if the necessary data to address the objectives of the study were generated. No changes were made to the questionnaire after the pretest.

Data Collection Tools
To fill up the structured questionnaire, I used a pen, paper, a weight machine, a measuring tape, a pencil and an eraser.

Data Management and Analysis Plan
After the collection of data, this was checked and verified for consistency and reduction of errors. These data were transferred to a suitable master sheet for processing and subsequent analysis. Data was entered into the computer and saved in Statistical Package for Social Sciences (SPSS) software version 22.0 and Quality and reliability of collected data was re-checked. Appropriate Statistical analysis, calculation and test were carried out to relate variables according to the objectives of the study.

Ethical Approval
It has been maintained all ethical issues according to the WHO guidelines and the IRB of the Bangladesh Physiotherapy Association. Every participant was given consent before data collection and they were free to exit from any parts of the study as they wanted.

Results

Socio-Demographic Characteristics
Table 1 showed that among the 110 participants, 38% (n=42) were male and 62% (n=68) were female. The female was the highest number of the respondents. Among 110 participants, fewer of 18-30 years is 59.1% (n=65), 39.1% (n=43) were in the age between 30-45 years old and 1.8% (n=2) were in the age of more than 30 years old. The 18-30-year group had the highest percentage. The study showed that most of the respondents, 90.9% of garment workers, were married and 8.2% were unmarried and the rest of 0.9% were divorced. Most of the respondents were Muslim (94.5%), followed by Hindu (4.5%) and Buddhist (0.9%).

Gender	Frequency (Number)	Percentage (%)
Male	42	38.2
Female	68	61.8
Age (Years)		
18-30	65	59.1
30-45	43	39.1
>45	2	1.8
Educational Status		
Below SSC	1	0.9
SSC	86	78.2
HSC	22	20

Graduate	1	0.9
Husband/Father's Occupation		
Day labourer	9	8.2
Cultivator	7	6.4
Rickshaw puller	10	9.1
Garments worker	21	19.1
Small business	15	13.6
Service	7	6.4
Not applicable	41	37.3
Wife/Father Occupation		
Garments worker	15	13.6
Small business	4	3.6
Service	2	1.8
Housewife	20	18.2
Not applicable	69	62.7
Family Member		
1-3	8	7.3
3-5	80	72.7
>5	22	20.0
Monthly Family Income		
20000-30000	47	42.7
30000-40000	60	54.5
>40000	3	2.7

Table 1: Sociodemographic characteristics.

Anthropometric Measurement

Most of the respondents (50%) belonged to 145-155 cm, 34.5% belonged to 155-165 cm and only 15.5% were 165-175 cm height, respectively. The Table 2 showed that 69.1% of respondents were 45-60 kg, according to 29.1% belonged to 61-75 kg and only 1.8% were >75 kg, respectively. This table shows that the majority of 81.8% of respondents BMI were 18.5-24.9, followed by 18.2% of respondents had a BMI of 25-29.9.

Height (cm)	**Frequency (Number)**	**Percentage (%)**
145-155	55	50
155-165	38	34.5
165-175	17	15.5
Weight(kg)		
45-60	76	69.1
61-75	32	29.1
>75	2	1.8
BMI		
18.5-24.9	90	81.8
25-29.9	20	18.2

Table 2: Anthropometric measurements.

Job-Related Information

As the Table 3 showed, 28.2% of respondents were 1-8 hours their working in garment factories, according to 71.8% worked 8-12 hours. The mean working hours were Mean=9.49; (SD=±0.993). overtime working hours are higher.

Regular Work Hours	Frequency (Number)	Percentage (%)
1-8	31	28.2
8-12	79	71.8
Mean = 9.49;(SD=0.993)		

Table 3: Distribution of respondents by regular working hours.

As the Table 4 showed, 70.9% did this work for 1-10 years, according to 29.1% did work 10-20 years.

