

Prevalence of Musculoskeletal Symptoms among Female Garment Workers in Dhaka, Bangladesh

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ABSTRACT

A cross-sectional, descriptive study was conducted among the female garment workers in Dhaka, Bangladesh, to observe their occupational impact on their musculoskeletal systems and biomechanical risks. A total of 488 female garment workers were selected from 4 garment factories in 4 corners of the greater Dhaka industrial zone. Among them, two were large factories and two were small factories. Data were collected by face-to-face interviews and by direct observation using Rapid Upper Limb Assessment (RULA) in employee assessment worksheet. RULA data showed 98.98% of respondents are action level 4 or more. Among them, mild, moderate and severe pain were reported by 47.12%, 50% and 2.66% of the workers respectively. Varying duration of pain symptoms were reported: <6 weeks by 61.88%, 6-12 weeks by 23.77% and >12 weeks by 14.14% of the participants. However, the majority of workers (88.32%) reported satisfaction with their jobs. 52% of the participants were suffering from some forms of musculoskeletal diseases. An extremely high prevalence (92%) of musculoskeletal symptoms were found among the participants. Musculoskeletal symptoms were reported in the generalized body, lower back, neck, foot, ankle, knee, shoulder, wrist and elbow (45.2%, 34.5%, 29.4%, 17.1%, 15.9%, 12.7%, 11.1%, 7.5% and 4.4% respectively). The research urgently calls for immediate ergonomic improvements, comprehensive health education, and substantial policy reforms to better protect the health and rights of these workers. It emphasizes the need for stakeholders to create safer and healthier working conditions, thereby enhancing the sustainability of the garment sector and empowering its critical workforce.

Keywords: Garment workers, musculoskeletal disorder, occupational hazard, Bangladesh.

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INTRODUCTION

Bangladesh's Readymade Garment (RMG) sector is a cornerstone of the national economy, contributing about 78.15% of the country's foreign income during the 2010-2011 fiscal year. Over 5,100 garment factories operate in Bangladesh, employing approximately 3.6 million workers, more than 80% of whom are women from rural backgrounds. This sector has been instrumental in providing employment opportunities

to these women, who might otherwise be confined to domestic roles, and empowering them economically¹. However, the working conditions in these factories are often substandard, with workers facing multiple health and safety challenges. The majority of the garment workforce lives under the poverty line, grappling with inadequate access to healthcare, proper housing, and essential services. Factory environments are typically cramped and poorly

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ventilated, contributing to various health risks, including respiratory infections and chronic ailments related to poor air quality². According to WHO, "Health is a state of complete physical, mental and social wellbeing and not merely the absence of diseases or infirmity". However, Bangladeshi garment workers cannot maintain any health standard prescribed by the World Health Organization (WHO)².

The garment workers in Bangladesh had to work from dawn to dusk in a confined environment where proper ventilation of air is absent. Most of the owners of the garment factories are found to be completely reluctant. Research reported that the restrictive work environment in garment factories severely impacts workers' health, leading to various health issues. Their study concluded that the specific nature of garment work results in numerous health hazards including headaches, malnutrition, musculoskeletal pain, eye strain, loss of appetite, chest pain, fainting, diarrhea, hepatitis, food poisoning, asthma, fungal infections, helminthiasis, and dermatitis³. In these circumstances, recognizing ergonomic risk factors in the workplace is an essential first step in correcting hazards and improving worker protection⁴.

Female garment workers primarily stitch fabrics, which exposes them to fabric dust, leading to asthma, respiratory issues, conjunctivitis, and visual discomfort. Extended periods of immobility at their desks result in common ailments like back pain, neck pain, joint pain, and musculoskeletal problems⁵. Women in garment factories often occupy low-skilled positions such as operators and helpers, where health hazards are exceptionally high. In these jobs, they had to continuously inhale toxic substances emitted from the dye used in colored fabric, dust, and small particles of fibre⁵. Evidence also showed that the health status of workers in the stitching section, revealing that 55% suffered from musculoskeletal problems. Additionally, 40% experienced neural issues like headaches, 30% had respiratory problems, 13% faced skin issues, 8% reported numbness in hands and fingers, 5% had hearing problems, and 2% experienced visual discomfort⁶. Moreover, hazardous conditions of work range from exposure to lint dust in an apparel factory to exposure to toxic chemicals in the recycling of electronic waste⁷.

Female garment workers face long hours, sexual harassment, pregnancy-related job insecurity, and a

high rate of miscarriages³. Despite the RMG sector's economic importance, Bangladesh has not ratified the core OSH Convention (No. 155), and occupational safety and health are not prioritized. The Labor Act allows compensation claims, but limited knowledge and weak enforcement hinder effective legal recourse⁶. Besides, female garment workers face heavy pressure to meet daily targets, leading to stress and illnesses like headaches, fainting, eye strain, and heart disease. Study found this pressure increases health problems and medical expenses⁸, and excessive workload, awkward postures, forceful exertions, repetitive motions, and heavy lifting expose workers to undue physical stress, strain, overexertion, and vibration⁴.

