

DOI: <https://dx.doi.org/10.18203/2319-2003.ijbcp20240991>

Original Research Article

## Assessment of frequency and factors associated with low back pain among undergraduate medical students in Bangalore Medical College and Research Institute: a cross-sectional study

Viswanathan S.\*, Geetha A., Maruthi Prasanna K. V.

Department of Pharmacology, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India

**Received:** 07 March 2024

**Accepted:** 28 March 2024

**\*Correspondence:**

Dr. Viswanathan S.,

Email: drviswaa@gmail.com

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** A large percentage of young adults suffer from low back pain. Due to their demanding curriculum, medical students are most susceptible. This study aims to assess the frequency and factors associated with low back pain among undergraduate medical students at a college in Bangalore.

**Methods:** An online cross-sectional study using a questionnaire was conducted among undergraduate medical students at Bangalore Medical College and Research Institute. SPSS 26.0 was used to analyze the data with a significance level of  $p < 0.05$ .

**Results:** Of the 250 students enrolled, 45.6% had low back pain. Long hours of sitting were the common factor aggravating the pain. The logistic regression analysis revealed that Phase 3 (part 2) MBBS (OR=2.53, 95% CI: 1.34 - 4.66), overweight (BMI>25) (OR=3.03, 95% CI: 1.42-6.50), coffee consumption regularly (OR=1.761, 95% CI: 1.007-3.009), Family history of LBP (OR=5.900, 95% CI: 3.182-10.939), duration of exercise/sports 1-2 hours per week (OR=1.691, 95% CI: 1.023-2.794), spending >8 hours for electronic gadgets daily (OR=2.02, 95% CI: 1.14-3.59) were found to be independently associated with low back pain. These results demonstrate an increased risk of low back pain among medical students with high BMI, lack of physical activity and increased electronic device usage.

**Conclusions:** It highlights the necessity of focused treatments to control stress, minimize extended periods of sitting, enhance physical activity, and support proper posture among medical students. By preventing and managing low back pain, medical students can improve overall performance and quality of life.

**Keywords:** Bangalore, Frequency, Low back pain, Medical students, Risk factors

### INTRODUCTION

Low back pain (LBP) is a severely debilitating health problem characterized by localized pain and discomfort below the costal margin and above the lower gluteal fold, with or without leg pain.<sup>1</sup> It is one of the most common musculoskeletal disorders worldwide. According to Ganesan et al the prevalence of LBP in young Indian individuals between the ages of 18 and 35 is 42.4% annually and 22.8% weekly.<sup>2</sup> But prior research has indicated high prevalence of LBP among medical students, ranging from 30% to 75%.<sup>3</sup>

Medical schools tend to have rigorous curriculums, which predispose students to sedentary lifestyles and factors like lack of sleep, physical inactivity, obesity, smoking can also increase the risk of LBP. Long hours of study, lectures, and clinical rotations can cause medical students to adopt awkward body positions, repetitive motions, and prolonged sitting or standing postures.<sup>4</sup> Medical students with LBP may experience decreased ability to concentrate, poor sleep, and limited physical activity, which can lead to increased stress levels, decreased academic performance and career goals.<sup>5</sup> Long-term exposure to these risk factors causes the back to deteriorate more quickly, which raises

the likelihood of an injury occurring later in life and can result in chronic and recurring lower back pain.<sup>6</sup> Currently, analgesics are the preferred treatment for low back pain. Less commonly, the cause of LBP is investigated. Physical therapy, rehabilitation and spinal adjustment are alternative treatments and disc surgery is the last option.<sup>7</sup>

Identifying effective interventions to manage low back pain may improve the quality of life and academic performance of medical students while reducing the burden of low back pain on health care resources. However, only fewer studies have been conducted to assess LBP and associated risk factors among medical students in India. There is also paucity of data regarding this, hence the present study is undertaken.

## METHODS

A cross-sectional study was conducted to assess frequency and factors associated with low back pain among undergraduate medical students at Bangalore Medical College and Research Institute from January 2024 to February 2024.

