


ORIGINAL RESEARCH ARTICLE

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Factors associated with low back pain in ready-made garments workers in Bangladesh

Samme Akter Mithy¹, Shohal Hossain^{2*}  and Sadia Afroz³

Abstract

Objectives Low back pain (LBP) is an increasingly prevalent work-related condition that affects workers in manufacturing in Dhaka, Bangladesh, which often causes disability or additional problems when doing demanding physical duties. This study focused on the risk factors for LBP in the context of workers with LBP who work in the ready-made garment (RMG) factories.

Methods and materials A cross-sectional study involved 385 RMG workers, all of whom were adults with ≥ 1 year of work job experience and who typically worked in a sitting position. We use surveys method for collecting data, and a standardized questionnaire covering sociodemographic, pain, work, associated effects, and activities, as well as risk factor-related variables, was used. To evaluate the associations among categorical variables and LBP, we used the chi-square test. To identify the variables that showed strong relationships with LBP, multivariable logistic regression analysis was also carried out.

Results The participant's age (mean \pm SD) is 31.27 ± 6.94 . One-hundred ninety-four of the 385 participants between the ages of 30–39 years (23.9%) suffered from LBP and statistically strongly significant ($\chi^2 = 15.187, p < 0.05$). BMI, employment pattern, and specific work experience are also strongly significant. Out of all risk factors, age 40 and above (OR 1.65, 95% CI 1.53–17.78), overweight (BMI ≥ 25 kg/m²) (OR 10.72, 95% CI 2.16–53.5), work in an awkward position, stationary position for long time, working beyond physical ability, incorrectly using body mechanics, repeated twisting and bending, continuously longtime sitting, and using ergonomically improper tools were found to be significantly associated with LBP.

Conclusion The point prevalence of LBP among RMG workers is 41.6%. Only male gender is associated with the presence of LBP. This study showed that working in an awkward position, stationary position for a long time, incorrectly using body mechanics, repeated twisting, and bending had significant associations with LBP. Training programs that instruct proper weight-bearing skills should be encouraged by factories. The occurrence of LBP must also be reduced by regularly performing screening activities to detect it, with a special focus on married people, overweight or obese, and older-aged people.

Keywords Back pain, Low back pain, LBP, Industrial workers, Risk factors, RMG workers

Introduction

Low back pain (LBP) is a prevalent and debilitating health issue that affects a substantial portion of the global population, including the ready-made garment (RMG) workers in Bangladesh [11]. This condition not only poses a significant burden on the affected individuals but also has socioeconomic implications, particularly in a country like Bangladesh, where the RMG sector plays a pivotal role in the national economy [9]. Understanding the

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factors associated with LBP in RMG workers is crucial for addressing their health and well-being, as well as for maintaining the productivity of this vital industry [26].

The RMG industry in Bangladesh has experienced exponential growth in recent decades and is a major source of employment for millions of workers [23]. However, this growth has been accompanied by concerns related to the occupational health and safety of RMG workers, including the prevalence of musculoskeletal disorders such as LBP [2]. LBP in RMG workers is a multifaceted issue influenced by a complex interplay of factors, including occupational, ergonomic, individual, and psychosocial factors [22].

In this context, it is imperative to conduct comprehensive research that explores the various facets of LBP in RMG workers in Bangladesh. This research aims to identify the key factors associated with the onset and persistence of LBP among RMG workers, shedding light on the specific challenges faced by this vulnerable population [13]. By examining these factors, we can develop targeted interventions and strategies to prevent and mitigate the impact of LBP in RMG workers, ultimately promoting their health and well-being [3, 19].

This study seeks to contribute to the existing body of knowledge on occupational health and ergonomics in the context of the RMG industry in Bangladesh. Through a thorough examination of the factors associated with LBP in RMG workers, we hope to provide valuable insights for policymakers, occupational health practitioners, and industry stakeholders to develop evidence-based interventions and policies that prioritize the welfare of RMG workers while sustaining the economic growth of this vital sector [1, 4].