Female garment workers earn insufficient to meet basic needs, leading to malnutrition and illnesses like diarrhoea and abdominal pain. An action paper on garment industry stated that their health issues arise from occupational hazards such as long hours, overcrowded conditions, and lack of health and safety measures. The absence of amenities and safe drinking water further exacerbates these problems⁹. They also sometimes face hearing disabilities from noisy sewing machines and neural problems due to poor lighting. Dust and loose fibres cause respiratory issues and common accidents include finger piercings from a lack of thimbles. Improperly maintained machines cause hand-arm vibration, leading to fatigue and headaches, while humid conditions from steam ironing result in respiratory problems and asthma⁶. Female garment workers often work overnight without separate restrooms, leading to unwanted contact and occasional harassment. This results in sexual diseases and job insecurity during pregnancy, forcing many to undergo abortions. Evidence showed a high miscarriage rates and repeated abortions among these workers, who face pressure to avoid having babies to keep their jobs. Despite their rights, they are denied the ability to have children due to fear of job loss⁵.

However, unfortunately employers and policymakers generally do not recognize occupational safety and health as a priority¹⁰. The national discussion about OSH issues tends to arise only in response to major industrial accidents. Bangladesh must still ratify the Occupational Safety and Health Convention (No. 155). The Labor Act allows workers, their families and trade unions to file court cases for compensation

in work-related accidents and diseases. Knowledge about occupational diseases and the capacity to pursue legal authority is limited, and the labour court system needs to be stronger. Given the RMG sector's importance and the severe health and safety issues its workers face, this study assesses the musculoskeletal conditions and related risk factors among female garment workers. It aims to identify prevalent musculoskeletal disorders (MSDs) affecting muscles, tendons, ligaments, and nerves, often presenting as pain in the neck, back, and extremities. The research will analyze risk factors, variation across occupational roles, and the frequency of musculoskeletal pain among different job types. The findings will inform recommendations to improve working conditions and promote the well-being of female garment workers in Bangladesh.

METHODS

This cross-sectional, descriptive study included 488 female garment workers from 4 garment factories in 4 corners of the greater Dhaka industrial zone., Bangladesh. Among them, two were large factories and two were small factories. Data were collected by face-to-face interviews and by direct observation using Rapid Upper Limb Assessment (RULA) in employee assessment worksheet. Our target population included all workers who were at least 18 years old, had worked in their factories for at least one year before the interview, and performed work related to the sections of sewing, ironing, cutting, buttoning, quality control, packing and finishing, cleaning. Multistage sampling techniques were used for sample determination; at first, 488 samples were selected from 4 garment factories in 4 corners of the greater Dhaka industrial zone. Then a simple random sampling technique was then performed to choose the participants from those four factories selected.

The modified standardized Rapid Upper Limb Assessment (RULA) method were used to collect data. The RULA (Rapid Upper Limb Assessment) evaluates biomechanical and postural risks through direct observation, developed initially for the garment industry. It scores body segments based on posture, motion, external force/load, and muscle function, with specific criteria for each. The assessment is divided into three parts: the upper arm, lower arm, wrist, and wrist twist (Part A), the neck, trunk, and legs (Part B), and the final grand score combining A and B (Part C). The final grand score determines action

levels: 1-2 (acceptable), 3-4 (investigate further), 5-6 (investigate and change soon), and 7 (investigate and change immediately).

Data were collected through a pre-tested, bilingual (English and Bengali) questionnaire with open and closed-ended questions, evaluating socio-demographic characteristics, posture, weightlifting habits, work hours, job satisfaction, and history of back trauma. Face-to-face interviews, which took about 5 to 10 minutes, were carried out by the researcher and research assistants during worker lunch breaks. For scoring using the RULA method, only the main researcher made observations, which took about 5"10 minutes. The RULA rating of body posture was determined during working hours. The observations were made for clusters of workers after their interviews.

All data was coded and analyzed using IBM SPSS Statistics for Windows (Version 22.0). Descriptive statistics such as means, standard deviations, percentages, and 95% confident intervals were used to describe sociodemographic information, work and workplace characteristics, and prevalence of musculoskeletal symptoms. Associations between specific sites of musculoskeletal symptoms and risk factors were analyzed by logistic regression to find adjusted odds ratios after controlling confounding factors (age, gender and underlying disease) with their 95% confident intervals.

The study was approved by the National Research Ethics Committee of Bangladesh Medical Research Council (BMRC), Dhaka, Bangladesh.

