# How common are aches and pains among garment factory workers? A work-related musculoskeletal disorder assessment study in three factories of south 24 Parganas district, West Bengal

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## ABSTRACT

**Context:** Garment Industry is considered to be the second-largest employment sector in India. Occupational health problems among workers are often ignored, work-related musculoskeletal disorders (WMSD) accounts for the majority of it. The leverage of a healthy workforce is indispensable in the smooth running of the country's economic machinery. **Aims:** To find out the prevalence of WMSD among the workers and to assess the relationship of WMSDs with sociodemographic, behavioral, and occupational factors. **Settings and Design:** A cross-sectional study was conducted from June 2017 to August 2019 among 222 workers in three garment factories located in a municipality area of south 24 Parganas District, West Bengal. **Methods and Material:** Sociodemographic and behavioral characteristics, occupational differentials, and morbidity profiles were assessed using a pre-designed, pre-tested schedule. **Statistical Analysis Used:** Data were analyzed by SPSS ver. 16.0. Logistic regression was done to determine the associates of WMSDs. **Results:** Most of the workers were males (70.27%), belonged to the age-group of 36–55 (42.34%) and were illiterate (33.78%). WMSD was prevalent among 70.72% of the workers. Presence of WMSD was significantly associated with educational status{illiterate (OR: 3.59; CI: 1.56–8.22), below secondary (OR-2.89;CI: 1.26-6.62)}, sitting job (OR: 2.02; CI: 1.01-4.03), unsatisfactory working environment (OR: 8.38; CI:1.95–36.06), and level of distress {mild (OR-2.89;CI: 1.26-6.62), moderate-severe (OR: 6.98; CI: 1.46–33.25)}. **Conclusions:** Improving health awareness and periodic health check-up is the need of the hour for the sustenance of the massive workforce, which can be achieved through the integration of basic occupational health services (BOHS) with primary health care (PHC) infrastructure.

**Keywords:** Basic occupational health services, garment factory workers, musculoskeletal discomfort, occupational diseases, pre-placement examination, work-related musculoskeletal disorder

## Introduction

The garment and apparel industry is considered to be the oldest, largest, and most global industries in the world. India is the second-largest manufacturer and exporter in the world, after China. The textile industry contributes to 7% of industry output in value terms, 2% of India's GDP and to 15% of the country's export earnings. In India, it is the second-largest employer, providing employment to 45 million people directly, and another 6 crore people in allied sectors, including a large number of women and rural populations.[1]

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This is a highly diversified industry with a wide range of segments ranging from products of traditional handloom, handicrafts, wool, and silk products to the organized textile industry. While the organized textile industry is characterized by the use of capital-intensive technology for mass production of textile products, a lion's share of this industry is unorganized in nature, mostly run by private establishments. This unorganized sector offers a wide range of opportunities including entry-level jobs for unskilled labor in developing countries, typically from rural locations.[2]

Various studies have enumerated the morbid conditions among these workers which include work-related musculoskeletal disorders (WMSD), respiratory disorders, occupational injuries, stress-related disorders. Ill health is further compounded by various occupational and socioeconomic factors such as poverty, lack of education, poor working conditions, excess working hours, and poor diet.[3-6]

WMSDs are conditions in which the work environment and performance of work contribute significantly to the condition and/or the condition is made worse or persists longer due to work conditions.[7]

WMSDs are debilitating in nature and impact an employee's performance substantially. Poor employee performance leads to financial loss for the organization and thereby puts job security at stake. Hence, early detection and amelioration of WMSD among garment factory workers would prove to be fruitful in the long run.

In view of the above, an observational, cross-sectional study was done among the workers of small scale garment industry in an urban area of Kolkata, with the objective of finding out the prevalence of WMSD among the workers and to assess the relationship of WMSDs with sociodemographic, behavioral and occupational factors.

## Materials and Methods

After obtaining permission from the institute ethics committee of All India Institute of Hygiene and Public Health, Kolkata and formal approval of the factory authorities, the researchers visited the factories and a brief introduction regarding the nature of the study was given to the participants. Face to face interview was done with the study participants using a predesigned pretested structured schedule consisting of the following domains:
1. Socio-economic and demographic characteristics (age, gender, religion, caste, marital status, type of family, education, socioeconomic status [Modified BG Prasad scale 2018]).[8]
2. Addiction—Use of at least one substance. (Tobacco-smoking/ smokeless; alcohol)
3. Occupational differentials:
   i. Hours of work per day. (in hours)
   ii. Duration of work in the present position. (in years)
   iii. Type of work categorized into standing and sitting.