### Study population

The study included medical students from first to final year aged 18 years and above at Bangalore Medical College and Research Institute who were willing to give informed consent. Participants with a history of spinal surgery, spinal deformity, vertebral fracture, and other musculoskeletal disorders were excluded from the study.

### Sample size calculation

According to the study conducted by Ahmad H. Alwashmi et al, the proportion of medical students who have back pain is 82%, with an absolute precision of 5%, a confidence interval of 95%, a dropout rate to be 10%, estimated sample size is 227.<sup>1</sup> In order to improve the accuracy of the findings, our study comprised 250 individuals.

### Data collection

The study was registered with the Institutional Ethics Committee. An online questionnaire with digital consent was developed using google forms and distributed via social media to the study participants. The data was collected using a pre-validated, pre-tested, semi-structured, questionnaire adopted from Taha et al was used for data collection with the following sections: socio-demographic characteristics, risk factors, and treatment for LBP and analyzed and imported to MS Excel.<sup>4</sup> The questionnaire consists of 27 questions all are close ended. The degree of pain was evaluated using the Visual Analogue Scale (VAS). This is a simple numerical scaling system that involves asking the participant experiencing pain to rate the severity on a scale of 0 (no pain) to 10 (worst pain). IBM SPSS version 26 was utilized for the

analysis of the gathered data. The findings of the descriptive analysis are presented as mean and standard deviations for continuous variables and as frequency and percentages for categorical variables. The chi-square test is used to evaluate the association between two categorical variables. Factors that are significantly associated ( $p < 0.05$ ) with LBP were further analyzed using multiple logistic regression. The results were considered statistically significant if  $p < 0.05$ .

## RESULTS

### Baseline characteristics of the participants

A total of 250 undergraduate medical students with a mean age of  $20.04 \pm 0.10$  years were enrolled, 141 (56.4%) were male and 109 (43.6%) were female. 70 students (28%) were enrolled in Phase 1 MBBS, 65 students (26%) were enrolled in Phase 2 MBBS, 58 students (23.2%) were enrolled in Phase 3 (Part 1) MBBS, and 57 students (22.8%) were enrolled in Phase 3 (Part 2) MBBS, with a mean height of  $167.81 \pm 0.62$  cms and a mean weight of  $62.78 \pm 0.75$  kgs. Among them 183 (73.2%) were normal weight, 25 (10%) were underweight, 35 (14%) were overweight, and 7 (2.8%) were obese (Table 1).

**Table 1: Relationship between baseline characteristics of low back pain.**

Characteristics	Frequency	Percentage	
<b>Gender</b>	Female	109	43.6
	Male	141	56.4
<b>Mean age</b>	20.04±0.10 years		
<b>Academic year</b>	Phase 1 MBBS	70	28.0
	Phase 2 MBBS	65	26.0
	Phase 3 (part 1) MBBS	58	23.2
	Phase 3 (part 2) MBBS	57	22.8
<b>Mean height</b>	167.81±0.62 cms		
<b>Mean weight</b>	62.78±0.75 kgs		
<b>Body mass index</b>	Underweight	25	10.0
	Normal	183	73.2
	Overweight	35	14.0
	Obese	7	2.8

### Frequency and risk factors of low back pain

Of the 250 students, 114 reported low back pain (45.6%). Among them (N=72, 63.2%) had low back pain related to no diagnosis or non-specific. Muscle strain was the next highest cause of pain (N=35, 30.7%), followed by wrong sleeping position (N=16, 14.1%), stress (N=10, 8.8%), intense sports activity (N=7, 6.1%) and ligament sprain (N=5, 4.4%). The mean pain score for all participants was  $3.13 \pm 1.69$ . Most participants experienced dull aching pain (84%). Long hours of sitting (N=62, 54.4%) was the most

reported factor aggravating low back pain. Sleeping in the right posture (N=47, 40.5%) and maintaining good posture (N=46, 39.7%) were the most reported factors relieving low back pain. Neck pain (N=32, 29.3%), and weakness (N=16, 13.8) were the most associated symptoms of low back pain (Table 2).