The ready-made garment industry stands as a significant driver of economic growth in Bangladesh. With approximately 4300 garment factories employing around 3.6 million workers, a substantial 80% of the labor force comprises women [10]. Given the nature of their work, LBP is a prevalent issue among female garment workers. However, comprehensive studies addressing the prevalence and occupational factors associated with LBP, particularly among Bangladeshi female workers, remain scarce. Notably, Sanjoy et al. conducted a study on LBP within Bangladeshi nurses, revealing that approximately 31% of nurses experience chronic LBP [21]. Furthermore, most of the existing literature on LBP primarily focuses on industrialized countries, leaving a dearth of research in developing nations like Bangladesh. In these contexts, female garment workers often hail from rural backgrounds, possess minimal training, and encounter suboptimal workplace management practices. Despite these challenges, there is a noticeable lack of documented research on these issues in Bangladesh.

Occupation-related factors represent the most prevalent contributors to LBP. Globally, it is estimated that 37% of LBP cases can be attributed to occupational risk factors [16]. In Bangladesh, garment workers often grapple with challenging socioeconomic conditions and work patterns, leading them to adopt less healthy lifestyles. These workers engage in prolonged periods of physical activity while maintaining suboptimal ergonomic positions, frequently performing tasks involving repetitive bending, twisting, and continuous vibration. Consequently, the nature of their work places garment workers in developing countries like Bangladesh at a heightened risk of experiencing work-related back pain. This study seeks to examine the prevalence of various LBP measures among garment workers in ready-made garment factories and explore the potential factors associated with each aspect of LBP. These factors encompass both individual characteristics and occupational variables.

Methodology

We conducted an analytical cross-sectional study; a total of eight (08) compliant RMG factories were randomly selected from all export processing zones (EPZs) in Bangladesh using the Bangladesh Garment Manufacturers and Exporters Association (BGMEA) factory list between September 2022 and January 2023. Face-to-face interviews were used to encourage participants between the ages of 18 and 40 to participate in the study. The minimum necessary sample size was estimated to ensure an accurate estimation of the proportion (p) of the worker population suffering LBP with a 95% confidence interval (CI) and a 4% margin of error. The sample size was determined to be $n=404$ by applying the formula for a population that is essentially limitless. However, the final study was carried out utilizing data from 385 RMG workers after applying inclusion and exclusion criteria and addressing data quality issues. Face-to-face interviews were used to collect the study's data. The semi-structured study was first created in English, and then it was translated into Bengali. Another translator thoroughly reviewed the questionnaire's accuracy once it had been translated. However, the native tongue was primarily employed to communicate with the respondents. The data collectors were then given an orientation session, after which 38 (10%) field tests were conducted. A door-to-door survey program targeting RMG workers was used to acquire the final data. A questionnaire with a diagram showing the lower back area was used to collect data on lower back pain (LBP). By asking four questions, we evaluated LBP in accordance with the methodology described by Feng et al. [8]. Only Bengali was spoken during the survey's administration, and the first question's focused on lower back pain (LBP). It read

as follows: “Have you experienced pain or tenderness in your lower back on most days or at any point in the past?” For this question, respondents could only check one of two response options: “yes” or “no.” The other three LBP-related questions concerned chronic pain (defined as daily pain that lasts for at least 3 months), intense pain (measured by an intensity score of six or higher on a visual analog scale ranging from 0 to 9), and seeking medical attention (involving visits to a doctor or physiotherapist because of LBP within the previous 12 months). In order to characterize lower back pain (LBP), four different measures were used. The acquired data went through a comprehensive error check before being transferred into SPSS 22 program for analysis and data management. Calculations of percentages and the display of sociodemographic data and risk factors as numbers and percentages were done using the SPSS and MS office software. Age and BMI were expressed as means and standard deviations (SD). All factors were examined for their relationship with LBP. To predict the factors associated with LBP, we used the logistic regression and calculated adjusted OR (AOR) for each factor. Chi-squared tests were used to compare categorical variables in employees with and without LBP and also investigated the association between LBP. The results were reported by odds ratios (ORs) and corresponded 95% confidence intervals (CIs). *p*-values less than 0.05 were considered statistically significant. One-sample statistics and test use to assess how the height and weight of respondents relate to LBP. All missing data were dropped from the analysis.