Job Duration (Years)	Frequency (Number)	Percentage (%)
1-10	78	70.9
10-20	32	29.1
Mean = 8.59;(SD=4.978)		

Table 4: Distribution of the respondents by duration of work in RMG (in years).

Table 5 shows that almost all garment workers (4.5%) were working on their ironing section, followed by 16.4% in were finishing section, 7.3% in were knitting section, 7.3% dyeing section, 15.5% quality section, 24.5% in were sewing section, 10% in were printing section,10.9% were cutting section 3.6% were other section.

Work Section	Frequency (Number)	Percentage (%)
Ironing section	5	4.5
Finishing section	18	16.4
Knitting	8	7.3
Dyeing	8	7.3
Quality	17	15.5
Sewing section	27	24.5
Printing	11	10.0
Cutting	12	10.9
Other	4	3.6

Table 5: Distribution of the respondents by name of section.

Predisposing Factors of Musculoskeletal Disorders Among the Participants
The risk of developing musculoskeletal disorder pain was almost 32.7% of respondents. There were 1-8 hours and 17.3% were 8-12 hours, by the daily time spent sitting at work and the not applicable respondent was 50.0%. The risk of developing musculoskeletal disorder pain was almost 46.4% of respondents reported 1-8 hours and 36.4% reported 8-12 hours due to daily standing at work. And the not applicable respondent was 17.3. Regarding the study, it has been shown that about 72.7% of respondents by heavy physical duty (lifting). The risk of developing musculoskeletal disorders among respondents was 47.3% sometimes with the increase in the amount of perceived stress. Those who never stress (14.5%) participate in groups respectively. And never any stress, 14.5, all the time very little, 14.8%.

Distribution of the Respondents by Suffering from Other Co-Existing Diseases
The table shows that 16.4% of respondents were not suffering from a common co-existing disease. Among them, 25.5% suffered common cold, 18.2% suffered from skin allergies, 11.8% suffered from fungal infection, 5.5% suffered from asthma and a small percentage suffered from co-morbidities.

Extended Nordic Musculoskeletal Questionnaire (NMQ-E) for Musculoskeletal Disorder
Considering the pain in different parts of the 9-body region, 23.6% had neck according to 12.7% had shoulder, 6.4% upper back, 3.6% had elbow 7.3%, 3.6% wrist/hand, 29.1% lower back, 0.9% Hips/thigh, 10.9% knees and 9.1% ankles/foot (Table 6).

Body Region	Frequency (Number)	Percentage (%)
Neck	26	23.6
Shoulder	14	12.7
Upper back	7	6.4
Elbows	4	3.6
Wrist/Hand	4	3.6
Low back	32	29.1
Hips/Thigh	1	0.9
Knees	12	10.9
Ankles/Feet	10	9.1

Table 6: Distribution of respondents by pattern of body region pain.

Association Between BMI and Lifting Objects/People During Work

A chi-square test for independence with α=0.05 was used to assess whether the BMI was related to lifting objects/people during work. The chi-square test is statistically significant, χ^2 (1, N=110)=6.366, p<0.05, with a phi coefficient of 0.241, indicating a moderate relationship. As seen in the figure, a normal BMI is more likely to lift objects/people than an overweight (Fig. 1).
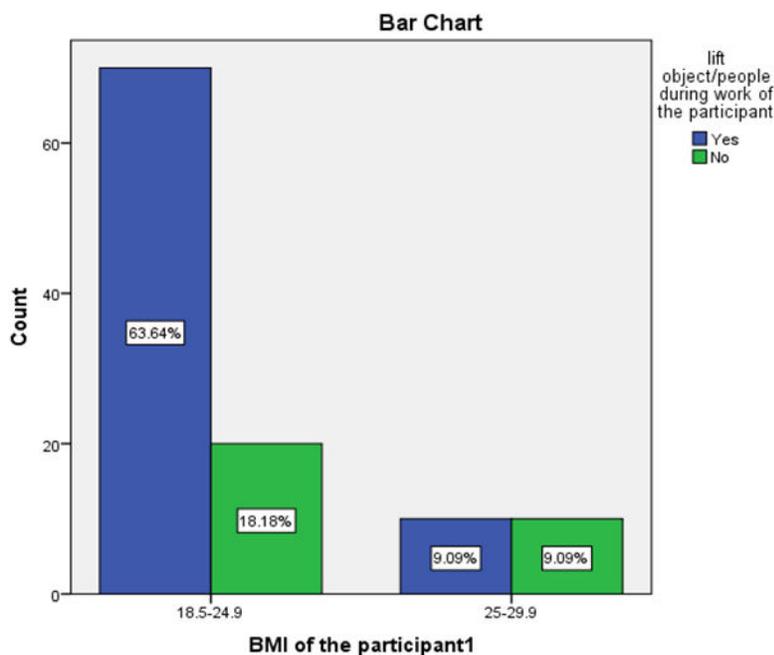