RESULTS

We tried to assess the musculoskeletal health impacts and associated risk factors among 488 female garment workers in Dhaka, Bangladesh, selected from four factories through stratified random sampling. The Rapid Upper Limb Assessment (RULA) scores showed that the majority of assessed tasks fall within scores 4 to 7, with only 0.2% at score 3, suggesting minimal risk. The most common score, 4, represents 40.57% of tasks, indicating a low level of risk but highlighting the need for further investigation and ergonomic improvements. Scores of 5, 6, and 7, accounting for 1.64%, 37.5%, and 20.08% of tasks respectively, show moderate to very high risk, necessitating varying degrees of intervention, from prompt to immediate (Table-I). Table-II further

categorizes these scores into intermediate (40.78%), high (39.14%), and very high risk (20.08%), emphasizing that a substantial 59.22% of tasks fall under high to very high risk, requiring urgent ergonomic modifications to reduce hazards. Most workers are engaged in long work hours: 76.43% had 8-12 hours, while 22.95% had <8 hours and 0.41% had >12 hours (Table-III). "Swing" and "Quality Control" were their main tasks, making up 61.89% and 30.33% of the workload (Table-IV). Among them, mild, moderate and severe pain were reported by 47.12%, 50% and 2.66% of the workers respectively (Table-V). Varying duration of pain symptoms were reported: <6 weeks by 61.88%, 6-12 weeks by 23.77% and >12 weeks by 14.14% of the participants (Table-VI). Despite the high prevalence of health issues, a large majority of workers (88.32%) reported satisfaction with their jobs (Table-VII). 52% of the participants were suffering from some forms of musculoskeletal diseases as identified by the health service providers (Fig. 1). An extremely high prevalence (92%) of musculoskeletal symptoms were found among the participants. This suggests a significant occupational health issue within the garment industry. Musculoskeletal symptoms were reported in the generalized body, lower back, neck, foot, ankle, knee, shoulder, wrist and elbow (45.2%, 34.5%, 29.4%, 17.1%, 15.9%, 12.7%, 11.1%, 7.5% and 4.4% respectively) (Fig. 3). Pain management strategies revealed a reliance on institutional doctors (42%) and pharmacy-bought medicines (23%), with 21% not seeking treatment (Fig. 4).

Table-I: RULA action level (n=488)

RULA Score	Frequency	Percentage
3	1	0.2
4	198	40.57
5	8	1.64
6	183	37.5
7	98	20.08

Table-II: RULA score by category (n=488)

RULA Score category	Frequency	Percentage
Intermediate	199	40.78
High	191	39.14
Very High	98	20.08

Table-III: Duration of work in a day (n=488)

Variables	Frequency	Percentage
<8 hours	112	22.95
8-12 hours	373	76.42
>12 hours	2	0.41
Missing	1	0.02

Table-IV: Types of work (n=488)

Variables	Frequency	Percentage
Swing	302	61.88
Buttoning	7	1.43
Cleaning	5	1.02
Packaging & Finishing	25	5.12
Quality Control	148	30.33
Missing	1	0.02

Table-V: Distribution of the intensity of pain

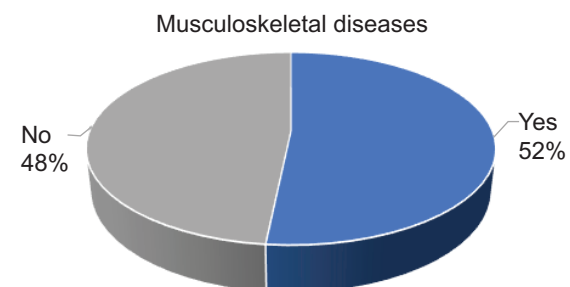
Variables	Frequency	Percentage
Mild	230	47.12
Moderate	244	50.0
Severe	13	2.66
Missing	1	0.02

Table-VI: Distribution of the duration of pain

Duration	Frequency	Percentages
<6 weeks	302	61.88
6-12 weeks	116	23.77
>12 weeks	69	14.14
Missing	1	0.02

Table-VII: Satisfaction with work

Variables	Frequency	Percentage
Yes	431	88.32
No	56	11.48
Missing	1	0.02

**Fig. 1: Pie chart showing the percentage of musculoskeletal diseases.**

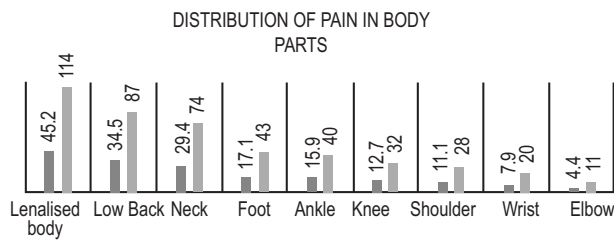


Fig. 2: Bar chart showing the distribution of pain in different body parts of the body