We thoroughly investigated the connections between LBP and other variables. We used logistic regression and calculated adjusted odds ratios (AOR) for each factor to evaluate the factors connected to LBP. To compare categorical factors between employees with and without LBP and to look into the relationship with LBP, chi-squared analyses were used. Odds ratios (ORs) and their accompanying 95% confidence intervals (CIs) were used to present the results. Results with *p*-values less than 0.05 were considered statistically significant (Table 1).

Result

The study comprised a total of 385 workers, where the males were 331 (86%) and females were 54 (14%). Age group of 30–39 years old constitutes the highest number followed by age group below 29 years old (37.9%), and the lowest was age group 40 years and above (11.7%). The (mean ± SD) of age, height, weight, and BMI are 31.27 ± 6.94, 164.26 ± 9.46, 54.68 ± 8.42, and 20.26 kg/m² ± 2.66 of the respondents, where the (mean ± SD) age, height, weight, and BMI of male are greater than from female. A total of 1.6% of the respondents had no primary education. A total of 24.2 had primary education.

A total of 30.1 had high school education. A total of 23.1 of the respondents had HSC, and above education, there are 20% male and 3.1 female. Two-hundred seventy-one (70.4%) respondents were married; on the other hand, only 114 (29.6%) respondents were single. A total of 41.3 of the respondents earn below 10,000 BDT, and 5.7 earn 20,000 BDT and above on the average monthly. Total 84.4 respondents permanently worked in the RMG industry, and a few workers worked as temporary which is 15.6%. A total of 20% workers started their work as a fresher, 34% workers have < 1 year, and 46% have > 1 year working experience. A total of 18.4 workers worked > 8 h, and 71.2 workers worked ≤ 8 h. A total of 50.1% respondents had training on health and safety.

Table 2 showed that 239 (62.1%) of the respondents are having pain and 146 (37.9%) having no pain experience in lower back at job life. One-hundred fifteen (29.9%) take any treatment, and 270 (70.1%) of the respondents do not take any treatment procedure for pain. One-hundred sixty 160 (41.6%) currently are experiencing LBP, and 225 (58.4%) respondents currently are not experiencing LBP.

Figure 1 represents about distribution of LBP among the RMG workers in Bangladesh in the study population. The data revealed that 81 (33.9%) of the respondents were having mild pain where 71 (29.7%) are male and 10 (4.2%) are female. One-hundred twenty-five 125 (52.3%) of the respondents were having moderate pain where 106 (44.4%) are male and 19 (7.9%) are female. Thirty-three (13.8%) of the respondents were having severe pain where 27 (11.3%) are male and 6 (2.5%) are female.

Table 3 showed that within all of respondents, 136 (35.3%) have pain effect, and 249 (64.7%) have no pain effect of daily activities. Thirty (7.8%) of the respondents have feeling any pain, and 355 (92.2%) of the respondents have no feeling any pain when walking. Eighty-three (21.6%) have feeling any pain, and 302 (78.4%) of the respondents have no feeling any pain when long time. One-hundred four (27%) have feeling any pain, and 281 (73%) of the respondents have no feeling any pain when traveling.

Table 4 showed that from all respondents, 56 (14.5%) are working, and 329 (85.5%) are not working in an awkward position. Fifty-seven (14.8%) are long time, and 238 (85.2%) are not long time for stationary position. Forty-five (11.7%) of respondents use incorrect body mechanics, while 340 (88.3%) do not. Fifty-nine (15.3%) of respondents engage, and the majority 326 (84.7%) do not engage in repeated bending and twisting. Three-hundred twelve (8.1%) of respondents work beyond their physical ability, while 354 (91.9%) do not. Fifty-seven (14.8%) of respondents sit for extended periods, while 328 (85.2%) do not. Twenty-three (6%) of respondents continue working despite injury or pain, while 362 (94%) do not.

