RESEARCH ARTICLE

Low back pain and associated risk factors among medical students in Bangladesh: a cross-sectional study [version 1; peer review: 2 approved with reservations]

Shabbir Ahmed Sany ¹, Taukir Tanjim ^{1,2}, Md Ikbal Hossain¹

¹Department of Community Medicine, Faridpur Medical College, Faridpur, Dhaka, Bangladesh

²Project Research Physician, International Centre for Diarrhoeal Disease Research, Dhaka, Bangladesh

V1 First published: 30 Jul 2021, 10:698
<https://doi.org/10.12688/f1000research.55151.1>
 Second version: 08 Feb 2022, 10:698
<https://doi.org/10.12688/f1000research.55151.2>
 Latest published: 25 Jul 2022, 10:698
<https://doi.org/10.12688/f1000research.55151.3>

Abstract

Background: Low back pain (LBP) is one of the leading causes of disability worldwide. Different studies showed the high prevalence of LBP among medical students. However, no study has been conducted on Bangladeshi medical students to estimate the prevalence of LBP. This study evaluated the prevalence, characteristics, and associated risk factors of LBP among medical students in Bangladesh.

Methods: A cross-sectional study was conducted from October to December 2020 among randomly selected 270 medical students and medical interns in Faridpur Medical College, Bangladesh, using an online questionnaire. In data analysis, chi-square test and binary logistic regression were performed, and a p-value of < 0.05 was regarded as statistically significant.

Results: A total of 207 participants responded fully to the survey, and were included in the analysis. The mean age of the participants was 22.36 ± 1.915 years. The point, 6-month, and 12-month prevalence of LBP was 25.6%, 46.9%, and 63.3%, respectively. In most participants, LBP was localized (53.2%), recurrent (64.9%), undiagnosed (70.8%), affected for a short period (55%), and relieved without receiving any treatment (60.4%). Participants who had a significantly higher 12-month prevalence of LBP included females (72.2% vs 52.2%), with BMI >25 kg/m² (73.2% vs 56.7%), those who performed physical activity at low to moderate frequency (72.4% vs 29.5%), those who spent > 6 hours/day by sitting (71.3% vs 45.3%), and those who did not have enough rest time (92.7% vs 56%). Ergonomic features of chairs, such as having back support, adjustable back support, and adjustable sitting surface, significantly ($p < 0.05$) influenced the outcomes.

Conclusion: The prevalence of LBP among medical students in Bangladesh was high, and most of the risk factors associated with the high prevalence of LBP were modifiable. Hence, LBP can be prevented

Open Peer Review

Approval Status

	1	2
version 3 (revision) 25 Jul 2022		
version 2 (revision) 08 Feb 2022	view	view
version 1 30 Jul 2021	view	view

1. **Mohammad Mostafa Zaman** , World Health Organization Country Office for Bangladesh, Dhaka, Bangladesh
2. **Matthew Chiwaridzo** , University of Zimbabwe, Harare, Zimbabwe

Any reports and responses or comments on the article can be found at the end of the article.

by implementing preventive strategies and providing ergonomic training and physical activity facilities.

Keywords

Bangladesh, Low back pain, Medical students, Prevalence, Risk factors.

Corresponding author: Shabbir Ahmed Sany (drsanyfmc@gmail.com)

Author roles: **Sany SA:** Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Software, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Tanjim T:** Conceptualization, Data Curation, Investigation, Methodology, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Hossain MI:** Data Curation, Formal Analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

Copyright: © 2021 Sany SA *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Sany SA, Tanjim T and Hossain MI. **Low back pain and associated risk factors among medical students in Bangladesh: a cross-sectional study [version 1; peer review: 2 approved with reservations]** F1000Research 2021, 10:698 <https://doi.org/10.12688/f1000research.55151.1>

First published: 30 Jul 2021, 10:698 <https://doi.org/10.12688/f1000research.55151.1>

Introduction

Low back pain (LBP) is considered the single leading cause of disability-related musculoskeletal conditions globally.^{1–3} Researchers showed that 70–80% of people suffer from LBP at least once in their lifetime^{2,4} and 18% of the people suffer from LBP at any given time.⁵ The healthcare-related costs due to LBP are increasing; hence it is becoming a burden in developed countries, as well as in low-income and middle-income countries.³

Individuals of all ages, including young people and students, can be affected by LBP.^{6–9} Medical students are at high risk of developing LBP as they have highly demanding curricula that facilitate a sedentary lifestyle, stressful routines, fewer sleeping hours, long hours of study, hospital training, and classes.^{5,9,10} It is therefore essential to identify the potential risk factors that lead to LBP at an early phase of their career. Prolonged exposure to these risk factors increases wear and tear of the back and consequently rises the injury rate in older age that leads to recurrent and chronic LBP.^{11–13} Moreover, Burton *et al.*¹⁴ addressed the modification of risk factors as the most crucial prevention strategy of LBP. However, very few studies^{5,6,10,15–20} have been conducted that evaluated the prevalence and potential risk factors associated with LBP among medical students. These studies showed a high prevalence of LBP. However, regarding the associated risk factors, the findings were inconsistent.

In Bangladesh, every year, approximately 10,500 students are admitted to 37 public, 70 private, and six armed forces medical colleges.²¹ To achieve an MBBS (Bachelor of Medicine and Surgery) degree in Bangladesh, students must study for at least five years, and after graduation, they have to complete a compulsory one-year training at the medical college hospital as medical interns. Hence, more than 50,000 students are studying MBBS courses in Bangladesh at any given time. Despite the high number of this specific vulnerable population, no study has been conducted to evaluate the prevalence of LBP among Bangladeshi medical students. Therefore, we aimed to conduct this study to determine the prevalence of LBP and its characteristics and identify the risk factors associated with LBP among medical students of a typical public medical college in Bangladesh.

Methods

Study settings and population

This cross-sectional study was conducted on MBBS students (first year to final year) and medical interns in Faridpur Medical College from October to December 2020. Every year, around 120 students are admitted to this medical college; hence typically, there are about 600 students and 120 medical interns in the medical college at any given time.

The study's sample size was calculated as 251 using **OpenEpi** version 3.1, assuming 47.5% as the estimated prevalence rate²² at a 95% confidence level with 5% precision. Because of the possibility of sample loss, the final sample size was determined as 270. Forty-five students from each batch (1st year to 5th year) and 45 medical interns were selected randomly by lottery method using their roll number. The study was reported following the STROBE guidelines for reporting observational studies.²³

Instruments

An online, standardized, self-administrated questionnaire²⁴ was used for data collection. The questionnaire was in English language and had three sections. Different sections of the questionnaire were adapted from the minimal dataset reported by Deyo *et al.*,²⁵ and the questionnaires that were validated and used in previous studies.^{26,27}

Section 1 contained five questions related to socio-demographic data, including gender, age, height, weight, and educational level. Body mass index (BMI) was calculated as weight (in kg) divided by height squared (in meters). In Section 2, lifestyle-related questions, such as exercise frequency, smoking habits, total sitting time in a day (in hours), type of activity mostly done in a day, and availability of enough rest time, were inquired. In addition, the ergonomic characteristics (availability of back support, adjustable back support, adjustable sitting surface) of participants' chairs were also assessed in that section. To determine the prevalence of LBP at different time points, participants were asked whether they suffered from LBP during the survey, the last 6 months, and the last 12 months (dichotomous scale, Yes/No) in Section 3. This section also included data regarding the first appearance, causes, and aggravating factors of LBP; duration and episode of LBP in the last 12 months; the presence of associated leg pain; and type of received treatment.

The questionnaire was piloted on 15 students before administration in the study to confirm the appropriateness and understandability of questions. The questionnaire was modified according to the feedback, and the responses from the pilot study were not included in the main study.

Operational definitions and study variables

- Point prevalence: Presence of LBP at the time of the survey.

- 6-month prevalence: Had at least one episode of LBP in the last 6 months.
- 12-month prevalence: Had at least one episode of LBP in the last 12 months.