Figure 1: Association between BMI and lifting objects/people during work.

Association Between Actual Regular Working Hours with Daily Sitting Hours

A chi-square test for independence with α=0.05 was used to assess whether the actual regular work hour was related to the daily sitting hours. The chi-square test is statistically significant, χ^2 (1, N=110)=8.985, p<0.05, with a phi coefficient of 0.404, indicating a strong relationship. As seen in the figure, actual regular-hour overtime is more likely sitting hours than during regular working hours (Fig. 2).
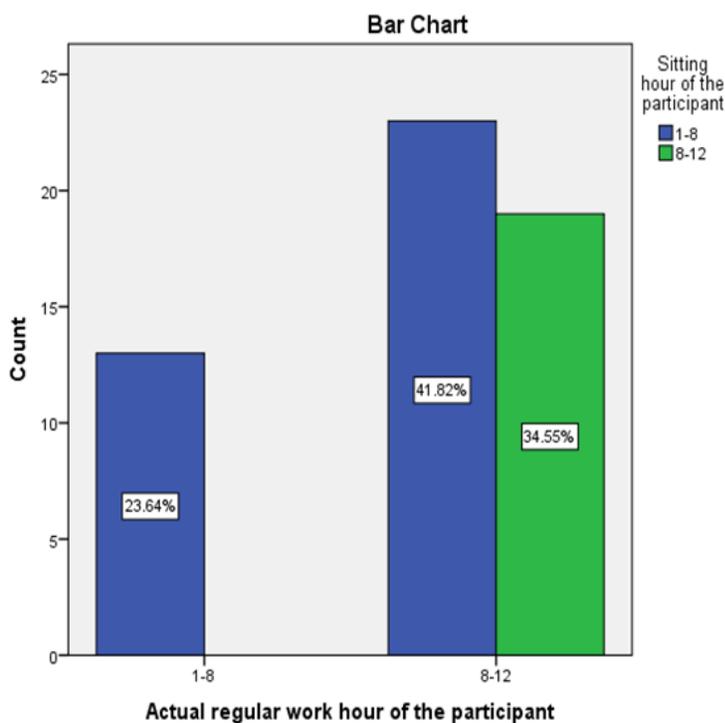
Figure 2: Association between actual regular working hours with daily sitting hours.