Table 1 The baseline characteristics of respondent ($n = 385$)

Characteristics	Male		Female		Overall	
	N	%	N	%	N	%
Gender	331	86%	54	14%	385	100%
Age group (in years)						
Below 29	117	30.4%	29	7.5%	146	37.9%
30–39	174	45.2%	20	5%	194	50.4%
40 and above	40	10.4%	5	1.3%	45	11.7%
Mean age in years (mean \pm SD)	31.58 \pm 6.905		29.37 \pm 6.943		31.27 \pm 6.94	
Height in cm (mean \pm SD)	166.28 \pm 8.28		151.89 \pm 6.37		164.26 \pm 9.46	
Weight in kg (mean \pm SD)	56.13 \pm 7.73		45.81 \pm 6.92		54.68 \pm 8.42	
BMI group						
Under weight (< 18.5 kg/m ²)	116	30.1%	23	6%	139	36.1%
Normal weight (18.5 to < 23.5 kg/m ²)	189	49.1%	26	6.8%	215	55.8%
Over weight (\geq 23 kg/m ²)	26	6.8%	5	1.3%	31	8.1%
BMI (mean \pm SD)	20.31 \pm 2.58		19.91 \pm 3.12		20.26 \pm 2.66	
Education qualification						
Illiterate	5	1.3%	1	0.3%	6	1.6%
Primary (1–5)	83	21.6%	10	2.6%	93	24.2%
High school (6–10)	103	26.8%	13	3.4%	116	30.1%
Secondary school certificate	63	16.4%	18	4.7%	81	21%
Higher secondary school certificate and above	77	20%	12	3.1%	89	23.1%
Marital status						
Single	93	24.2%	21	5.5%	114	29.6%
Married	238	61.8%	33	8.6%	271	70.4%
Average monthly income						
Below 10,000 TK	134	34%	25	6.5%	159	41.3%
10,000–15,000 TK	145	37.7%	19	4.9%	164	42.6%
15,000–20,000 TK	33	8.6%	7	1.8%	40	10.4%
Above 20,000 TK	19	4.9%	3	0.8%	22	5.7%
Employment pattern						
Temporary	37	9.6%	23	6%	60	15.6%
Permanent	294	76.4%	31	8.1%	325	84.4%
Specific work experience						
No	62	16.1%	15	3.9%	77	20%
< 1 year	106	27.5%	25	6.5%	131	34%
> 1 year	163	42.3%	14	3.6%	177	46%
Working hours (per day)						
< 8 h	274	71.2%	40	10.4%	314	81.6%
> 8 h	57	14.8%	14	3.6%	71	18.4%
Training on health and safety						
No	156	40.5%	36	9.4%	192	49.9%
Yes	175	45.5%	18	4.7%	193	50.1%

Thirty-five (9.1%) of respondents use ergonomically improper tools, while 350 (90.9%) do not.

Table 5 illustrated that industrial worker how LBPs are significantly associated with their sociodemographic characteristics. Highly LBP was more likely to be male (36.1%), be aged between 30–39 years old (23.9%), be

BMI group normal weight (20.8%), be education qualification high school 6–10 class (12.7%), be married (31.9%), be average monthly income 10–15 k (19.2%), and employment pattern permanent (37.4%). The LBP of industrial workers is strongly significant associated with Age Group ($\chi^2 = 15.187$, $p < 0.05$), BMI group ($\chi^2 = 5.525$,

Table 2 Pain-related characteristics (n = 385)

Characteristics	Gender	Yes	Percentage	No	Percentage
Pain experience in lower back at job life	Male	204	53%	127	33%
	Female	35	9.1%	19	4.9%
	Total	239	62.1%	146	37.9%
Taking any treatment procedure for pain	Male	100	26.9%	231	60%
	Female	15	4%	39	10.1%
	Total	115	29.9%	270	70.1%
Currently experiencing in LBP	Male	139	36.1%	192	49.9%
	Female	21	5.5%	33	8.6%
	Total	160	41.6%	225	58.4%

