

Evaluating Musculoskeletal Health and Ergonomics Awareness Among Bank Employees in Dhaka, Bangladesh

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ABSTRACT: Musculoskeletal disorder (MSD) is a significant occupational health concern, particularly in sedentary professions like banking. This study aimed to assess the prevalence and associated risk factors of Work-related Musculo Skeletal Disorders (WMSDs) among bank workers in Dhaka, Bangladesh. Data was collected with a standardized and pre-validated questionnaire from 300 bank employees of 35 branches of different public, private and international banks. The study revealed a high prevalence of WMSDs among bank workers, where significant risk factors are age, increased body mass index (BMI), longer working hours, extended job tenure, low knowledge of ergonomic training, poor awareness of good working posture, inadequate understanding of physiotherapy management for WMSDs, higher psychosocial stress, and increased activity levels. The study finally underscored several proactive measures. Ergonomic interventions are proposed as a preventive measure, emphasizing the importance of proper workstation design, posture, and regular exercise programs to mitigate the risk of WMSDs. Furthermore, the study advocates for the inclusion of occupational health physiotherapists within the banking sector to provide training, treatment, and rehabilitation, ultimately enhancing the well-being of bank workers and reducing the economic burden associated with WMSDs. It is necessary to implement comprehensive strategies to prevent WMSDs, emphasizing the importance of ergonomics, awareness, and specialized healthcare support in creating a healthier work environment for this vital sector of the economy.

Key words. Musculoskeletal disorders (MSDs), bank workers, ergonomic training, physiotherapy, occupational health, sedentary profession.

INTRODUCTION

Work-related Musculo Skeletal Disorders (WMSDs) are common health issues of muscles, nerves, tendons and joints caused by repetition, force, vibration or awkward posture.^{1,2} The disorders mostly affect sedentary people like bank workers. Given the significance of the banking sector in the modern economy, understanding the health of bank workers is crucial. With 61 banks and 8,693 branches in Bangladesh, the current number (reported in June

2023) of employees is 1,99,506.^{3,4} So, it is crucial to help them remain healthy by maintaining the efficiency of these huge populations.

Musculoskeletal disorders, particularly low back pain (LBP), have a severe impact on employee's efficiency, leading to disability and physical discomfort.^{5,6} WHO and ILO estimate the global work-related LBP prevalence at 37%, resulting in 818,000 disability-adjusted life years lost, with men more affected than women due to physically demanding jobs.⁷ The 2015 Labor Force Survey in Great Britain recorded 553,000 WMSDs cases in 2014/15, accounting for 44% of work-related illnesses. This disorder resulted in 9.5 million lost

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workdays, averaging 17 days per case.⁸ In the US, nonfatal injuries and illnesses cost \$46 billion in 2007.⁹

Early recognition of musculoskeletal injuries is crucial for prompt corrective actions and potential rehabilitation. Preventing work-related injuries involves education and well-designed job tasks that minimize physical strain. Ergonomic intervention (EI), adjustment of workers' environment and behavior, is one of many potential measures for treating and preventing WMSDs.¹⁰⁻¹¹ Other ways to prevent/maintain the disorder include physiotherapy and stress management.¹²⁻¹⁴

There are few studies on Bangladeshi bank workers before who mainly focused on back pain^{15,16} and neck pain¹⁷. No study has explored the prevalence of WMSDs in this professional group. These studies revealed a significant correlation of sedentary activities with either back or neck pain. However, they did not use pre-validated questionnaires and focused only on a particular body part.

The current study aims to assess self-reported WMSDs prevalence among bank workers in Dhaka, Bangladesh. We investigated the correlation between demographic characteristics (e.g., age, gender, BMI, stress, workload, self-perceived mental and physical health) and the prevalence of perceived WMSDs among bank workers; to identify the most affected body parts due to WMSDs; to examine the association between ergonomic training and the prevalence of perceived WMSDs; and to explore the relationship between knowledge (regarding proper working posture, ergonomic training, and understanding of physiotherapy management for WMSDs) and the prevalence of perceived WMSDs.