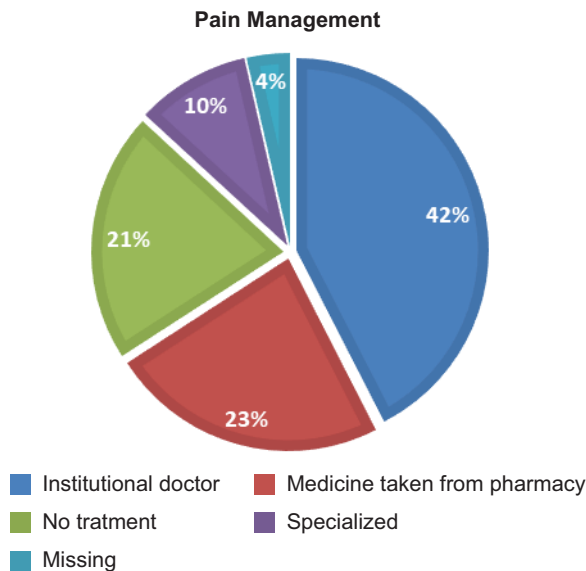


Fig. 3: Pie chart showing health seeking behaviour relating to pain management

DISCUSSION

The current study reveals an alarmingly high prevalence of musculoskeletal symptoms among Bangladeshi garment workers, with 92% reporting symptoms. Various studies have confirmed that a high prevalence of musculoskeletal symptoms is related to low-quality working conditions, poor workstation and tool design, high workload, mental stress, and biomechanical factors when working¹¹⁻¹⁴.

In this study, garment workers commonly experienced prolonged poor posture, with sewing workers sitting for 10 to 12 hours a day, performing repetitive motions that can lead to muscle and joint injuries due to insufficient recovery time. Non-sewing staff also faced long hours of standing. These conditions are exacerbated by the use of inadequate chairs that fail to provide proper back support. The fixed, rigid, cushionless chairs without backrests or with very short backrests (about 20 cm) used by these workers do not support their backs effectively,

contributing to their symptoms. Evidence also showed that a chair with a backrest consisting of lumbar support, which preserved lumbar lordosis, and a thoracic support, which supported the upper back during backward leaning, was very effective in supporting workers' backs during task performance¹⁵⁻¹⁷.

The RULA ratings in the present study showed very high levels of biomechanical risk for the garment factory workers. Almost 40% of the RULA ratings were at a level indicating that the workstations were a moderate risk needing more investigation and change soon, and 20% of the ratings were at the highest level, indicating extreme biomechanical risk and needing investigation and change immediately.

Furthermore, exposure to vibration at the workstation and feeling stressed with work were significant risk factors for discomfort or pain in the neck, shoulder, lower back, and upper back. Many workers felt stressed with work because of the high workload and long working hours, as the majority of the sewing machine operators worked from eight to ten hours per day. Repetitive or monotonous movement was another significant predictor of the likelihood of shoulder and upper back discomfort. Workers performed their tasks using the same motion for most of the workday, and their limb movements were repetitive and fast. Only forceful exertion was significantly associated with lower back symptoms. Our findings are consistent with previous studies, in which factors such as feeling stressed with work^{18,19}, and whole body vibration²⁰, were risk factors of musculoskeletal symptoms in the neck.

Previous studies have shown that lower back pain was related to physical load and frequent lifting and to frequent manual handling of materials²¹. These occupational activities caused forceful exertion because they increased muscular effort or placed a high load on muscles or joints. The association between shoulder pain and repetitive movement and vibration exposure is established from several evidence²⁰⁻²². In our study, no employee was rated by the RULA as being at the acceptable lowest-risk level. This is consistent with prior garment industry research¹⁸. Biomechanical factors appear to be highly related to the development of musculoskeletal symptoms among garment workers in Bangladesh. Reassuringly, Choobineh et al. found that workstation intervention could reduce the prevalence

of symptoms and the RULA scores, as 75% of subjects expressed increased comfort at work²³.

Future studies need to include longitudinal research to assess the long-term effects of implemented ergonomic interventions and expanded studies that include a broader range of factories and worker demographics to generalize findings more effectively. Additionally, exploring the specific impact of psychosocial interventions alongside physical, and ergonomic adjustments could provide deeper insights into the multifaceted nature of workplace health.

CONCLUSION

This study significantly contributes to the growing body of evidence that underscores the necessity of comprehensive ergonomic and psychosocial interventions in the garment industry. It serves as a reminder for industry leaders and policymakers to consider the immediate and long-term health benefits of such interventions. By fostering a safer and healthier work environment, the garment industry can ensure a more sustainable and productive future.

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