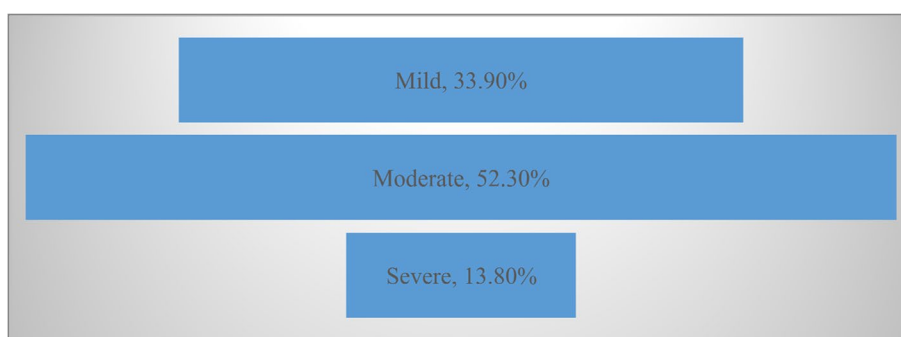


Fig. 1 Distribution of LBP among the RMG workers in Bangladesh

Table 3 Associated effect and activity-related characteristics

Characteristics	Gender	Yes		No	
		Freq	%	Freq	%
Pain effect of daily activities	Male	117	30.4%	214	55.6%
	Female	19	4.9%	35	9.1%
	Total	136	35.3%	249	64.7%
Feeling any pain when walking	Male	24	6.2%	307	79.7%
	Female	6	1.6%	48	12.5%
	Total	30	7.8%	355	92.2%
Feeling any pain when long time setting	Male	78	20.3%	253	65.7%
	Female	5	1.3%	49	12.7%
	Total	83	21.6%	302	78.4%
Feeling any pain when traveling	Male	93	24.1%	238	61.8%
	Female	11	2.9%	43	11.2%
	Total	104	27%	281	73%

$p < 0.05$), employment pattern ($\chi^2 = 6.49, p < 0.05$), specific work experience ($\chi^2 = 10.31, p < 0.05$).

The fitted logistic regression model revealed in Table 6 that respondents aged 40 and above years ($OR = 5.206, 95\% CI = 1.523-17.8, p = 0.009$) are more likely to be highly preformed with LBP. Respondents who work in an

awkward position ($OR = 18.156, 95\% CI = 5.368-64.409, p = 0.00$) are strongly significant with LBP. Respondents stationary position for a long time ($OR = 15.338, 95\% CI = 4.572-51.451, p = 0.00$) is strongly significant with LBP. Respondents incorrectly use body mechanics ($OR = 44.334, 95\% CI = 5.419-362.7, p = 0.00$) which

Table 4 Risk factor-related characteristics

Characteristics	Gender	Yes		No	
		Freq	%	Freq	%
Working in an awkward position	Male	43	11.2%	288	74.8%
	Female	13	3.4%	41	10.6%
	Total	56	14.5%	329	85.5%
Stationary position for a long time	Male	52	13.5%	279	72.5%
	Female	5	1.3%	49	12.7%
	Total	57	14.8%	328	85.2%
Incorrectly using body mechanics	Male	39	10.1%	292	75.8%
	Female	6	1.6%	48	12.5%
	Total	45	11.7%	340	88.3%
Repeated bending and twisting	Male	52	13.5%	279	72.5%
	Female	7	1.8%	47	12.2%
	Total	59	15.3%	326	84.7%
Working beyond physical ability	Male	26	6.8%	305	79.2%
	Female	5	1.3%	49	12.7%
	Total	31	8.1%	354	91.9%
Continuously long time sitting	Male	50	13%	281	73.2%
	Female	7	1.8%	47	12.2%
	Total	57	14.8%	328	85.2%
Continue work despite injury or pain	Male	21	5.5%	310	80.5%
	Female	2	0.5%	52	13.5%
	Total	23	6%	362	94%
Using ergonomically improper tools	Male	32	8.3%	299	77.7%
	Female	3	0.8%	51	13.2%
	Total	35	9.1%	350	90.9%