MATERIALS AND METHODS

We adopted a cross-sectional design to find the prevalence and associated risk factors of musculoskeletal disorders among bank workers. Three hundred (300) bank workers from 35 branches of various international, private and public banks in Dhaka city participated in the study. The standard

formula for calculating sample size with a 95% confidence interval was applied as follows:

$$n = \frac{z^2 pq}{d^2} = \frac{(1.96)^2 \times (0.338) \times (1 - 0.338)}{(0.05)^2} = 343.60 = 344$$

n = the sample size; z = 1.96, corresponding to the 95% confidence level; p = proportion of the target population estimated at 33.8%¹⁸; q = (1-p); d = degree of accuracy set at 5%.

The calculated sample size was 344, but due to time constraints and the difficulty of obtaining responses from busy bank workers, the researcher opted for a feasible sample size of 300 which is larger than the sample size (n = 100) used in similar studies reported before in Bangladesh.¹⁵⁻¹⁷

The questionnaire consisted of two parts: Part-I gathered demographic information and certain risk factors from literature reviews, while Part-II used questions from the standardized and pre-validated Nordic musculoskeletal questionnaire (NMQ) to provide additional data for tentative hypotheses.¹⁹⁻²² The questionnaire covered general health, self-perceived physical fitness, end-of-day fatigue (both physical and mental), knowledge of ergonomic training, awareness of physiotherapy for musculoskeletal disorders, maintaining good working posture, stress levels, and activities contributing to work-related musculoskeletal disorders. For stress assessment, five questions were included from a study by Zafir, *et al.* (2011)²³ and for activity-related WMSDs assessment, six questions were included from Sommerich, C.M. *et al.* (1993)²⁴ and Yu, I. and Wong T. (1996)²⁵. The questionnaire was administered in English.

Participants, dedicating at least 8 hours daily to their job, were selected from various positions across different banks irrespective of age, gender, or ethnicity. We excluded participants with pre-existing musculoskeletal conditions, prior surgery or trauma, history of cancer, active infections, weakness, paralysis, or pregnancy, to ensure a homogenous sample.

We received ethical approval from the Institutional Review Board (IRB) at Bangladesh Health Professional Institute (BHPI) P.O CRP-Chapain, Savar, Dhaka-1343. Confidentiality was strictly upheld and bank and branch names were omitted. Data analysis was performed using SPSS Version-20 and MS excel 2016.

RESULTS AND DISCUSSION

Findings related to demographic characteristics, the prevalence of musculoskeletal symptoms within

the past 12 months of the study, the most affected body parts during that period, disruptions in normal activities within the past 12 months, affected body parts within the last 7 days, as well as associations between MSDs and demographic characteristics were discovered. The demographics of the 300 participating bank workers are outlined in table 1. Different variables were compared with consideration for gender differences. Among the participants, a majority (73.33%) was male, while 26.67% were female.

Table 1. Socio-demographic characteristics of the study population.

Variables	Categories of variables	Sex		
		Male	Female	Total
Age	<=30	13	17	30
	31-35	51	21	72
	36-40	62	18	80
	41-45	33	13	46
	46-50	39	9	48
	51-55	7	2	9
	55+	15	0	15
Designation	Entry level	33	22	55
	Mid-level	125	41	166
	Top-level	62	17	79
Working hour (per week)	<45	99	27	126
	45-50	91	48	139
	>50	30	5	35
Job tenure	1-5 year	45	22	67
	5-15 year	104	38	142
	>15 year	71	20	91
Knowledge of ergonomic training, physiotherapy, and posture	No	128	55	183
	Medium	35	7	42
	High	57	18	75
Stress	No/Low stress	33	2	35
	Medium stress	149	53	202
	High stress	38	25	63
BMI ^a	Underweight	2	0	2
	Normal	53	22	75
	Overweight	134	40	174
	Obesity	31	18	49
Activity level	Low	52	13	65
	Medium	156	59	215
	High	12	8	20
MSDs	Yes	146	62	208
	No	74	18	92

^a - underweight (below 18.5), normal (18.5-24.9), overweight (25-29.9) and obese (30 and above).

We assessed the level of activity in questionnaire number 18, consisting of 6 sub-questions. Participants responding ‘Yes’ to two or fewer questions were categorized as having a 'Low' activity level. If they answered 3-4 questions affirmatively, they were classified as having a 'Medium' activity level. Those who responded positively to 5-6 questions were placed in the 'High' activity level category. We found that most (71%) of the respondents are moderately active. Moreover, 40.7% (122) of bank workers reported having reasonably good health, while 28.3% (85) perceived their health as not good. Additionally, 22% (66) considered their

health to be good, and 9% (27) stated that their health status was poor.