Dependent variable:

- Low back pain (LBP): LBP is the pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds with or without leg pain.²⁸

Independent variables:

- Body mass index (BMI): the weight in kilograms, divided by height in meters squared.²⁹
- Aggravating factors of LBP: The activities that cause the low back symptoms to recur.
- Exercise: A controlled, structured, and repetitive subset of physical activity with an ultimate or intermediate objective to improve or maintain physical fitness.³⁰

Data collection

We used the online survey software from Google Drive to conduct the survey and record the responses. The weblink of the questionnaire was sent to selected participants via email with a cover letter that informed the objective of the study and assurance confidentiality of the responses. Participants' full consent was taken before collecting the data, and they had the right to withdraw anytime without completing the questionnaire. We did not offer any incentives or rewards for participation.

Data analysis

After receiving responses from the participants, the accuracy and completeness were checked manually, and data were cleaned when required. All statistical analyses were performed by using IBM Statistical Package for Social Sciences (SPSS) Version 26. Descriptive statistics were calculated, and the continuous variables were summarized as mean and standard deviation, whereas the categorical variables were summarized as frequency and percentage. Bivariate analysis using the chi-square test was performed to evaluate the variables associated with LBP at different time points. In addition, binary logistic regression was applied to determine the relative odds of occurrence of LBP in the last 12 months due to the presence of a particular factor. The results were presented with an adjusted odds ratio (OR) and confidence intervals for 95% (95% CI). All statistical analysis was set at a 5% level of significance ($p < 0.05$).

Ethics

Permission was taken from the Ethical Review Committee (ERC) of the institute.

Results

Characteristics of participants

A total of 223 subjects responded to the survey, with a response of 82.59%. However, 16 participants did not complete the survey fully; hence they were excluded. Eventually, 167 medical students and 40 medical interns participated entirely in the study and were included in the analysis. Breakdown of the students was: 31 (15%) in the first, 31 (15%) in the second, 30 (14.5%) in the third, 35 (16.9%) in the fourth, and 40 (19.3%) in the final year of MBBS course (Figure 1).

Among all participants, 44.4% were males, and 55.6% were females. The mean age of the participants was 22.36 ± 1.915 years, ranging between 19 and 27 years. Based on the mean age, participants were divided into ≤ 21 , $22 - 24$, and ≥ 25 age groups. Regarding weight, participants were divided into two groups, namely, below normal to normal weight ($\text{BMI} \leq 25 \text{ kg/m}^2$) and above normal weight ($\text{BMI} > 25 \text{ kg/m}^2$). Three out of five participants (61.4%) had $\text{BMI} \leq 25 \text{ kg/m}^2$.

The frequency of physical activity was categorized into three groups: Low level (< 4 times/month), moderate level ($1-4$ times/week), and high level (≥ 5 times/week). Among all participants, almost half (45.4%) performed a low level of physical activity, the majority (83.1%) were non-smokers, nearly half (48.3%) reported that they performed most of their daily activities by sitting, more than two-thirds (69.1%) of participants spent ≥ 6 hours/day in sitting, and four out of five participants (80.2%) had enough rest time. Moreover, the majority (76.3%) used chairs with back support, almost two-thirds (65.2%) used chairs with nonadjustable back support, and more than half (55.6%) used chairs without an adjustable sitting surface (Table 1).

Figure 1. Flow chart of the participants' inclusion for analysis.

LBP prevalence and LBP characteristics

The point, 6-month, and 12-month prevalence of LBP was 25.6%, 46.9%, and 63.3%, respectively. Nearly two-thirds (65.9%) of participants with LBP informed that they suffered the first episode of LBP after being admitted in medical, while only 5.5% experienced it during the internship. 35.1% of participants reported that they experienced only one episode of LBP, whereas 35.1% experienced 2–3 episodes, and 29.8% experienced more than three episodes in the previous 12 months. More than half of the respondents (55%) had a short duration (1 – 7 days) of LBP, while 8.4% reported they had LBP every day in the past year.⁷²

As for causes or diagnosis of LBP, the majority (70.8%) reported no diagnosis, therefore had non-specific LBP. More than half of the participants (53.2%) reported no associated leg pain, while 31.2% reported radiated leg pain. Regarding aggravating factors, more than half of the participants (55.2%) reported that LBP worsened when they maintained a static position for a long time followed by bending or twisting (18.8%), lifting any object (8.4%), sudden movement (5.2%), performing repetitive tasks (3.2%) and non-specific (9.1%). Three-fifths of the participants (60.4%) reported their pain relieved without taking any specific treatment while the remaining received different medications in the form of opioid analgesics (22.1%), exercise therapy (9.1%), steroid injection (1.3%), both opioid and exercise therapy (5.2%), and opioid with steroid injection (1.9%) (Table 2).

Relationship between socio-demographic factors and LBP prevalence

Bivariate analysis showed no significant association between LBP and age groups ($p > 0.160$) or the education level of participants ($p > 0.161$) regardless of the time of occurrence (Table 1).

Table 1. Socio-demographic and lifestyle-related factors associated with LBP and LBP prevalence (n = 207)

Variables		Study sample		LBP point prevalence		LBP 6 months prevalence		LBP 12 months (1 year) prevalence	
		Frequency	Percent	LBP Yes (%)	P value	LBP Yes (%)	P value	LBP Yes (%)	P value
Gender	Male	92	44.4	20.7	0.144	38	0.023	52.2	0.003
	Female	115	55.6	29.6		53.9		72.2	
Age group (years)	≤ 21	76	36.7	19.7	0.160	47.4	0.942	63.2	0.755
	22-24	108	52.2	26.9		47.2		64.8	
	≥ 25	23	11.1	39.1		43.5		56.5	
Education level	1 st year	31	15	16.1	0.541	35.5	0.263	45.2	0.161
	2 nd year	31	15	25.8		58.1		77.4	
	3 rd year	30	14.5	33.3		56.7		70	
	4 th year	35	16.9	25.7		42.9		65.7	
	Final year	40	19.3	20		37.5		60	
	Internship	40	19.3	32.5		52.5		62.5	
BMI	≤ 25	127	61.4	22.8	0.250	39.4	0.007	56.7	0.013
	> 25	80	38.6	30		58.8		73.8	
Physical activity frequency	Low	94	45.4	28.7	0.05	55.3	< 0.005	72.3	< 0.005
	Moderate	69	33.3	30.4		52.2		72.5	
	High	44	21.3	11.4		20.5		29.5	
Smoking habit	Smoker	27	13	22.2	0.606	55.6	0.099	74.1	0.160
	Ex-smoker	8	3.9	12.5		12.5		37.5	
	Non-smoker	172	83.1	26.7		47.1		62.8	
Sitting time (hours/day)	< 6	64	30.9	18.8	0.131	31.3	0.003	45.3	< 0.005
	≥ 6	143	69.1	28.7		53.8		71.3	
Chair type	Have back support	158	76.3	20.9	0.005	41.1	0.003	58.9	0.018
	No back support	49	23.7	40.8		65.3		77.6	
Chair's back support	Adjustable	72	34.8	13.9	0.005	27.8	< 0.005	37.5	< 0.005
	Non-adjustable	135	65.2	31.9		57		77	
Chair's sitting surface	Adjustable	92	44.4	16.3	0.006	32.6	< 0.005	46.7	< 0.005
	Non-adjustable	115	55.6	33		58.3		76.5	
Rest time	Enough	166	80.2	24.1	0.317	40.4	< 0.005	56	< 0.005
	Not enough	41	19.8	31.7		73.2		92.7	
Most activity done in a day (by)	No task for long time	82	39.6	13.4	0.006	24.4	< 0.005	40.2	< 0.005
	Sitting	100	48.3	35		65		83	
	Standing or walking	17	8.2	35.3		52.9		52.9	
	Bending	8	3.9	12.5		37.5		75	

Table 2. Characteristics of low back pain among Bangladeshi medical students, 2020 (n = 207).