is strongly significant with LBP. Workers who repeated bending and twisting ($OR=12.75$, 95% $CI=3.303-48.871$, $p=0.00$) are strongly significant with LBP. Workers who work beyond physical ability ($OR=13.888$, 95% $CI=2.636-85.792$, $p=0.00$) are strongly significant with LBP. Respondents who continuously work sitting long time ($OR=16.791$, 95% $CI=3.286-85.788$, $p=0.001$) are strongly significant with LBP. Respondents who use ergonomically improper tools ($OR=5.008$, 95% $CI=1.334-18.792$, $p=0.017$) are likely significant with LBP.

Discussions

Workers in Bangladesh's RMG industry frequently develop LBP, which is caused by a few occupational factors rather than workplace accidents. We do research LBP among RMG employees because of the financial, social, and professional burden it places on them. Without knowledge of the workplace conditions that contribute to LBP, effective management and prevention may be significantly hampered.

The goal of this study was to thoroughly investigate the risk factors for low back pain (LBP) in male and female RMG workers; however, obtaining a sufficient number of

female participants proved to be difficult. This limitation may have been caused by logistical difficulties in obtaining female workers, cultural hurdles impeding female participation in research, and the predominance of male workers in RMG factories. We feel that our study still offers important insights into the general risk factors for LBP in the industry, even though the small percentage of female participants may affect the generalizability of our findings to female RMG workers.

According to this study, 62.1% of RMG workers reported experiencing lower back pain, indicating a higher risk for industrial workers in developing LBP. Numerous risk factors have been pinpointed within the employee population, with age standing out as a prevalent and significant contributor to the development of lower back pain (LBP) [27]. In our investigation, we observed that a greater number of 30–39-year-old employees reported experiencing LBP compared to their younger counterparts. Additionally, marital status has shown to influence the likelihood of developing LBP, a finding consistent with a study conducted on the Iranian population [5, 25]. This connection might be attributed to the fact that a substantial portion of married individuals falls within an older age bracket, potentially explaining their higher propensity to report LBP issues. These findings align with similar studies, where LBP prevalence was observed in 60% of Malaysian hotel employees [17], 46% of workers in the UK [14], 58.1% of workers in Ethiopia, and 60% of industrial workers in India [6]. While the results of this study support the presence of LBP in RMG workers, they are more prevalent than in studies carried out in other nations. Notably, a study from Egypt reported an even higher prevalence of 63.3% [7, 18]. This study also found that employment status in the industry was a predictor of back pain. Permanent employees are more likely than temporary employees to experience back pain. This could be attributed to regular, year-round work, consistent production loads, and the need to work overtime to meet financial needs or achieve promotions. Furthermore, improper use of body mechanics was linked to increased LBP, as certain RMG industrial workers employed incorrect techniques that placed additional strain on their backs and muscles, intensifying pain with physical exertion. Repetitive bending or twisting during tasks was identified as a risk factor for LBP, a finding consistent with observations in Ethiopian hotel workers. Prolonged sitting was also correlated with an increased risk of LBP, likely due to the overstretching or overloading of lower back muscles caused by extended periods of sitting. A prior investigation showed a greater frequency of lower back difficulty (LBP) in occupations demanding substantial physical exertion. Multiple research endeavors have established notable correlations between body