We then compared the self-perceived WRMSDs in different body parts of bank workers over the past 12 months (Figure 1). Notably, lower back trouble stands out as the most prevalent, affecting 119 individuals (39.7%). Among those reporting lower back trouble, 70 individuals (23.3%) noted disruptions in their daily activities over the past year. Additionally, 79 respondents (26.3%) mentioned recent trouble within the last 7 days, underscoring the ongoing nature of these issues and their immediate effects on work performance and well-being.

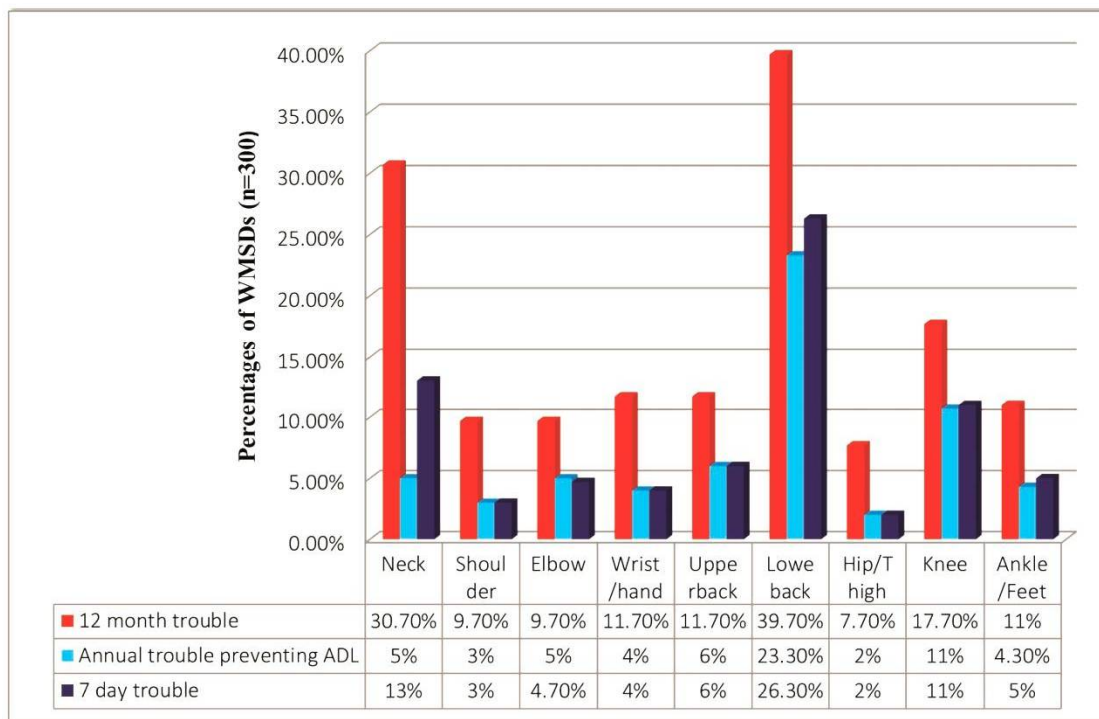


Figure 1. Occurrence of MSDs in different body parts.

We also observed that 35% (106) of bank workers assessed their physical fitness as reasonably not bad, while 30% (90) perceived it as reasonably good. Additionally, 25% (75) considered their physical fitness to be good, and 10% (29) mentioned that their physical fitness was poor. Among the bank workers surveyed, a higher percentage reported experiencing mental fatigue (55%) compared to physical fatigue (32%) at the end of a working day.

This finding suggests that the demands of their work, whether it involves cognitive tasks, stress or other mental factors, may have a more significant impact on their overall well-being and energy levels than physical exertion. The varieties of stress (Table 2) and physical load (Table 3) leading to WRMDs was then evaluated.

The data in table 4 reveals that several factors, including age, weekly working hours, job tenure, knowledge of ergonomic training, posture and physiotherapy awareness, stress levels, BMI, and activity levels, demonstrate a statistically significant

association with the presence of MSDs within the past 12 months. Notably, the variable of gender did not exhibit a significant association with MSD occurrence.