Association Between Actual Regular Working Hours with Daily Standing Hours

A chi-square test for independence with α=0.05 was used to assess whether the actual regular work hour was related to the daily standing hour. The chi-square test is statistically significant, χ^2 (1, N=110)=25.56, p<0.05, with coefficient of 0.530, indicating a strong relationship. As seen in the Fig. 3 actual regular-hour over time is more likely standing hours than a regular working hour.
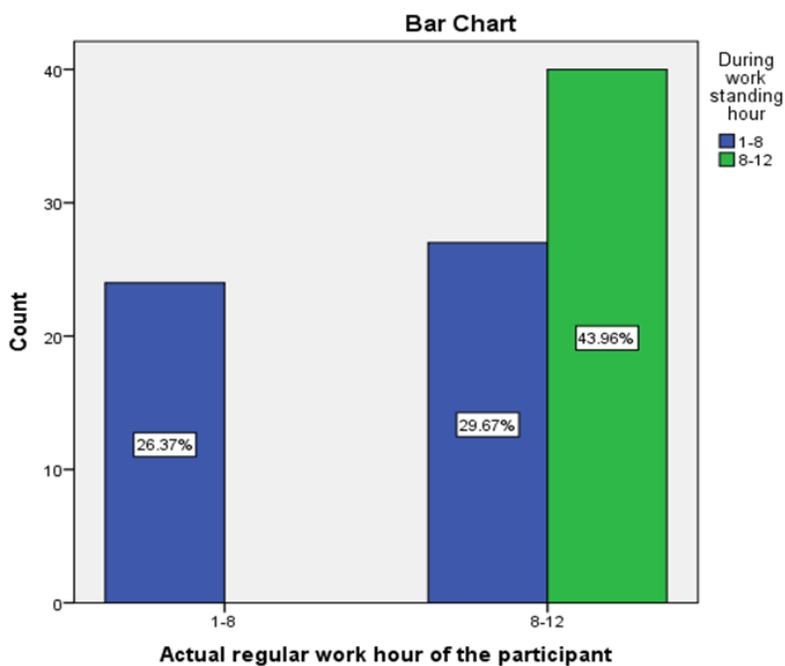

Figure 3: Association between actual regular working hours with daily standing hours.

Discussion

Garment workers mostly work in a sitting posture and they hold their posture sincerely due to the nature of their work and its importance. Prolonged sitting makes people discomfort and leads to musculoskeletal disorders. In Bangladesh, most of the garment workers are early adult and their physical capacity is higher than other age. So, they can compensate for the problem. When this population is under threat of musculoskeletal disorders, then it's alarming. It was observed in the present study that the mean age of the respondents was 21.89 (SD± 3.899) years. The majority of the respondents (28.8%) were between 19-20 years. Only 22.3% were above 25 years and almost all were Muslim (91.2%) except one who belonged to the Hindu Community. It was observed in the present study that 110 participant's 38% (n=42) participants were male and 62% (n=68) were female. The female was the highest number of the respondents. It was observed in the present study that the mean age of the respondents was 29.94 (SD± 6.571) years. Among 110 participants, less than 18-30 years is 59.1% (n=65), 39.1% (n=43) were in the age between 30-45 years and 1.8% (n=2) were in the age of more than 30 years. The 18-30-year group had the highest percentage. Most of the respondents were Muslim (94.5%), followed by Hindu (4.5%) and Buddhist (0.9%).

Most of the respondents, 90.9% of garment workers, were married, 8.2% were unmarried and the rest 0.9% were divorced. among 110 respondents, 0.9% (n=1) have the below SSC educational level, 78.2% (n=86) have the SSC educational level, 20% (n=22) have the HSC educational level and 0.9% (n=1) have the graduate educational level. SSC's educational level has the highest number of participants. This finding correlates with LFS findings, that people with no or little education had a high labour force participation rate (Rahman, 2014). Husband /father occupation of the respondent's day labourer 8.2% (n=9), cultivator 6.4% (n=7), rickshaw puller 9.1% (n=10), garment worker 19.1% (n=21), Small business 13.6% (n=15), Service 6.4% (n=7) and not applicable 37.3% (n=41). Wife /father occupation of the respondent's: Garments worker 13.6% (n=15), Small business 3.6% (n=4), Service 1.8% (n=2, Housewife 18.2%(n=20) and not applicable 62.7% (n=69). The epidemiology showed that underprivileged populations are working in the garment factory.