Those involved in cutting, stitching, checking, finishing, and supervisor were clubbed together as "*sitting*" jobs; those involved in loading, helping, ironing, packing, and security personnel was together considered to be "*standing*" jobs.
   iv. Self-perceived working environment-perception was categorized into satisfactory and unsatisfactory.
   All garment factory workers were scored based on their assessment of six parameters namely *lighting, space per person, noise, temperature, ventilation, and inter-personal relationship with co-workers* at work. Adequacy or comfortable response was scored as "1." Range of attainable score was 0–6. Those attaining 50% of the attainable score (i.e. >3) were considered as "satisfactory."
4. Morbidities:
   i. WMSD elicited by using Cornell musculoskeletal discomfort questionnaires (CMDQ)[9]
   WMSD was defined as the attainment of the lowest positive score ($\geq 1.5$) in the CMDQ questionnaire. Higher CMDQ scores indicate a greater degree of musculoskeletal discomfort.
   ii. Level of distress-elicited using PHQ–4 (patient health questionnaire for Depression and anxiety.[10]
      **PHQ-4-**Scoring: Total score ranges from 0 to 12, with categories of psychological distress being classified as:
      • None—0–2
      • Mild—3–5
      • Moderate—6–8
      • Severe—9–12

**Data analysis** was done using to Statistical Package for the Social Sciences (SPSS) version 16.0 (Armonk, NY: IBM Corporation) for final analysis. *P* value <0.05 was considered as the cutoff for statistical significance.

## Results

Table 1: The sociodemographic profile of the study population exhibited that most of the workers were males (70.27%), and belonged to the age-group of 36–55 (42.34%), with none below 17 years of age. It was seen that 33.78% of the workers were illiterate and almost half (41.44%) workers belong to socioeconomic class III, according to the modified B.G. Prasad Scale 2018. Addiction was prevalent among more than two-thirds (65.76%) of the workers to one or more substances. Almost half of the workers (49.54%) were engaged in Stitching; most (33.58%) were working for between 1 and 5 years with mean working hours of 10.57 per day. The majority (84.24%) of the workers were satisfied with their working environment.

None of the workers had undergone any formal training and pre-placement examination before joining work. All of them admitted to not using any form of personal protective equipment (PPE). There was no provision of a periodic medical examination for the workers in any of the factories.

**Table 1: Distribution of garment factory workers according to socio-demographic characteristics and occupational differentials (n=222)**

| Variables | Categories | Number (%) |
|---|---|---|
| Age (in completed years) | ≤18 | 16 (7.21) |
| Mean: 39.88 years | 18-35 | 87 (39.19) |
| SD: 13.5 years | 36-55 | 94 (42.34) |
| Range: 17-70 years | >56 | 25 (11.26) |
| Gender | Male | 156 (70.27) |
| | Female | 66 (29.73) |
| Level of education | Illiterate | 75 (33.78) |
| | Below Primary (up to class 4) | 11 (4.95) |
| | Primary(class 4-7) | 61 (27.47) |
| | Middle(class 8-9 ) | 36 (16.21) |
| | Secondary (passed class 10) | 13 ( 5.85) |
| | Higher secondary(passed class 12) | 12 (5.40) |
| | Graduate and above | 14 (6.34) |
| Type of family | Nuclear | 202 (91.0) |
| | Joint | 20 (9.0) |
| Socioeconomic class (as per modified BG Prasad Scale May 2018) | Class I (≥₹.6596.7 ) | 15 (6.75) |
| | Class II (₹.3298.3 to 6596.7 ) | 76 (34.23) |
| | Class III (₹. 1979 to 3298.3) | 92 (41.44) |
| | Class IV (₹. 989.5 to 1979 ) | 37 (16.66) |
| | Class V (<₹. 989.5 ) | 2 (0.9) |
| Present job specification | Cutting | 18 (8.10) |
| | Stitching | 110 (49.54) |
| | Checking/finishing | 46 (20.72) |
| | Ironing/packing | 17 (7.65) |
| | Loading/helper | 21 (9.45) |
| | Supervisor/designer | 5 (2.25) |
| | Security | 5 (2.25) |
| Duration at present position (in years) | < 1 | 23 (10.36) |
| | 1 to 5 | 79 (35.58) |
| Mean: 14 years | 6 to 10 | 53 (23.88) |
| SD: 5.75 years | 11 to 15 | 53 (23.88) |
| Range: 0.08 to 30 years | > 15 | 14 (6.30) |
| Hours of work per day | ≤ 8 | 35 (15.76) |
| Mean: 10.57 hours | 9 to 11 | 115 (51.80) |
| SD: 1.58 hours | ≥ 12 | 72 (32.44) |
| Range: 6-14 hours | | |
| Self-perceived workplace satisfaction | Unsatisfied | 35 (15.76) |
| | Satisfied | 187 (84.24) |

It was found that WMSD was prevalent in **70.72%** of the garment factory workers.