		Males (%)	Females (%)	Total (%)
Experienced a major episode of LBP for the first time	As an intern doctor	8.1	3.9	5.5
	As a medical student	66.1	65.7	65.9
	As a college student	17.7	19.6	18.9
	As a school student	8.1	10.8	9.8
Duration of LBP in last 12 months	(1 – 7) days	52.1	56.6	55
	(8 – 30) days	20.8	15.7	17.6
	> 30 days	18.8	19.3	19.1
	Everyday	8.3	8.4	8.4
LBP episodes in last 12 months	1	37.5	33.7	35.1
	(2 – 3)	33.3	36.1	35.1
	> 3	29.2	30.1	29.8
Causes of LBP	No diagnosis or non-specific	71.2	70.5	70.8
	Ligament sprain	3.4	3.2	3.2
	Muscle strain	6.8	9.5	8.4
	Neuropathy	1.7	0	0.6
	Vertebral disc involvement	0	3.2	1.9
	Degeneration	1.7	0	0.6
	Back trauma and fracture	10.2	3.2	5.8
	Others	5.1	10.4	8.4
LBP associated with leg pain	Yes	23.7	35.8	31.2
	No	64.4	46.3	53.2
	Maybe	11.9	17.9	15.6
Aggravating factors	Bending or twisting	23.7	15.8	18.8
	Lifting any object	10.2	7.4	8.4
	Maintaining a position for long time	45.8	61.1	55.2
	Sudden movement	5.1	5.3	5.2
	Performing repetitive tasks	3.4	3.2	3.2
	Non-specific	11.9	7.4	9.1
Treatment received	Opioid painkillers	20.3	23.2	22.1
	Steroid injections	1.7	1.1	1.3
	Exercise therapy	13.6	6.3	9.1
	Psychological counselling	0	0	0
	Opioid + exercise	3.4	6.3	5.2
	Opioid + steroid injection	1.7	2.1	1.9
	No treatment	59.3	61.1	60.4

In contrast, the 6-month and 12-month prevalence of LBP were significantly correlated with gender or being overweight. The number of females with LBP was more than the number of males with LBP during the survey (20.7% vs 29.6%, $p = 0.144$), in the last 6 months (38% vs 53.9%; $p = 0.023$) and in the last 12 months (52.2% vs 72.2%; $p = 0.003$). In addition, participants with BMI > 25 kg/m² reported the presence of LBP more frequently than the participants with BMI ≤ 25 kg/m² during survey (22.8% vs 30%), in the past 6 months (39.4% vs 58.8%) and in the last 12 months (56.7% vs 73.8%) (Table 1).

In the logistic regression analysis, females were 2.3 times more likely to had LBP compared to males (OR: 2.378, 95% CI: 1.334 – 4.236; $p = 0.003$), and the participants with BMI $> 25 \text{ kg/m}^2$ were around two times at higher risk of developing LBP than the participants with BMI $\leq 25 \text{ kg/m}^2$ (OR: 2.146, 95% CI: 1.167 – 3.947; $p = 0.014$) in the last 12 months (Table 3).

Relationship between lifestyle factors and LBP prevalence

According to the bivariate analysis, the factors that significantly contributed to LBP occurrence in the last 6 months and 12 months were frequency of physical activity, total sitting time per day, availability of rest time, and type of activity mostly done in a day. However, the point prevalence of LBP was significantly correlated with only physical activity and the type of activity mostly done in a day. Results demonstrated that the respondents who performed a high frequency of

Table 3. Logistic regression analysis of factors associated with low back pain (n = 207).

Variables		OR (95% CI)	P value
Gender	Male	1	
	Female	2.378 (1.334 – 4.236)	0.003
Age group (years)	≤ 21	1	
	22-24	1.075 (0.583 – 1.979)	0.818
	≥ 25	0.758 (0.294 – 1.955)	0.567
Education level	1 st year	1	
	2 nd year	4.163 (1.386 – 12.503)	0.011
	3 rd year	2.833 (0.988 – 8.126)	0.053
	4 th year	2.327 (0.862 – 6.287)	0.096
	Final year	1.821 (0.705 – 4.705)	0.216
	Internship	2.024 (0.780 – 5.254)	0.148
BMI (kg/m ²)	≤ 25	1	
	> 25	2.146 (1.167 – 3.947)	0.014
Physical activity frequency	High	1	
	Moderate	6.275 (2.721 – 14.474)	< 0.005
	Low	6.237 (2.831 – 13.738)	< 0.005
Smoking habit	Non-Smoker	1	
	Ex-smoker	0.356 (0.082 – 1.538)	0.166
	Smoker	1.693 (0.678 – 4.226)	0.259
Sitting time (hours/day)	< 6	1	
	≥ 6	3.003 (1.629 – 5.533)	< 0.005
Chair type	Have back support	1	
	No back support	2.414 (1.150 – 5.071)	0.020
Chair's back support	Adjustable	1	
	Non-adjustable	5.591 (2.998 – 10.428)	< 0.005
Chair's sitting surface	Adjustable	1	
	Non-adjustable	3.714 (2.049 – 6.732)	< 0.005
Rest time	Enough	1	
	Not enough	9.943 (2.951 – 33.500)	< 0.005
Most activity done in a day (by)	No task for long time	1	
	Sitting	7.250 (3.660 – 14.359)	< 0.005
	Standing or walking	1.670 (0.585 – 4.772)	0.338
	Bending	4.455 (0.847 – 23.429)	0.078

physical activity, those who spent < 6 hours per day by sitting, those who had enough rest time, and those who did not perform any specific task for a long time had the least prevalence of LBP in all time points compared to their counterparts (Table 1).

Results of logistic regression analysis showed that the participants who performed moderate and low frequency of physical activity were 6.275 times (OR: 6.275, 95% CI: 2.721 – 14.474; $p < 0.005$), and 6.237 times (OR: 6.237, 95% CI: 2.831 – 13.738, $p < 0.005$) more likely to develop LBP in last 12 months than the participants who performed a high frequency of physical activity, respectively. Moreover, the odds of LBP were nearly 1.5 times higher among smokers than non-smokers (OR: 1.693, 95% CI: 0.678 – 4.226; $p = 0.259$), more than three times higher among participants who spent ≥ 6 hours in sitting than those spent < 6 hours (OR: 3.003, 95% CI: 1.629 – 5.533; $p < 0.005$), and almost 10 times higher among the subjects who had insufficient rest time than those who had enough rest time (OR: 9.943, 95% CI: 2.951 – 33.500; $p < 0.005$). In addition, the participants who did most of the activity in a day by sitting, standing, or walking, and bending were about 7.2 times (OR: 7.250, 95% CI: 3.660 – 14.359; $p < 0.005$), 1.6 times (OR: 1.670, 95% CI: 0.585 – 4.772; $p = 0.338$) and 4.5 times (OR: 4.455, 95% CI: 0.847 – 23.429; $p = 0.078$) more likely to suffer from LBP in last year compared to the participants who did not perform any activity in a specific position for a long time, respectively (Table 3).

Relationship between participants' chair type and LBP prevalence

Bivariate analysis revealed that the prevalence of LBP, regardless of the time of occurrence, was significantly correlated with the presence of back support, adjustable back support, and adjustable sitting surface of participants' chairs. Results showed that the participants who had chairs with back support, adjustable back support, and adjustable sitting surface had a lower LBP prevalence than their counterparts (Table 1).

Further analysis showed that the 12-month prevalence of LBP was about 2.5 times higher among participants who used chairs without back support (OR: 2.414, 95% CI: 1.150 – 5.071; $p = 0.020$), nearly 5.5 times higher among participants who used chairs without adjustable back support (OR: 5.591, 95% CI: 2.998 – 10.428; $p < 0.005$), and almost 3.7 times higher among participants who used chairs without adjustable sitting surface (OR: 3.714, 95% CI: 2.049 – 6.732; $p < 0.005$) compared to their respective reference group (Table 3).