RMG is placing second place for Job facilities for many unskilled labourers coming from rural areas seeking work. Without prior knowledge, many labourers handled heavy loads which are monotonous, continuous and prolonged. Without proper protective equipment and inappropriate ergonomic provisions, their health is vulnerable. This study aimed to determine the WMSDs and risk factors among RMG workers and find out the association and correlation with pain among different predefined variables in Bangladesh. Musculoskeletal Disorders (MSDs) are a significant health concern in the workplace, particularly in industries that require repetitive motions and sustained physical activity, such as garment manufacturing.

The risk of developing musculoskeletal disorder pain was almost 32.7% of respondents. There were 1-8 hours and 17.3% were 8-12 hours of daily sitting at work. And the not applicable respondent was 50.0%. The risk of developing musculoskeletal disorder pain was almost 46.4% of respondents reported 1-8 hours and 36.4% reported 8-12 hours due to daily standing at work. And the not applicable respondent was 17.3. It regards 72.7% of respondents by heavy physical duty (lifting). The risk of developing musculoskeletal disorders among respondents was 47.3% sometimes with the increase in the amount of perceived stress. Those who never stress (14.5%) participate in the group, respectively. And never any stress, 14.5, all the time, very little, 14.8%.

Co-morbid diseases have been associated with musculoskeletal disorder pain [12]. 16.4% of respondents were not suffering from common co-existing diseases. Among them, 25.5% were suffering from the common cold, 18.2% suffered skin allergies, 11.8% suffered from fungal infection and 5.5% had asthma and a small percentage had another co-existing disease. In our study, among 110 respondents, 9-body region, 23.6% had a neck according to 12.7% had a shoulder, 6.4% upper back, 3.6% had an elbow 7.3%, 3.6% wrist/hand, 29.1% lower back, 0.9% had Hips/thigh, 10.9% knees and 9.1% ankles/foot. Initial ages of trouble arise in 6.4% below 18 years of age, according to 64.5% in here age range 18-30 years, 28.2% in here age range 30-40 years and 0.9% above 40 years 0.9%. Due to trouble among 110 respondents, 5.5% (n=6) are hospitalized and the rest of 94.5% (n=104) did not require hospitalisation. Due to trouble changing jobs/duties among 110 respondents, 16.4% (n=18) changed jobs/duties and the rest of the majority, 83.6% 9(n=92) did not need it. Trouble (ache, pain or discomfort) lasted 4 weeks among 110 respondents; 73.6% (n=81) felt it and 26.4% (n=29) did not experience it. Trouble (ache, pain or discomfort) today, among 110 respondents, 92.7% (n=102) experience it and the rest of 7.3% (n=8) do not experience it. Preventing from work (home or away from home) among 110 respondents, 31.8% (n=35) faced it and the rest of the majority, 68.2% (n=75) did not face it. Among 110 respondents who received doctor, physiotherapist, chiropractor or other treatment, 93.6% (n=103) and the rest of not receive any treatment, 6.4% (n=7).