Table 2: The majority of the workers experienced musculoskeletal discomfort of the *back* (61.26%), followed by the knee (44.59%), lower leg (43.69%), neck (32.43%). The mean CMDQ scores were highest for lower back (14.40), right shoulder (8.29), followed by the right knee (6.29), and right lower leg (6.29).

Table 3: Univariate logistic regression showed that presence of Work-related Musculoskeletal Disorder was significantly associated with *lower educational qualification* (illiterate [OR: 3.59; CI: 1.56–8.22], and below secondary [OR: 3.01; CI: 1.40–6.43]), *type of job* (sitting [OR: 2.02; CI: 1.01–4.03]), *self-perception of the working environment* (unsatisfactory [OR: 8.38; CI: 1.95–36.06]), *addiction* (OR: 2.06;CI: 1.14-3.76) and

*level of distress* (mild [OR: 2.89; CI: 1.26–6.62]), and moderate to severe ([OR: 6.36; CI: 1.44–28.12]).

Table 4: Multivariable hierarchical logistic regression was done where predictors of WMSD were sequentially incorporated into models. On successive inclusion of domains, the Nagelkerke's $R^2$ increased from 0.074 to 0.226; while the Hosmer and Lemeshow test results remained not significant for all three models (*P-value* > 0.05).

## Discussion

The prevalence of WMSDs in this study **(70.72%)** was found to be similar to studies by Saha *et al.* in Kolkata (69.6%), Ahmed *et al.* in Ghazipur (78.8%), Kumar *et al.* in Bangalore (71.9%), and Ravichandran *et al.* in Tirupur (77.6%).[3,11-13]

The back was found to be the most common anatomical area to be affected. This finding corroborated the findings of Saha *et al.*, Bandyopadhyay *et al.*, Mehta in Jaipur, Punitha *et al.* in Puducherry, and Vidusha *et al.* in Bangalore.[3,14-17]

The International Labour Organization estimated that 40% of all costs related to work-related injuries and diseases were due to WMSDs, among which low back pain was the most common. Lack of proper ergonomic measures compounded by prolonged work hours is a major cause of low back pain.[18,19]

As observed by Saha, even in this study it was found that there was no provision of pre-placement examination, periodic health screening.[20] Being an unorganized sector, the well-being of the garment factory workers are often at the mercy of the factory owners. They are under immense pressure to perform under stressful and hazardous working conditions, especially during the increased market demands of festive seasons. The workers are thus caught in a vicious cycle of poor socioeconomic status, unhealthy working conditions, and poor health status with no provision of targeted health care.

Mean CMDQ scores were found to be much higher on the right side as compared to the left side, which might be due to the fact that the majority of the population was right-handed. The scores were higher in the lower extremity than the upper extremity, which can be attributed to the lack of rest periods during work, as the employees are often under pressure to meet targets and deadlines.[9]

In this study, age (≤35 years), lower educational qualification, sitting job, unsatisfactory working environment, addiction, and psychological distress were found to be significant determinants of WMSD among the garment factory workers, which reiterated the findings of Saha *et al.* and Bandyopadhyay *et al.*[3,14]

### Strength of the study

The researchers elicited the data with sincerity and tactfulness keeping in mind that such unorganized sectors are usually

resistant to any research activities as it makes the employers apprehensive that they might be held accountable for the poor state of their employees and might be burdened to take steps for betterment.

## Limitations

This was an institution based study involving complete enumeration of three factories, hence it lacks external generalizability.

| Table 2: Distribution of garment factory workers according to areas of musculoskeletal discomfort with Mean CMDQ scores (*n*=222)* |||
| --- | --- | --- |
| Areas of musculoskeletal discomfort | Number (%) | Mean CMDQ Scores |
| Neck | 72 (32.43) | 6.31 |
| Shoulder | 65 (29.28) | Right-8.29 Left-2.89 |
| Back | 136 (61.26) | Upper back4.12 Lower Back14.40 |
| Upper Arm | 42 (18.92) | Right-5.48 Left-4.27 |
| Forearm | 19 (8.56) | Right-0.44 Left-0.19 |
| Wrist | 57 (25.67) | Right-1.77 Left-0.62 |
| Hip | 37 (16.67) | 1.67 |
| Thigh | 53 (23.87) | Right-2.46 Left-1.22 |
| Knee | 99 (44.59) | Right-6.29 Left-4.02 |
| Lower leg | 97 (43.69) | Right-6.29 Left-3.41 |

*Multiple responses

## Conclusion and Recommendation

The garment industry cannot flourish in the long run at the cost of a worker's health. It is the responsibility of the Government and employers to provide a safe and healthy work environment to the garment workers.