Discussion

LBP prevalence

The results of our study indicated that almost half (46.9%) and two-thirds (63.3%) of the participants experienced LBP in the past 6 months and 12 months, respectively, while 25.6% reported LBP at the time of the survey. Compared to this study, 12-month prevalence of LBP was lower among the medical students in Pakistan (38.6%),¹⁵ China (40.1%),¹⁶ the US (42.8%),¹⁷ Malaysia (46.1%),¹⁸ India (47.5%),⁶ Austria (53.4%),¹⁰ Serbia (59.5%),⁵ Brazil (59.9%),¹⁹ Saudi Arabia (61.4%),²⁰ and was higher among the medical students in Turkey (96.4%).³¹ The discrepancy in the LBP prevalence could be from some factors, including the variation of faculty year of study, academic curriculum, methodological heterogeneity, mode of data collection, cross-cultural factors, and subjective perception of pain.^{32,33}

Socio-demographic factors and LBP prevalence

Age

Age is considered one of the risk factors of LBP. Several studies have stated that the prevalence of LBP increases with age,^{7,34} although some studies revealed that the prevalence of LBP was higher among younger nurses than older nurses.^{35–37} Contrary to these findings, our study demonstrated no significant relationship between age and prevalence of LBP, which is comparable with several studies.^{38,39}

Sex

Results showed that females had a significantly higher prevalence of LBP than males, which was consistent with several studies.^{5,8,27,40,41} Males are structurally, anatomically, and physiologically different from females, and researchers asserted that females have lower pain thresholds and higher sensitivity to pain than males.^{42,43} For these reasons, females are more likely to report LBP than males. Although, some studies did not reveal any significant association between LBP prevalence and gender.^{6,16,18,38,41}

Weight

Regarding the participant's weight, our study showed participants with BMI $> 25 \text{ kg/m}^2$ had a higher prevalence of LBP than the participants with BMI $\leq 25 \text{ kg/m}^2$, which is comparable with the findings of a meta-analysis by Shiri *et al.*⁴⁴ and a

study by Webb *et al.*⁴⁵ Researchers showed that as weight increases, it creates higher pressure on the intervertebral disc and other spine structures, consequently triggers pain.⁴⁶ However, few studies did not find any association between weight and LBP prevalence.^{7,31,38,41}

Year of study

Several studies demonstrated a significant correlation between the year of study with musculoskeletal pain (MSP), including LBP among medical students.^{9,18,19,41} Two of these studies revealed an increased association of year of study with LBP,^{9,19} while others found that LBP prevalence was higher among third-year medical students.^{41,47} Amelot *et al.*⁴¹ stated that the third year is the first clinical year; hence, students might find it challenging to organize their schedule between theoretical lessons and hospital internships, which consequently causes psychological disturbance and LBP. In addition, Aggarwal *et al.*⁶ revealed that the prevalence of LBP increased with each class year, although the relationship was not significant. They mentioned workload, prolonged standing during clinical classes, and psychological factors as the reasons for that trend.⁶ However, the results of our study indicated that the second year students had a higher prevalence of LBP than others. The reason could be that the second year students need to appear for their first professional exam, and at that time, different factors, including more study hours, stress, and psychological imbalance, could evoke LBP. In contrast, few studies did not find any association between MSP prevalence, including LBP, and study year among medical students.^{15,20,38,39}

Lifestyle factors and LBP prevalence

Smoking

Shiri *et al.*⁴⁸ found the correlation between smoking habits and LBP prevalence in their meta-analysis, and they reported that smokers and ex-smokers had a higher prevalence of LBP than non-smokers. Other studies also revealed that medical students who smoked were more likely to suffer LBP.^{38,49} In contrast, our study revealed no association between smoking habit and LBP prevalence at any time point, in accordance with other studies.^{9,15,16,20,22,50} This discrepancy could be for the low number of smokers as it can be inferred that studies with less than 10% prevalence of smoking did not find any association between smoking habits and LBP prevalence. Moreover, research showed a positive relationship between the risk of LBP and smoking dose.⁵¹ Our study did not assess the intensity of smoking and the duration of exposure to the habit.

Sitting time

Prolonged sitting is another risk factor of LBP^{52,53} as it increases spinal compression load and dysfunction of paraspinal muscles.^{54,55} Nyland and Grimmer⁵³ affirmed that 'a sitting and looking down position' was a potential risk factor of LBP, and studies demonstrated a positive correlation between staying in a sitting position for a long time and LBP.^{31,38,56} Our study revealed that participants who spent ≥ 6 hours sitting had a significantly higher prevalence of LBP than participants who spent < 6 hours sitting. Conversely, Hartvigsen *et al.*,⁵⁷ Spyropoulos *et al.*,²⁷ and Tavares *et al.*³⁹ reported no association between sitting time and LBP prevalence.

Physical activity

Generally, medical students remain busy with their classes and hospital visits, making their life sedentary. A study on medical students of Delhi showed that only one-third of the medical students performed the recommended amount of physical activity.⁵⁸ Physical exercise or regular sports practice are encouraged in different studies as it helps to minimize the rate of LBP prevalence and effective for primary and secondary prevention of LBP.⁵⁹ The findings of our study demonstrated a significant relationship between the prevalence of LBP and frequency of physical activity, which was supported by previous studies.^{5,41} Moreover, The American College of Sports Medicine recommended that to promote and maintain health, physical activity should be performed for at least 30 minutes at moderate intensity with a minimum frequency of 5 days/week.^{60,61} The findings of our study were in line with this recommendation as the participants who performed high frequency ($\geq$ five days/week) of physical activity had a significantly lower prevalence of LBP than those who performed low or moderate frequency ($<$ five days/week) of physical activity. However, several studies did not reveal any significant association between physical activity and LBP prevalence among medical students.^{6,19,27,31,49}

LBP characteristics

We found that in the majority of cases (64.9%), LBP was recurrent, and more than half (55%) of the participants had a short annual duration (1–7 days) of LBP which was consistent with previous studies on Greek public office workers,²⁷ and nursing students and graduate nurses.²⁶ That indicated the high chance of LBP recurrence and chronicity in the future.

In addition, most of the participants (53.2%) had localized LBP, and 31.2% reported radiated leg pain, which was consistent with several studies.^{62,63}

El-soud *et al.*⁶³ found that LBP remained undiagnosed in most cases. In agreement with that result, our study also revealed that 70.8% of the subjects had LBP without a diagnosis. Regarding treatment, the majority (60.4%) of participants reported they did not seek any medication for their symptoms, which is comparable with the findings of studies from Wong *et al.* (65.9%),⁶² Hafeez *et al.* (64.5%)⁴⁹ and Falavigna *et al.* (67.3%).¹⁹ Moreover, maintaining a specific posture, including standing and sitting, for a long time was the most cited (55.2%) aggravating factor for LBP in our study. In agreement with our finding, previous studies⁶⁴ also reported LBP mostly worsened after prolonged standing/sitting.

Hestbaek *et al.*⁶⁵ claimed that the lifetime prevalence of LBP increases markedly between 12 and 22 years of age. Our study came to the same conclusion as we found that 28.7% and 65.7% of participants had LBP before commencing their medical studies and during medical studies, respectively; and more than half (50.4%) of the participants who had LBP in the last 12 months aged ≤ 22 years. That indicated the importance of implementing the LBP prevention strategies before or at the beginning of the medical course.

Type of chair and LBP prevalence

Individuals suffering from different musculoskeletal pains due to prolonged sitting are recommended to use ergonomically sound chairs as the chair directly influences body alignment or posture.^{66,67} Researchers concluded that scarcity of knowledge, understanding, or application of ergonomics' basic principles and rules could lead to LBP.⁶⁸ Moreover, it is vital to adjust the height of the sitting surface of the chair to meet individual biomechanical requirements so that they can use the desk with ease without aggravating the spine.^{69,70} Our results showed that the participants who used chairs with back support, adjustable back support, and the adjustable sitting surface had a significantly lower prevalence of LBP compared to their counterparts at all time points. However, previous studies did not show any significant association between LBP prevalence and using a chair with back support^{27,49} or using a chair with an adjustable sitting surface.²⁷ Whereas Mohsen *et al.*⁷¹ and Spyropoulos *et al.*²⁷ demonstrated that LBP prevalence could be lowered using chairs with back support.

Strengths and limitations

This study was the first study that evaluated the prevalence of LBP among Bangladeshi medical students, and the response rate of the study was satisfactory. However, our study has some limitations that should be acknowledged. First, as we included students from only one medical college, the outcomes may not fully represent the situation for all medical students in Bangladesh. Second, the study outcomes relied solely on the self-administrated questionnaire, and we did not perform any medical tests to confirm the presence of LBP. Therefore, information bias and subject bias cannot be ruled out. Moreover, the difficulty in recalling arises the possibility of over-or underreporting of LBP as participants reported the presence of LBP in the last one year, which entirely depended on the participants' memory. Finally, as it was a cross-sectional study, the exposure to risk factors and outcomes were evaluated concurrently. Hence, we showed only the relationship but could not establish any evidence of the causal association between exposure and LBP occurrence.