Among 110 respondents who received medication, 87.3% (n=96) and the rest of 12.7% (n=14) did not. Most of the respondents received treatment, 93.6% (n=103). The rest of 2.7%(n=3) do not receive treatment due to lack of money, 1.8% (n=2) due to distance from health facilities and another 1.8% (n=2) due to expenditure for treatment. Among 110 respondents taking sick leave for trouble, 61.8% (n=68) and the rest 38.2% (n=42) did not. The majority of more than half (56.4%) of respondents had 1-6 days of leave last 12 months, followed by 40.0% who had 7-12 days in the last 12 months and 0.9% had more than 12 days of leave last year. And the rest of the 2.7% had no leave last 12 months. Most of the respondents (50%) belonged to 145-155 cm, 34.5% belonged to 155-165 cm and only 15.5% were 165-175 cm in height, respectively. 69.1% of respondents were 45-60kg, according to 29.1% belonged to 61-75 kg and only 1.8% were >75 kg, respectively. The majority of 81.8% of respondents' BMI was 18.5-24.9, followed by 18.2% of respondents were 25-29.9. There was a relationship between the BMI was related to lifting objects/people during work. 72.7% of respondents by heavy physical duty (lifting). The findings are statistically moderately significant. χ^2 (1, N=110) =6.366, p<0.05 with phi co-efficient of 0.241. Relationship between hours spent sitting and participants with regular duty hours. The risk of developing musculoskeletal disorder pain was almost 32.7% of respondents reported 1-8 hours and 17.3% reported 8-12 hours due to daily sitting at work. The findings show a statistically strong relationship. χ^2 (1, N=110) =8.985, p<0.05 with phi co-efficient of .404. Regular-hour overtime is more likely sitting hour than regular working hours. Relationship between hours spent standing and participants with regular duty hours. The risk of developing musculoskeletal disorder pain was almost 46.4% of respondents reported 1-8 hours and 36.4% reported 8-12 hours due to daily standing at work. The findings show a statistically strong relationship. Here, χ^2 (1, N=110) =25.56, p<0.05 with phi co-efficient of 0.530. Actual regular-hour overtime is more likely to be standing hours than regular working hours. Interestingly, a study of Sri Lankan garment workers found a relatively low prevalence of musculoskeletal disorders, with few sewing machine operators reporting neck or upper extremity pain. This is surprising, given that the garment industry generally experiences some of the highest rates of neck and shoulder pain compared to other manufacturing sectors [11-25]. In Bangladesh, the garment sector plays a crucial role in the economy, employing a large portion of the workforce, with a significant number of workers being women. Despite its economic importance, the industry is notorious for its poor working conditions, which include prolonged standing, repetitive motions, inadequate seating arrangements and poor ergonomics, all of which contribute to the development of musculoskeletal disorders [13-48].

Strength of the Study

The study was implemented in one of the biggest garment factories in Bangladesh. So, it was generated the quality data. The data collector was trained before starting data collection, so they have given very nice output. The ethical issues were maintained properly.

Limitations of the Study

It was a single-centred study which was not sufficient to get all aspects information. Due to a self-funded study, it was not possible to get data from multiple centres.

Conclusion and Recommendations

The range of health issues faced by garment workers, especially the high incidence of musculoskeletal problems, is alarming. It is essential to take measures to revise their wages and improve working conditions to enhance their socioeconomic status. Additionally, providing counselling for alcohol and tobacco addiction is crucial, along with educating workers about disease prevention and the importance of personal hygiene. In the ready-made garment sector of Bangladesh, a significant number of female workers continue their employment despite suffering from various diseases and illnesses, as they have no alternative means of support. The growth and development of this sector heavily rely on female workers, who are its primary contributors. It is important to recognize that unhealthy workers cannot sustain a healthy economy. Health issues among workers significantly impact the competitive strength of the garment sector in the global market, as they greatly reduce productivity. To identify workers at high risk of poor outcomes, factors associated with chronic low back pain can be utilized. These factors include recovery expectations, interactions with healthcare providers, self-reported pain and physical limitations and the physical demands of the job. Screening workers based on these factors can help pinpoint those at high risk of long-term or permanent disability. There is conflicting evidence regarding the association of the female gender with musculoskeletal disorders, particularly in occupations like nursing and jobs requiring heavy physical labour. Participation in physical activities more than three times a week is protective against lower back pain. It is essential to maintain a balance between prolonged sitting, standing and walking, as excessive amounts of any of these can contribute to the development of musculoskeletal pain. Additionally, stress is associated with musculoskeletal pain, which may also be linked to other chronic diseases.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Consent To Participate

The authors certify that they have obtained all appropriate patient consent.

Data Availability and Consent of Patient

Data is available for the journal. Informed consents were not necessary for this paper.

Author's Contribution

All authors contributed equally for this paper.

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