Proper counseling and health education meted out to them can not only improve their overall health status but also make them aware of their rights.

There is a dire need for pre-placement and periodic medical examination to be done by trained medical professionals. As already recommended by WHO, integration of basic occupational health services (BOHS) with primary health care (PHC) infrastructure is the need of the hour. Bringing BOHS under the umbrella of PHC would be pivotal in prevention, early diagnosis and treatment of morbidities prevailing among the workers, which in the long run will be beneficial for both employees and the employers, and the nation as a whole.[21]

## Ethical approval

The study was approved by the institutional ethics committee, All India Institute of Hygiene and Public Health, Kolkata.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

| Table 3: Bivariate analysis showing factors associated with work-related musculoskeletal disorder (WMSD) ||||
| --- | --- | --- | --- |
| Variable | Categories | Work-related musculoskeletal disorder || OR(CI) |
| | | Absent | Present | |
| Age | ≤ 35 years | 29 (28.2%) | 74 (71.8%) | 1.11(0.61-1.98) |
| | > 35 years | 36 (30.3%) | 83 (69.7%) | 1 |
| Gender | Male | 51 (32.7%) | 105 (67.3%) | 1 |
| | Female | 14 (21.2%) | 52 (78.8%) | 1.80(0.91-3.55) |
| Education status | Illiterate | 17 (22.7%) | 58 (77.3%) | 3.59(1.56-8.22) |
| | Below Secondary | 28 (25.9%) | 80 (74.1%) | 3.01(1.40-6.43) |
| | Above Secondary | 20 (51.3%) | 19 (48.7%) | 1 |
| Type of family | Nuclear | 61 (30.2%) | 141 (69.8%) | 1 |
| | Joint | 4 (20.0%) | 16 (80.6%) | 0.578(0.19-1.80) |
| Duration of work in hours per day | ≤8 | 9 (25.7%) | 26 (74.3%) | 1.23(0.54-2.80) |
| | >8 | 56 (29.9%) | 131 (70.1%) | 1 |
| Type of work | Sitting | 47 (26.3%) | 132 (73.75%) | 2.02(1.01-4.03) |
| | Standing | 18 (41.9%) | 25 (58.1%) | 1 |
| Self-perception of working environment | Unsatisfactory | 2 (5.7%) | 33 (94.3%) | 8.38(1.95-36.06) |
| | Satisfactory | 63 (33.7%) | 124 (66.3%) | 1 |
| Addiction (any one substance) | No | 30 (39.5%) | 46 (60.5%) | 1 |
| | Yes | 35 (24.0%) | 111 (76.0%) | 2.068(1.14-3.76) |
| Presence of any chronic disease | Absent | 38 (30.4%) | 87 (69.6%) | 1 |
| | Present | 27 (27.8%) | 70 (72.2%) | 1.13(0.63-2.03) |
| Level of distress | No | 55 (36.7%) | 95 (63.3%) | 1 |
| | Mild | 8 (16.7%) | 40 (83.3%) | 2.89(1.26-6.62) |
| | Moderate to Severe | 2 (8.3%) | 22 (91.7%) | 6.36(1.44-28.12) |

**Table 4: Predictors of work-related musculoskeletal disorder (multivariable hierarchical logistic regression)**

| Variable | Categories | Model 1 AOR(CI) | Model 2 AOR(CI) | Model 3 AOR(CI) |
|---|---|---|---|---|
| Age | ≤ 35 years | 1.46(0.74-2.76) | 1.74(0.86-3.68) | 2.16(1.00-4.72) |
| | > 35 years | 1 | 1 | 1 |
| Education status | Illiterate | 4.23(1.76-10.22) | 4.18(1.66-10.52) | 4.97(1.90-13.01) |
| | Below secondary | 3.19(1.48-6.90) | 2.72(1.17-6.33) | 3.00(1.24-7.28) |
| | Above secondary | 1 | 1 | 1 |
| Type of job | Sitting | -- | 1.62(1.23-3.62) | 1.42(1.28-3.26) |
| | Standing | | 1 | 1 |
| Self-perception of working environment | Unsatisfactory | -- | 8.86(2.01-38.94) | 6.28(1.30-30.29) |
| | Satisfactory | | 1 | 1 |
| Level of distress | No | | | 1 |
| | Mild | -- | -- | 1.83(0.71-4.73) |
| | Moderate to Severe | | | 6.98(1.46-33.25) |
| Nagelkerke R square | | 0.074 | 0.174 | 0.226 |
| Hosmer and Lemeshow test | | 0.061 | 0.094 | 0.078 |

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