Table 5 Sociodemographic characteristics and association between LBP

Characteristics	Total (n = 385; 100%)		Yes	LBP (n = 160; 41.6%)		p-value
	Freq	%		%	χ^2 value	
Gender						
Male	331	86%	139	36.1%	0.184	0.668
Female	54	14%	21	5.5%		
Age group (in years)						
Below 29	146	37.9%	43	11.2%	15.187	0.001***
30–39	194	50.4%	92	23.9%		
40 and above	45	11.7%	25	6.5%		
BMI group						
Underweight (< 18.5 kg/m ²)	139	36.1%	59	15.3%	10.47	0.005**
Normal weight (18.5 to < 23.5 kg/m ²)	215	55.8%	80	20.8%		
Overweight (\geq 23 kg/m ²)	31	8.1%	21	5.5%		
Education qualification						
Illiterate	6	1.6%	1	0.3%	6.247	0.181
Primary (1–5)	93	24.2%	32	8.3%		
High school (6–10)	116	30.1%	49	12.7%		
SSC	81	21%	41	10.6%		
HSC and above	89	23.1%	37	9.6%		
Marital status						
Single	114	29.6%	37	9.6%	5.525	0.019***
Married	271	70.4%	123	31.9%		
Average monthly income						
Below 10,000	159	41.3%	58	15.1%	2.88	0.411
10,000–15,000	164	42.6%	74	19.2%		
15,000–20,000	40	10.4%	18	4.7%		
Above 20,000	22	5.7%	10	2.6%		
Employment pattern						
Temporary	60	15.6%	16	4%	6.49	0.011***
Permanent	325	84.4%	144	37.4%		
Specific work experience						
No	77	2%	27	7%	10.31	0.006***
< 1 year	131	34%	44	11.4%		
> 1 year	177	46%	89	23.1%		
Working hours (per day)						
< 8 h	314	81.6%	126	32.7%	1.436	0.231
> 8 h	71	18.4%	34	8.8%		
Training on health and safety						
No	192	49.9%	79	20.5%	0.027	0.87
Yes	193	50.1%	81	21%		

** Statistically significant at the 0.05 level (2-tailed). ***Statistically significant at the 0.01 level (2-tailed)

mass index (BMI) and LBP [20, 24]. Additionally, a strong correlation between obesity and LBP is discovered in this study. The origin of this pain may be attributed to the forward displacement of the pelvis in obese individuals, leading to increased strain on the lower back. This increased strain on the lower back can manifest as symptoms including pain, discomfort, and tension [12].

Conclusions

The study encompassed a total of 385 workers in the ready-made garment (RMG) industry in Bangladesh, with 86% being male and 14% female. The majority of participants fell within the age group of 30–39 years, and the mean age, height, weight, and BMI were reported. Education levels varied, with a significant percentage

Table 6 Logistic regression model for predicting factors associated with LBP

Characteristics	Coefficients	p-value	OR	95% CI	
				Lower	Upper
Age group					
Below 29 (ref.)	1	0.02			
30–39	0.906	0.025	2.475	1.121	5.468
40 and above	1.65**	0.009	5.206	1.523	17.8
Gender					
Male (ref.)	1				
Female	0.61	0.236	1.841	0.671	5.046
BMI (kg/m²)					
Underweight (ref.)	1	0.015			
Normal weight	0.366	0.301	1.443	0.721	2.888
Overweight	2.373	0.004	10.726	2.169	53.052
Blood pressure					
Low blood pressure (ref.)	1	0.347			
Normal blood pressure	−0.431	0.215	0.65	0.329	1.284
High blood pressure	−0.758	0.252	0.468	0.128	1.712
Marital status					
Single (ref.)	1				
Married	0.497	0.253	1.644	0.701	3.853
Employment pattern					
Temporary (ref.)	1				
Permanent	0.59	0.258	1.804	0.649	5.014
Specific work experience					
No (ref.)	1	0.926			
< 1 year	−0.027	0.955	0.973	0.384	2.469
> 1 year	−0.166	0.739	0.847	0.319	2.246
Working hours (per day)					
< 8 h (ref.)	1				
> 8 h	0.447	0.34	1.564	0.624	3.919
Training on health and safety					
No (ref.)	1				
Yes	0.189	0.597	1.208	0.599	2.438
Working in an awkward position					
No (ref.)	1				
Yes	2.899***	0.00	18.156	5.368	61.409
Stationary position for a long time					
No (ref.)	1				
Yes	2.73***	0.00	15.338	4.572	51.451
Incorrectly using body mechanics					
No (ref.)	1				
Yes	3.792***	0.0	44.334	5.419	362.7
Repeated bending and twisting					
No (ref.)	1				
Yes	2.542***	0.0	12.705	3.303	48.871
Working beyond physical ability					
No (ref.)	1				