Table 2. Various stress parameters and their distribution within the study population (n = 300).

Parameter of stress		Frequency	Percent
Do you often feel tense?	no	129	43.0
	yes	171	57.0
Do you often feel nervous?	no	243	81.0
	yes	57	19.0
Do you often feel flustered?	no	209	69.7
	yes	91	30.3
Often very tired after work	no	75	25.0
	yes	225	75.0
Regularly feeling tired after getting up in morning	no	183	61.0
	yes	117	39.0

Table 3. Activities in working affects occurrences of MSDs.

Activities in working causes MSDs		Frequency	Percent
Working in the same position for a long time	no	69	23.0
	yes	231	77.0
Performing the same task over and over	no	53	17.7
	yes	247	82.3
Bending and twisting in an awkward way	no	176	58.7
	yes	124	41.3
Repetitive movement of upper limb	no	155	51.7
	yes	145	48.3
Work scheduling (Overtime, Irregular shift etc.)	no	272	90.7
	yes	28	9.3
Carry heavy load	no	271	90.3
	yes	29	9.7

Table 3 presents the activities carried out during work that contribute to musculoskeletal disorders (MSDs) and provides a distribution of these activities within the study population.

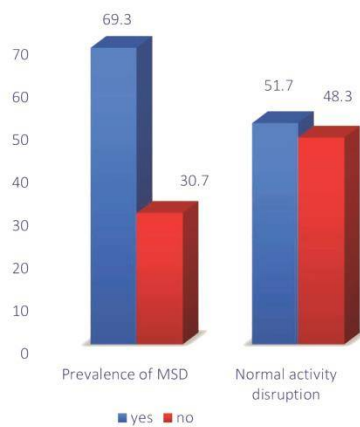


Figure 2. Prevalence of MSD and disruption of carrying out normal activities in last 12 months.

Based on the *t*-test conducted to compare individuals with MSDs and those without, we identified that two variables, namely age and BMI, displayed statistical significance. Specifically, the occurrence of MSDs was found to be influenced by age [$t(298) = 4.614, p < 0.0001$] and BMI [$t(298) = 5.305, p < 0.0001$].

The prevalence of work-related musculoskeletal disorders (WRMSDs) is shown in figure 2, revealing

that 69.3% (208) of respondents reported experiencing trouble in a specific body part during the past 12 months. Among these individuals, 51.7% reported that they were hindered from carrying out their regular activities due to MSDs during the same period. This data underscores the substantial impact of WRMSDs on individuals' ability to engage in normal daily activities and highlights the importance of addressing these issues in the workplace.

Table 4. Association of WMSDs with socio-demographic and related variables.

Variables	Category of variables	Annual prevalence of MSDs			Chi-square (χ^2) value	P-value
		Yes (%)	No (%)	Total		
Sex	Male	146 (66.4%)	74 (33.6%)	220(73.3%)	3.422	.067
	Female	62 (77.5%)	18 (22.5%)	80(26.66%)		
Age	<=30	16 (53.3%)	14 (46.7%)	30(10%)	10.911	.043
	31-35	45 (62.5%)	27 (37.6%)	72(24%)		
	36-40	54 (67.5%)	26 (32.2%)	80(26.6%)		
	41-45	35 (76.1%)	11(23.9%)	46(15.3%)		
	46-50	38 (79.2%)	10 (20.8%)	48(16%)		
	51-55	7 (77.8%)	2(22.2%)	9(3%)		
	55+	13 (86.7%)	2(13.3%)	15(5%)		
Working hour (per week)	<45	77 (61.1%)	49(38.9%)	126(42%)	6.978	.031
	45-50	104 (74.8%)	35(25.2%)	139(46.3%)		
	>50	27 (77.1%)	8(22.9%)	35(11.67%)		
Job tenure	1-5 year	36 (53.7%)	31(46.3%)	67(22.33%)	15.068	.001
	5-15 year	97 (68.3%)	45(31.7%)	142(47.3%)		
	>15 year	75 (82.4%)	16(17.6%)	91(30.34%)		
Knowledge of ergonomics, posture, & physiotherapy	No	161(88%)	22(12%)	183(61%)	127.967	.000
	Medium	34 (81%)	8(19%)	42(14%)		
	High	13 (17.3%)	62 (82.7%)	75(25%)		
Stress	No/Low stress	8 (22.9%)	27 (77.1%)	35(11.66%)	53.099	.000
	Med. stress	141 (69.8%)	61 (30.2%)	202(67.3%)		
	High stress	59 (93.7%)	4 (6.3%)	63(21.01%)		
BMI	Under Wt.	1 (50%)	1 (50%)	2(.67%)	33.711	.000
	Normal	33 (44%)	42 (56%)	75(25%)		
	Over Wt.	131 (75.3%)	43 (24.7%)	174(56%)		
	Obesity	43 (87.8%)	6 (12.2%)	49(16.33%)		
Activity level	Low	33 (50.8%)	32 (49.2%)	65(21.66%)	14.590	.001
	Medium	158 (73.5%)	57 (26.5%)	215(71.7%)		
	High	17 (85%)	3 (15%)	20(6.68%)		