Conclusion

The overall results of our study demonstrated the high prevalence of LBP among Bangladeshi medical students and indicated the necessity of formulating and implementing comprehensive preventive strategies. The majority of the risk factors are modifiable. Hence, initiatives can be taken to inspire them to avoid those risk factors, which could improve medical students' and future doctors' overall health and quality of life. Students should be encouraged to perform the recommended amount of physical activity by providing education and facilities and reserving a couple of hours exclusively for exercise and sports activities. Moreover, education on ergonomics and providing sound ergonomic chairs to the students could help minimize LBP prevalence.

In this study, we included students only from one medical college. Future studies should be undertaken with a larger sample size by including students from more than one medical college. Epidemiological longitudinal studies should be conducted to confirm the association of risk factors with LBP.

Data availability

Underlying data

Mendeley Data: Low back pain and associated risk factors among medical students in Bangladesh: A cross-sectional study. <https://doi.org/10.17632/mfky2jttwp.3>.⁷²

The project contains the following underlying data:

- Raw dataset.xlsx

Extended data

Mendeley Data: Low back pain and associated risk factors among medical students in Bangladesh: A cross-sectional study. <https://doi.org/10.17632/mfky2jttwp.3>.⁷²

The project contains the following extended data:

- Course Evaluation – Google Forms.pdf
- STROBE Checklist.doc

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](#) (CC-BY 4.0).

Acknowledgments

The authors are indebted to the study participants. The authors' special gratitude to all batch captains of FMC and supervisors of the study.

References

- Vos T, *et al.*: **Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015.** *Lancet*. 2016; **388**: 1545–1602.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Maher C, Underwood M, Buchbinder R: **Non-specific low back pain.** *Lancet*. 2017; **389**: 736–747.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Hartvigsen J, *et al.*: **What low back pain is and why we need to pay attention.** *Lancet*. 2018; **391**: 2356–2367.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Nguyen TH, Randolph DC: **Nonspecific low back pain and return to work.** *Am. Fam. Physician*. 2007; **76**.
[PubMed Abstract](#)
- Vujcic I, *et al.*: **Low Back Pain among Medical Students in Belgrade (Serbia): A Cross-Sectional Study.** *Pain Res. Manag.* 2018; **2018**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Aggarwal N, Anand T, Kishore J, *et al.*: **Low back pain and associated risk factors among undergraduate students of a medical college in Delhi.** *Educ. Heal. Chang. Learn. Pract.* 2013; **26**: 103–108.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Nordin NAM, Singh DKA, Kanglun L: **Low back pain and associated risk factors among health science undergraduates.** *Sains Malaysiana*. 2014; **43**: 423–428.
- Smith DR, Leggat PA: **Prevalence and distribution of musculoskeletal pain among Australian medical students.** *J. Musculoskelet. Pain*. 2007; **15**: 39–46.
[Publisher Full Text](#)
- Algarni AD, *et al.*: **The Prevalence of and Factors Associated with Neck, Shoulder, and Low-Back Pains among Medical Students at University Hospitals in Central Saudi Arabia.** *Pain Res. Treat.* 2017; **2017**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Moroder P, Runer A, Resch H, *et al.*: **Low back pain among medical students.** *Acta Orthop. Belg.* 2011; **77**: 88–92.
[PubMed Abstract](#)
- Brennan G, Shafat A, Donncha C, *et al.*: **Lower back pain in physically demanding college academic programs: A questionnaire based study.** *BMC Musculoskelet. Disord.* 2007; **8**: 1–8.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Harreby M, Neergaard K, Hesselsoe G, *et al.*: **Are radiologic changes in the thoracic and lumbar spine of adolescents risk factors for low back pain in adults?: A 25-year prospective cohort study of 640 school children.** *Spine (Phila. Pa. 1976)*. 1995; **20**: 2298–2302.
[PubMed Abstract](#) | [Publisher Full Text](#)
- G B: **The incidence of back pain and headache among Swedish school children.** *Qual. Life Res.* 1994; **3**(Suppl 1).
[PubMed Abstract](#) | [Publisher Full Text](#)
- Burton AK, Clarke RD, McClune TD, *et al.*: **The natural history of low back pain in adolescents.** *Spine (Phila. Pa. 1976)*. 1996; **(21)**: 2323–2328.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Haroon H, Mehmood S, Imtiaz F, *et al.*: **Musculoskeletal pain and its associated risk factors among medical students of a public sector university in Karachi, Pakistan.** *J. Pak. Med. Assoc.* 2018; **68**: 682–688.
[PubMed Abstract](#)
- Smith DR, Wei N, Ishitake T, *et al.*: **Musculoskeletal disorders among Chinese medical students.** *Kurume Med. J.* 2005; **52**: 139–146.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Kennedy C, Kassab O, Gilkey D, *et al.*: **Psychosocial factors and low back pain among college students.** *J. Am. Coll. Heal.* 2008; **57**: 191–196.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Alshagga MA, *et al.*: **Prevalence and factors associated with neck, shoulder and low back pains among medical students in a Malaysian Medical College.** *BMC Res. Notes*. 2013; **6**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Falavigna A, *et al.*: **Increased prevalence of low back pain among physiotherapy students compared to medical students.** *Eur. Spine J.* 2011; **20**: 500–505.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Dighriri Y, *et al.*: **Prevalence and associated factors of neck, shoulder, and low-back pains among medical students at Jazan University, Saudi Arabia: A cross-sectional study.** *J. Fam. Med. Prim. Care*. 2019; **8**: 3826.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- List of medical colleges in Bangladesh - Wikipedia.
[Reference Source](#)
- Aggarwal N, Anand T, Kishore J, *et al.*: **Low back pain and associated risk factors among undergraduate students of a medical college in Delhi.** *Educ. Heal. Chang. Learn. Pract.* 2013; **26**: 103–108.
[PubMed Abstract](#) | [Publisher Full Text](#)
- von E E, *et al.*: **The Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies.** *J. Clin. Epidemiol.* 2008; **61**:

- 344–349.
[PubMed Abstract](#) | [Publisher Full Text](#)
24. Sany SA, Tanjim T, Hossain MI: **Low back pain and associated risk factors among medical students in Bangladesh: A cross-sectional study.** 2021; vol. 3.
[Reference Source](#)
 25. Deyo RA, *et al.*: **Report of the NIH task force on research standards for chronic low back pain.** *J. Pain.* 2014; **15**: 569–585.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 26. Mitchell T, O'Sullivan PB, Burnett AF, *et al.*: **Low back pain characteristics from undergraduate student to working nurse in Australia: A cross-sectional survey.** *Int. J. Nurs. Stud.* 2008; **45**: 1636–1644.
[PubMed Abstract](#) | [Publisher Full Text](#)
 27. Spyropoulos P, *et al.*: **Prevalence of low back pain in Greek public office workers.** *Pain Physician.* 2007; **10**: 651–660.
[PubMed Abstract](#)
 28. Chou R: **Low back pain (chronic).** *BMJ Clin Evid.* 2010; **2010**.
[PubMed Abstract](#) | [Free Full Text](#)
 29. Nuttall FQ: **Body mass index: Obesity, BMI, and health: A critical review.** *Nutr Today.* 2015; **50**: 117–128.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 30. Caspersen C, Powell K, Gregory C: **Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research.** *Public Health Rep.* 1985;Mar-Apr; **100**(2): 126–31. US Natl. Libr. Med. 100 (2), 126–131 (1985).
[PubMed Abstract](#) | [Free Full Text](#)
 31. Yucel H, Torun P: **Incidence and Risk Factors of Low Back Pain in Students Studying at a Health University.** *Bezmialem Sci.* 2016; **4**: 12–18.
[Publisher Full Text](#)
 32. Fatoye F, Gebrye T, Odeyemi I: **Real-world incidence and prevalence of low back pain using routinely collected data.** *Rheumatol Int.* 2019; **39**: 619–626.
[PubMed Abstract](#) | [Publisher Full Text](#)
 33. Leggat PA, Smith DR, Clark MJ: **Prevalence and correlates of low back pain among occupational therapy students in Northern Queensland.** *Can. J. Occup. Ther.* 2008; **75**: 35–41.
[PubMed Abstract](#) | [Publisher Full Text](#)
 34. Ghilan K, *et al.*: **Low back pain among female nurses in Yemen.** *Int. J. Occup. Med. Environ. Health.* 2013; **26**(605–614).
[PubMed Abstract](#) | [Publisher Full Text](#)
 35. Yassi A, *et al.*: **The epidemiology of back injuries in nurses at a large Canadian tertiary care hospital: Implications for prevention.** *Occup. Med. (Chic. Ill).* 1995; **45**: 215–220.
[PubMed Abstract](#) | [Publisher Full Text](#)
 36. Karahan A, Kav S, Abbasoglu A, *et al.*: **Low back pain: Prevalence and associated risk factors among hospital staff.** *J. Adv. Nurs.* 2009; **65**: 516–524.
[PubMed Abstract](#) | [Publisher Full Text](#)
 37. Belay MM, Worku A, Gebrie S, *et al.*: **Epidemiology of low back pain among nurses working in public hospitals of Addis Ababa, Ethiopia.** *East Cent. African J. Surg.* 2016; **21**: 113.
[Publisher Full Text](#)
 38. Illic I, *et al.*: **Prevalence and correlates of low back pain among undergraduate medical students in Serbia, a cross-sectional study.** *PeerJ.* 2021; **9**: e11055.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 39. Tavares C, Salvi CS, Nisihara R, *et al.*: **Low back pain in Brazilian medical students: a cross-sectional study in 629 individuals.** *Clin. Rheumatol.* 2019; **38**: 939–942.
[PubMed Abstract](#) | [Publisher Full Text](#)
 40. Sikiru L, Shmaila H: **Prevalence and risk factors of low back pain among nurses in Africa: Nigerian and Ethiopian specialized hospitals survey study.** *East Afr. J. Public Health.* 2009; **6**(22–25).
[PubMed Abstract](#) | [Publisher Full Text](#)
 41. Amelot A, *et al.*: **Low Back Pain among Medical Students: A Burden and an Impact to Consider!** *Spine (Phila. Pa. 1976).* 2019; **(44)**: 1390–1395.
[PubMed Abstract](#) | [Publisher Full Text](#)
 42. Keriri HM: **Prevalence and risk factors of low back pain among nurses in operating rooms, Taif, Saudi Arabia.** 2013; **(1)**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 43. Makris UE, Fraenkel L, Han L, *et al.*: **Epidemiology of restricting back pain in community-living older persons.** *J. Am. Geriatr. Soc.* 2011; **59**: 610–614.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 44. Shiri R, Karppinen J, Leino-Arjas P, *et al.*: **The association between obesity and low back pain: A meta-analysis.** *Am. J. Epidemiol.* 2010; **171**: 135–154.
[PubMed Abstract](#) | [Publisher Full Text](#)
 45. Webb R, *et al.*: **Prevalence and Predictors of Intense, Chronic, and Disabling Neck and Back Pain in the UK General Population.** *Spine (Phila. Pa. 1976).* 2003; **(28)**: 1195–1202.
[PubMed Abstract](#) | [Publisher Full Text](#)
 46. Andrusaitis SF, Oliveira RP, Barros Filho TEP: **Study of the prevalence and risk factors for low back pain in truck drivers in the state of São Paulo, Brazil.** *Clinics.* 2006; **61**: 503–510.
[PubMed Abstract](#) | [Publisher Full Text](#)
 47. Alshagga MA, *et al.*: **Prevalence and factors associated with neck, shoulder and low back pains among medical students in a Malaysian Medical College.** *BMC Res. Notes.* 2013; **6**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 48. Shiri R, Karppinen J, Leino-Arjas P, *et al.*: **The Association between Smoking and Low Back Pain: A Meta-analysis.** *Am. J. Med.* 2010; **123**.
[PubMed Abstract](#) | [Publisher Full Text](#)
 49. Hafeez K, *et al.*: **Back pain - are health care undergraduates at risk?** *Iran. J. Public Health.* 2013; **42**: 819–825.
[PubMed Abstract](#) | [Free Full Text](#)
 50. AlShayhan FA, Saadeddin M: **Prevalence of low back pain among health sciences students.** *Eur. J. Orthop. Surg. Traumatol.* 2018; **28**: 165–170.
[PubMed Abstract](#) | [Publisher Full Text](#)
 51. Alkherayf F, Wai EK, Tsai EC, *et al.*: **A. C. Daily smoking and lower back pain in adult Canadians: the Canadian Community Health Survey.** *J. Pain Res.* 2010; **3**(155).
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 52. Lis AM, Black KM, Korn H, *et al.*: **Association between sitting and occupational LBP.** *Eur Spine J.* 2007; **16**: 283–298.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 53. Nyland LJ, Grimmer KA: **Is undergraduate physiotherapy study a risk factor for low back pain? A prevalence study of LBP in physiotherapy students.** *BMC Musculoskelet. Disord.* 2003; **4**: 1–12.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 54. Callaghan JP, McGill SM: **Low back joint loading and kinematics during standing and unsupported sitting.** *Ergonomics.* 2001; **44**: 280–294.
[PubMed Abstract](#) | [Publisher Full Text](#)
 55. Solomonow M, *et al.*: **Muscular dysfunction elicited by creep of lumbar viscoelastic tissue.** *J. Electromyogr. Kinesiol.* 2003; **13**: 381–396.
[PubMed Abstract](#) | [Publisher Full Text](#)
 56. Diaz-Caballero AJ, Gómez-Palencia IP, Díaz-Cárdenas S: **Ergonomic factors that cause the presence of pain muscle in students of dentistry.** *Med. Oral Patol. Oral Cir. Bucal.* 2010; **15**.
[PubMed Abstract](#)
 57. Hartvigsen J, Leboeuf-Yde C, Lings S, *et al.*: **Review Article: Is sitting-while-at-work associated with low back pain? A systematic, critical literature review.** *Scand J Public Health.* 2000; **28**: 230–239.
[PubMed Abstract](#)
 58. Anand T, Tanwar S, Kumar R, *et al.*: **Knowledge, attitude, and level of physical activity among medical undergraduate students in Delhi.** *Indian J. Med. Sci.* 2011; **65**: 133–142.
[PubMed Abstract](#) | [Publisher Full Text](#)
 59. Henchoz Y, Kai-Lik So A: **Exercise and nonspecific low back pain: A literature review.** *Joint Bone Spine.* 2008; **75**: 533–539.
[PubMed Abstract](#) | [Publisher Full Text](#)
 60. Bennett GG, Wolin KY, Puleo EM, *et al.*: **Awareness of national physical activity recommendations for health promotion among US adults.** *Med. Sci. Sports Exerc.* 2009; **41**: 1849–1855.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 61. Garber CE, *et al.*: **Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise.** *Med. Sci. Sports Exerc.* 2011; **43**: 1334–1359.
[Publisher Full Text](#)
 62. Wong T, Teo N, Kyaw M: **Prevalence and Risk Factors Associated with Low Back Pain Among Health Care Providers in a District Hospital.** *Malaysian Orthop. J.* 2010; **4**: 23–28.
[Publisher Full Text](#)
 63. El-Soud AMA, El-Najjar AR, El-Fattah NA, *et al.*: **Prevalence of low back pain in working nurses in Zagazig University Hospitals: an epidemiological study.** *Egypt. Rheumatol. Rehabil.* 2014; **41**: 109–115.
[Publisher Full Text](#)
 64. Johnson O, Edward E: **Prevalence and Risk Factors of Low Back Pain among Workers in a Health Facility in South-South Nigeria.** *Br. J. Med. Med. Res.* 2016; **11**: 1–8.
[Publisher Full Text](#)
 65. Hestbaek L, Leboeuf-Yde C, Kyvik KO: **Is comorbidity in adolescence a predictor for adult low back pain? A prospective study of a**