Table 6 (continued)

Characteristics	Coefficients	p-value	OR	95% CI	
				Lower	Upper
Yes	2.631***	0.002	13.888	2.636	73.158
Continuously long time sitting					
No (ref.)	1				
Yes	2.821***	0.001	16.791	3.286	85.788
Continue work despite injury or pain					
No (ref.)	1				
Yes	1.115	0.148	3.049	0.674	13.783
Using ergonomically improper tools					
No (ref.)	1				
Yes	1.611**	0.017	5.008	1.334	18.792

** Statistically significant at the 0.05 level (2-tailed), ***Statistically significant at the 0.01 level (2-tailed)

having high school education, and the majority of respondents were married. The study provided insights into the sociodemographic characteristics of the RMG workforce. Regarding lower back pain (LBP), the prevalence was substantial, with 62.1% of respondents reporting pain at their job. The distribution of pain severity was categorized into mild, moderate, and severe, revealing varying degrees of discomfort among the participants. The impact of LBP on daily activities was assessed, with a notable proportion experiencing pain effects. Further analysis explored the association between LBP and sociodemographic factors, indicating significant correlations with age, BMI, employment pattern, and specific work experience. Logistic regression highlighted those respondents aged 40 and above, those working in awkward positions, in stationary positions for a long time, using incorrect body mechanics, engaging in repeated bending and twisting, working beyond physical ability, sitting for extended periods, and using ergonomically improper tools were more likely to experience LBP. The discussions delved into the broader context of LBP in the RMG industry, emphasizing the multifactorial nature of the condition. Risk factors such as age, marital status, employment status, body mechanics, repetitive movements, prolonged sitting, and BMI were identified as contributors to LBP. The prevalence of LBP in the RMG sector was compared with findings from other countries, indicating a higher prevalence in the Bangladeshi context. The study sheds light on the significant issue of LBP among RMG workers in Bangladesh, providing valuable insights for addressing and preventing this occupational health concern. The results contribute to the existing body of knowledge on the sociodemographic and occupational factors associated with LBP in the context of the RMG industry.

Limitations

This study has a number of limitations, such as its cross-sectional design, potential memory bias, dependence on self-reported data addressing lower back pain (LBP), and an absence of particular data indicating the level of pain or impairment caused by LBP. Notably, the study did not collect information on important psychosocial variables that have been linked to LBP in prior studies, including job demands, monotony at work, social support, and job satisfaction. It is important to note that this study identified industrial OSH compliance status as a crucial protective factor against musculoskeletal diseases (MSDs) [15]. It is crucial to keep in mind that complying factories in this study tended to have bigger worker populations, which may reflect underlying characteristics such as factory architecture, job and equipment design, and the level of automation rather than just OSH compliance status.

Abbreviations

LBP	Low back pain
MSDs	Musculoskeletal diseases
OR	Odd ratio
GBD	Global Burden of Disease
SPSS	Statistical Package for the Social Sciences
SD	Standard deviation
BDT	Bangladesh Taka
CI	Confidence interval
CDC	Centers for Disease Control and Prevention
OSH	Occupational Safety and Health

Acknowledgements

We thank the ready-made garment employees who kindly offered up their time to take part in our investigation. We appreciate all of the data collectors and supervisors who helped us finish this study. The factory owners' assistance throughout the current investigation is also acknowledged by the authors.

Authors' contributions

Shohal Hossain and Samme Akter Mithy designed and conducted the survey. Shohal Hossain analyzed and interpreted the survey data. Sadia Afroz collected the data. All authors reviewed and approved the final manuscript.

Funding

Nil.

Declarations

Ethics approval and consent to participate

The Institutional Review Board of the Center for Multidisciplinary Research of Gono Bishwabidyalay (ID: CMREC-0012) granted ethical approval for this study, which includes human subjects. Before taking part, participants gave their informed consent to take part in the study.

Competing interests

The authors declare that they have no competing interests.

Received: 4 March 2024 Accepted: 9 May 2024

Published online: 02 August 2024

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