Table 5. Logistic regression analysis.

Parameter		B	Odd ratio (e ^B)	Std. error	Hypothesis test		
					Wald Chi-Square	Df	Sig.
(Intercept)		-7.276		2.8869	6.352	1	0.012
Sex	Male	-0.924	0.39	0.4989	3.427	1	0.064
	Female	0 ^a		.	.	.	.
Workload (hr/week)	Low	-.381	0.68	0.6300	0.366	1	0.005
	Medium	0.222	1.25	0.6480	0.118	1	0.002
	High	0 ^a		.	.	.	.
Job tenure	1-5 year	-0.641	0.53	1.0632	0.363	1	0.017
	5-15 year	-0.197	0.82	0.7748	0.065	1	0.049
	>15 year	0 ^a		.	.	.	.
Knowledge of different management process	No	3.724	41.42	0.5159	52.093	1	0.000
	Medium	4.046	57.16	0.6716	36.302	1	0.000
	High	0 ^a		.	.	.	.
Stress	Low	-2.229	0.11	0.8178	7.430	1	0.006
	Medium	-0.282	0.75	0.6517	0.187	1	0.666
	High	0 ^a		.	.	.	.
Activity Level	Low	-0.276	0.76	0.8557	0.104	1	0.047
	Medium	-0.219	0.75	.08069	0.073	1	0.160
	High	0 ^a		.	.	.	.
Age		0.102	1.11	0.0577	3.154	1	0.036
BMI		0.111	1.12	0.0660	2.820	1	0.093

*dependent variable: MSD 1=yes 0=no

We then studied the ways of mitigating the disturbing WRMDs. We found that individuals with knowledge of ergonomic training tend to experience fewer WRMSDs, while those lacking this knowledge are more likely to have WRMSDs (Figure 3A). Also, individuals with knowledge of good working posture

tend to experience fewer WRMSDs, while those without such knowledge are more prone to these disorders (Figure 3B). This underscores the importance of promoting proper posture practices in the workplace to reduce the risk of musculoskeletal discomfort and injuries.

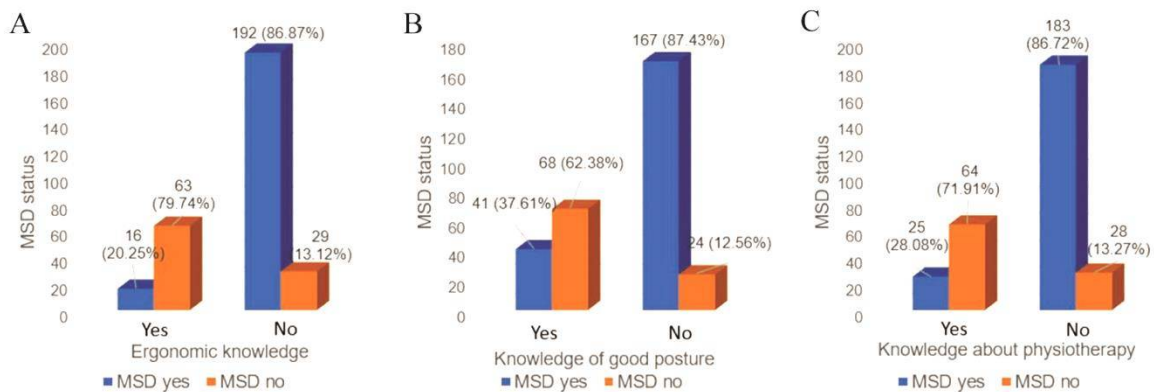


Figure 3. Relationship between the occurrence of WRMSDs and knowledge about ergonomic training (A), posture (B) and physiotherapy management (C).