- young population. *BMC Musculoskeletal Disorders*. 2006; **7**.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
66. Aarås A, Horgen G, Bjørset HH, *et al.*: **Musculoskeletal, visual and psychosocial stress in VDU operators before and after multidisciplinary ergonomic interventions. A 6 years prospective study - Part II. Appl. Ergon.** 2001; **32**: 559–571.
[PubMed Abstract](#) | [Publisher Full Text](#)
 67. Van Niekerk SM, Louw QA, Hillier S: **The effectiveness of a chair intervention in the workplace to reduce musculoskeletal symptoms. A systematic review. BMC Musculoskeletal Disorders.** 2012; **13**: 145.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
 68. Gopinadh A, *et al.*: **Ergonomics and musculoskeletal disorder: As an occupational hazard in dentistry. J. Contemp. Dent. Pract.** 2013; **14**: 299–303.
[PubMed Abstract](#) | [Publisher Full Text](#)
 69. Office Chair: **How to Reduce Back Pain?**
[Reference Source](#)
 70. **Chapter 4: Body Alignment, Posture, And Gait.**
[Reference Source](#)
 71. Makhsous M, Lin F, Hendrix RW, *et al.*: **Sitting with adjustable ischial and back supports: Biomechanical changes. Spine (Phila. Pa. 1976).** 2003; **28**: 1113–1121.
[PubMed Abstract](#) | [Publisher Full Text](#)
 72. Sany SA, Tanjim T, Hossain MI: **Low back pain and associated risk factors among medical students in Bangladesh: A cross-sectional study. Mendeley Data.**
[Publisher Full Text](#)

Open Peer Review

Current Peer Review Status: ? ?

Version 1

Reviewer Report 18 October 2021

<https://doi.org/10.5256/f1000research.58703.r95514>

© 2021 Chiwaridzo M. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Matthew Chiwaridzo

Faculty of Medicine and Health Sciences, Department of Primary Health Care Sciences, University of Zimbabwe, Harare, Zimbabwe

Thank you for the opportunity to review this interesting manuscript.

Although the study addresses an interesting research question for Bangladesh, and perhaps other countries, there is more detail that I would like to see in the introduction and methods sections, as well as integration of a few additional references and concepts throughout the manuscript. As such, this manuscript will require minor revisions to meet the criteria for indexing.

As the research design is observational, the authors are commended for applying the STROBE guidelines (available via the equator network at <http://www.equator-network.org/reporting-guidelines/>).

Introduction

- This paper needs to strongly emphasise its unique contribution to the literature base in the context of what other authors have already researched and reported with regards to low back pain among medical students. LBP among medical students or generally university students is a well-researched area globally with studies from India, Pakistan, China, USA, Brazil, South Africa, Zimbabwe, Austria, and Malaysia.
- The theoretical perspective to the problem is narrow in light of the many studies that have been conducted to answer the research question the authors are posing. Admittedly, the authors pointed many studies reporting a high prevalence of LBP among medical students from elsewhere.
- The authors should briefly describe the results of some of the referenced studies in the background so that we can understand the theoretical background of this study.
 - What was the prevalence of LBP among medical students from other studies?
 - Which type of LBP was investigated and how was the investigation carried out?

- Where were these studies carried out and how do the results of these few studies mentioned in the background apply or not apply to the Bangladesh medical students' situation?
- What factors affect the extrapolation of results?
- In what way are medical students from Bangladesh different from medical students from other countries like India, Pakistan for example?
- The authors should also highlight the contextual background underpinning the conduction of the study in Bangladesh, Faridpur Medical College.
 - What prompted the authors to want to do this study?
 - What local problem justifies this study?
 - What was observed by the authors among medical students in Bangladesh strongly justifying the need for this study?
- I commend the authors for giving us a brief narration of the MBBS programme but more can be added to show how exposed the students are to LBP and what exposes them. How is that exposure so unique to the Bangladeshis?
- The authors are reminded that a statement like this "...no study has been conducted to evaluate the prevalence of LBP among Bangladeshi medical students" is not a sound and adequate justification. What is the problem now that has prompted an investigation into the prevalence of LBP and associated factors among medical students in Bangladesh particularly in the setting the study was conducted? Identification of the specific problem in Bangladesh makes the study uniquely different from similar studies conducted elsewhere.
- Provide a hint on the significance of this study in your context.

Methods

- Clearly provide details of the psychometric properties of the LBP questionnaire used in the study. How was the questionnaire tested for reliability and logical validity against the set objectives?
- Kindly reference your operational variables such as point prevalence.
- Not clear whether the authors are addressing non-specific or specific LBP, acute vs chronic until the results section.
- Reference 6 is the same as reference 22. Kindly check and address.
- For Sample size calculation: Which recall period (point, 6-month or 12-month) was used for the estimation of the sample size? Kindly provide a justification for adopting a prevalence figure from the following study by Aggarwal *et al.*, 2017¹ to inform your sample size calculation.
- "Because of the possibility of sample loss, the final sample size was determined as 270": Be clear how that was arrived at.
- Did the authors check the continuous variables for normality first, and if so what tests were

used?

- Clarify the Inclusion and exclusion criteria of the participants.
- The Ethical approval number from the “institute” should be provided.

Results

- Your final sample size was less than the calculated minimum sample size?
- The use of a flow chart is commendable.
- Statistical analysis is appropriate and well explained.

Discussion and conclusion

- May I suggest removing sub-headings in the discussion section for clarity.
- The first paragraph of the discussion should summarise the main findings from the study addressing the main research question.
- Discuss briefly your findings on the association between age and LBP as they contrasted many findings from the literature.
- Study limitations are well explained.
- “The overall results of our study demonstrated the high prevalence of LBP among Bangladeshi medical students and indicated the necessity of formulating and implementing comprehensive preventive strategies”: May I suggest you expand briefly on the possible preventative strategies based on your study findings. This is the most important part of this study. What can be done to curtail the problem of LBP among medical students given contextual information and study results?

References

- Lack of consistency in referencing style in the reference list.
- References 6 and 22 duplicated.
- Add URL links for internet-derived references and dates accessed.

References

1. Aggarwal N, Anand T, Kishore J, Ingle GK: Low back pain and associated risk factors among undergraduate students of a medical college in Delhi. *Educ Health (Abingdon)*. **26** (2): 103-8 [PubMed Abstract](#) | [Publisher Full Text](#)

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 31 Jan 2022

Shabbir Ahmed Sany, Faridpur Medical College, Faridpur, Bangladesh

Thank you for giving us the opportunity to submit a revised draft of our manuscript. We would like to thank you for your insightful comments on the paper, as these comments led us to improve the quality of the manuscript. We took into consideration all comments and concerns in the paper. Detailed responses are given below:

Introduction:

- Thank you for your valuable suggestion. We have made some changes as you suggested, especially we described the necessity of conducting the current study. Although several studies have been conducted globally to determine the prevalence of LBP, the results were inconsistent. Particularly regarding the risk factors, the results were contradictory as the socio-demographic factors of participants, study design, and exposure to risk factors were not the same. Therefore, this study was conducted to estimate the prevalence of LBP among medical students of Bangladesh. The results of this study will help to better know about the risk factors and their impact. We can also compare the results with other studies which will help to examine the validity of evidence and take initiatives to prevent LBP.
- We have also included the studies that determined LBP prevalence among medical students of different countries.

Methods:

- The questionnaire was piloted on 15 students before administration in the study to confirm the validity and reliability.
- The reference for the definition of operational variables was included.

- Determining the acute vs. chronic, non-specific vs. specific LBP was not the study's primary aim. We just showed the percentage of participants who had non-specific and specific LBP.
- Test of Normality for continuous variables was not performed as we categorized the continuous variables for analysis.
- We included the inclusion and exclusion criteria briefly as you suggested.
- No formal ethical approval was required from the institution; hence, no approval number was provided. The intuition requires formal ethical approval for clinical trials involving human participants.
- We followed the STROBE guidelines. The checklist of the STROBE guidelines can be found at the Mendeley data repository¹.

Results:

- A flow chart was included as 'Figure 1', which demonstrated the different phases of the study.
- Two hundred twenty-three participants responded, and then 16 were excluded as they did not respond fully. Therefore, a total of 207 respondents were included for analysis.

Discussion and conclusion:

- Changes were made where you suggested. Some sub-headings were removed for clarity. The association between age and prevalence of LBP was discussed under the subheading titled 'Socio-demographic factors and LBP prevalence.'
- The preventive measure was discussed briefly. It would have been better to expand it. However, in the case of our study, it seems slightly out of scope. Future studies involving medical students with more than one medical college are warranted for better evidence and giving the appropriate recommendation for implementing preventive measures.