Moreover, individuals with knowledge of physiotherapy management for MSDs tend to experience fewer WRMSDs, while those without this knowledge appear to have a higher incidence of WRMSDs (Figure 3C). This shows the potential advantages of integrating physiotherapy-based approaches in workplaces to reduce the risk of musculoskeletal discomfort and injuries.

To identify the factors contributing to MSDs, a logistic regression model was used with MSDs as the dependent variable (present or absent) and several independent variables: sex, activity level, job tenure, knowledge (ergonomic training, good working posture and physiotherapy for msds), stress, workload, activity, age and BMI.

Firstly, females had higher odds of MSDs compared to males. Heavier workloads were associated with increased MSD odds. Individuals with 1-5 years of job tenure had lower MSD odds compared to those with over 15 years.

The most significant variable was knowledge of management processes (ergonomic training, good posture, and physiotherapy for MSDs). Limited knowledge correlated with higher MSD odds. Additionally, high stress levels and increased physical activity were linked to elevated MSD odds. Higher age and BMI were also significant factors, associated with increased MSD odds.

These findings highlight the significant burden of WMSDs in the banking sector in Dhaka. Our study also identified the most affected body parts, with the lower back (39.7%) and neck (30.7%) being the most common sites of discomfort and pain. These results align with previous studies conducted among office workers and bank employees, indicating a consistent pattern of WMSDs in these occupational groups. Comparing the prevalence rates with other studies, our findings were similar to those reported by Samaei *et al.* (2016)²⁶ and Loghmani *et al.* (2013)²⁷ but higher than the rates reported by Sulaiman *et al.* (2017)¹⁸. This disparity may be attributed to geographical differences and variations in ergonomic practices and workplace conditions.

Another important observation in our study was the higher prevalence of mental tiredness compared to physical tiredness among bank workers at the end of the working day. This finding raises concerns about the potential association between mental fatigue and the development of WMSDs. Several studies have also reported a link between psychosocial stress and musculoskeletal disorders,^{23,28} suggesting that stress management and psychosocial support should be integral components of workplace health programs.

Our study identified a strong association between knowledge levels of ergonomic training, good working posture and physiotherapy treatment for WMSDs and the occurrence of these disorders. Bank workers with limited knowledge in these areas had a higher risk of developing WMSDs. These findings underscore the importance of providing comprehensive training and education to employees to enhance their awareness of ergonomic practices and available treatments for musculoskeletal disorders.

Socio-demographic factors also played a significant role in the prevalence of WMSDs among bank workers. Older age, longer working hours per week, greater job tenure, higher BMI and increased activity levels were associated with an elevated risk of WMSDs. Female bank workers were more susceptible to these disorders. These results are consistent with previous research, which has consistently demonstrated that age, job tenure and physical factors like BMI contribute to the development of WMSDs.²⁹⁻³⁴

We recommend appointing occupational health physiotherapists in banks for training, treatment and prevention of WMSDs. Establishing a 'National Institute of Occupational Health and Safety' is suggested.

CONCLUSION

The study identified a high prevalence of musculoskeletal disorders among bank workers in Dhaka, Bangladesh. Key risk factors include age, increased BMI, longer working hours, extended job

tenure, limited knowledge of ergonomics and good posture, high psychosocial stress and increased activity levels. To circumvent this problem, proactive ergonomic measures are necessary. Given the sedentary nature of banking jobs, educating workers about safe practices, correct posture and ergonomics is essential. Implementing both short-term and long-term programs, including workplace assessments, ergonomic adjustments and exercise guidance, can improve well-being and productivity. Advocating for occupational health physiotherapists in banks to assess, educate and treat employees is vital for reducing musculoskeletal disorders and promoting occupational health.

DECLARATION

There are no conflicts of interest to declare.

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