References:

- The correction was done as you suggested. The reference style was autogenerated by using Mendeley software. Later it was published following the journal's formatting style.

1. Sany, Shabbir Ahmed; Tanjim, Taukir; Hossain, Md Ikbal (2021), "Low back pain and associated risk factors among medical students in Bangladesh: A cross-sectional study", Mendeley Data, V4, doi: 10.17632/mfky2jttwp.4.

Competing Interests: No competing interests

Reviewer Report 27 September 2021

<https://doi.org/10.5256/f1000research.58703.r93460>

© 2021 Zaman M. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Mohammad Mostafa Zaman

Non-Communicable Disease Unit, World Health Organization Country Office for Bangladesh, Dhaka, Bangladesh

LBP is a common problem in Bangladesh and elsewhere. Data for medical students are lacking. This survey has been done among students of a medical college in Bangladesh (Faridpur Medical College). The manuscript will contribute to LBP prevention measures in the medical profession. However, there are points of concern:

1. Abstract

- The objective was to evaluate the prevalence. The authors have not done any evaluation. "Evaluated" could be replaced by "determined".
- 70.8% were undiagnosed is not correct; the authors have not diagnosed LBP patients that were not diagnosed before.

2. Introduction

- The literature review is incomplete. National survey findings have been published in 2020, I do not see it in the review. For example, Zahid-Al-Quadir *et al.*¹ reported the burden of LBP in the general population, and the introduction could build on this and the discussion could also benefit from adding this.

3. Methods

- Sample size calculation is based on an Indian study, which is very high. Prevalence in Bangladesh is much lower. There was another COPCORD study that reported LBP among other rheumatic disorders.
- Logistic regression analysis was done for a 12-month recall period, which has a potential of recall bias; this could be done for point prevalence.
- Ethical clearance has been obtained from the institute. Which institute?

4. Results

- The results described have many digits after the decimal point; these could be up to one decimal point. No message will be lost by removing extra decimal points.
- Dividing a small number of students (207) into so many age and educational groups is meaningless. There are hardly any points of implications by age and educational years, the differences in education and age are obviously very narrow. The message of the study could be generated for one group only. At best, the results could be presented for male and female, and students and interns.
- Providing both CIs and P-values is redundant information. The authors could put esoteric marks against significant CIs (Table 3).

5. Discussion

- The discussion is quite long. There are so many subheadings used because authors have

discussed all variables under study. They could highlight the main points of the message that the study transmits to the readers. For example, years cannot be changed or intervened separately but it has a lengthy description.

- The last paragraph under the Conclusion is a repetition of the limitations mentioned above; this could be deleted.

6. Reference

- Reference 72 is a duplication of reference 24.

References

1. Zahid-Al-Quadir A, Zaman MM, Ahmed S, Bhuiyan MR, et al.: Prevalence of musculoskeletal conditions and related disabilities in Bangladeshi adults: a cross-sectional national survey. *BMC Rheumatol.* 2020; **4** (1): 69 [PubMed Abstract](#) | [Publisher Full Text](#)

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Epidemiology of NCD risk factors, rheumatic disorders

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 31 Jan 2022

Shabbir Ahmed Sany, Faridpur Medical College, Faridpur, Bangladesh

Thank you for giving us the opportunity to submit a revised draft of our manuscript. We appreciate the time and effort you have dedicated to providing your valuable feedback on

the manuscript. We are grateful to you for your insightful comments on our paper. We have been able to incorporate changes to reflect most of your suggestions. Here is a point-by-point response to the reviewers' comments and concerns.

Abstract:

- *The objective was to evaluate the prevalence. The authors have not done any evaluation. "Evaluated" could be replaced by "determined".*

Response: Thank you for your suggestion. We have replaced the word 'evaluated' with 'determined.'

- *70.8% were undiagnosed is not correct; the authors have not diagnosed LBP patients that were not diagnosed before.*

Response: We agree with this comment. 70.8% were non-specific LBP rather undiagnosed. We have corrected it.

Introduction:

- *The literature review is incomplete. National survey findings have been published in 2020, I do not see it in the review. For example, Zahid-Al-Quadir et al.¹ reported the burden of LBP in the general population, and the introduction could build on this and the discussion could also benefit from adding this.*

Response: Thank you for your suggestion. We have made the changes as you suggested.

Methods:

- *Sample size calculation is based on an Indian study, which is very high. Prevalence in Bangladesh is much lower. There was another COPCORD study that reported LBP among other rheumatic disorders.*

Response: Thank you for pointing this out. However, the prevalence of LBP is relatively higher among the people involved with health professions. Physiotherapists in Bangladesh, for instance, had a 60.8% prevalence of LBP, which is higher than other professions [1]. Moreover, our study was the first study that determined LBP prevalence among Bangladeshi medical students. Therefore, we calculated the sample size based on an Indian study as the Bangladeshi medical students have relatively similar curriculum, clinical class exposure, study load, and social and cultural demographics as Indian medical students.

- *Logistic regression analysis was done for a 12-month recall period, which has a potential of recall bias; this could be done for point prevalence.*

Response: You have raised an important point here. However, determining risk factors was one of the study's primary objectives; we opted to do logistic regression analysis for 1-year prevalence instead of point prevalence despite the potential of recall bias. Point prevalence could be too short a period to conclude the effect of exposure of any particular risk factor.

- *Ethical clearance has been obtained from the institute. Which institute?*

Response: Thank you for pointing this out. We have corrected it. The ethical Permission was taken from the Ethical Review Committee (ERC) of Faridpur Medical College.

Results:

- *The results described have many digits after the decimal point; these could be up to one decimal point. No message will be lost by removing extra decimal points.*

Response: Agree. We have incorporated your suggestion throughout the manuscript.

- *Dividing a small number of students (207) into so many age and educational groups is meaningless. There are hardly any points of implications by age and educational years, the differences in education and age are obviously very narrow. The message of the study could be generated for one group only. At best, the results could be presented for male and female, and students and interns.*

Response: Thank you for your comment. However, previous studies showed a significant association between medical students' age and education years and LBP prevalence. For this reason, we wanted to observe it among Bangladeshi medical students, and we divided the students into three age groups and academic years. We found that the 2nd year medical students had a higher prevalence of LBP, although the difference was not significant.

- *Providing both CIs and P-values is redundant information. The authors could put esoteric marks against significant CIs (Table 3).*

Response: Thank you for pointing this out. We have modified Table 3 as you suggested.

Discussion:

- *The discussion is quite long. There are so many subheadings used because authors have discussed all variables under study. They could highlight the main points of the message that the study transmits to the readers. For example, years cannot be changed or intervened separately but it has a lengthy description.*

Response: Thank you for your suggestion. We have made the changes as you suggested.

- *The last paragraph under the Conclusion is a repetition of the limitations mentioned above; this could be deleted.*

Response: We have deleted the line as you suggested.

Reference:

- Reference 72 is a duplication of reference 24.

Response: Thank you for pointing this out. We have corrected it.

[1] R. Mondal, R. C. Sarker, S. Akter, P. C. Banik, and S. K. Baroi, "Prevalence of low back pain and its associated factors among physiotherapists in Dhaka city of Bangladesh in 2016," *J. Occup. Heal. Epidemiol.*, vol. 7, no. 2, pp. 70–74, 2018.

Competing Interests: No competing interests

Comments on this article

Version 1

Author Response 04 Sep 2021

Shabbir Ahmed Sany, Faridpur Medical College, Faridpur, Bangladesh

Dear Mohammad Ali, thank you for your valuable suggestion. We will mention some studies that

assessed the prevalence of LBP in Bangladesh in version 2 of this paper.

Competing Interests: No competing interests were disclosed.

Reader Comment 27 Aug 2021

Mohammad Ali, Uttara Adhunik Medical College and Hospital, Dhaka, Bangladesh

This is an interesting study, however, you must include the LBP prevalence of Bangladeshi cohorts in the introduction and discussion. For

example: <https://onlinelibrary.wiley.com/doi/full/10.1002/1348-9585.12131>

Competing Interests: No competing interests were disclosed.

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com

F1000Research