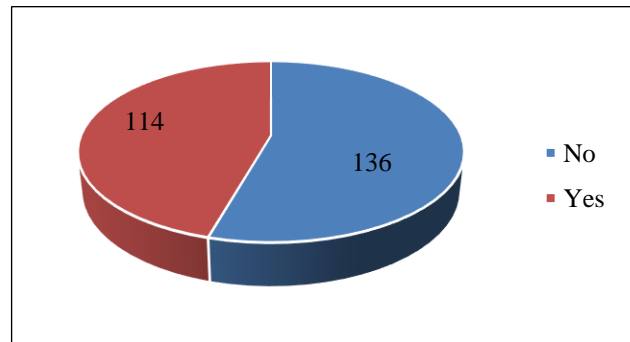
**Table 2: Relationship between frequency and risk factors of low back pain.**

Characteristics		Frequency	%
Have low back pain	Yes	114	45.6
	No	136	54.4
Duration of LBP	<3 months	82	71.9
	>3 months	32	28.1
Cause for LBP	No diagnosis or non-specific	72	63.2
	Muscle strain	35	30.7
	Ligament sprain	5	4.4
	Menstrual cramps	2	1.7
Factors aggravating LBP	Long hours of sitting	62	54.4
	Wrong sleeping position	16	14.1
	Stress	10	8.8
	Physical inactivity	8	7.0
	Intense sports activity	7	6.1
	Inappropriate lifting	4	3.5
	Backpack	5	4.3
	Anxiety	1	0.9
	Physiotherapy	1	0.9
	Factors relieving LBP	Sleeping in the right posture	47
Maintaining good posture		46	39.7
Nothing		9	8.6
Sitting in the right posture		8	7.7
Exercise		4	3.5
Associated symptoms	Nothing	54	46.5
	Neck pain	32	29.3
	Weakness	16	13.8
	Numbness	6	5.2
	Pain radiating to the leg	6	5.2

**Frequency and associated features of low back pain**

Of those with low back pain (N=38, 32.8%), drank coffee regularly; (N=66, 58.6%) participated in sports or exercise for 1-2 hours (N=32, 27.6%) for 3-4 hours; and (N=16, 13.8%) for 5-7 hours each week; (N=88, 75.9%) used electronic devices in a sitting position; and (N=26, 24.1%) used them in a recumbent position. While 76 students (67.2%) used electronic gadgets for less than eight hours a

day, 38 (32.8%) used them for more than eight hours. At bedtime, 40 (34.5%) reported back discomfort. While 11 (9.5%) reported low back pain sleeping >8 hours, 78 (68.9%) reported sleeping 6-8 hours, and 25 (21.6%) reported sleeping 4-6 hours. 54 (46.6%) had a family history of LBP, and 42 (36.2%) said that their work or daily routine was disrupted.



**Figure 1: Do you have low back pain (LBP)?.**

The different treatment options used were, heat or cold application by 52 students (45%), massage therapy by 14 students (12.1%), physiotherapy by 15 (12.9%), pharmacological treatment by 41 students (35.3%). Among the 41 students, 20 (18.8%) took aceclofenac, 11 (9.5%) took diclofenac, 7 (6%) took paracetamol, 2 (1.7) took etoricoxib, 1 (0.9%) took mefenamic acid, 14 (12.1%) took muscle relaxants like thiocolchicoside, 6 (5.2%) took chlorzoxazone and 1 (0.9%) took metaxalone in combination with NSAIDS (Table 3).

**Association of LBP with baseline characteristics and its factors**

A significant association was found between low back pain and the body mass index, academic year, duration of LBP, causative factors like nonspecific diagnosis, muscle strain, ligament sprain, aggravating factors like stress, inappropriate lifting, Intense sports activity, long hours of sitting, physical inactivity, wrong sleeping position, backpacks, regular coffee consumption, duration of usage of electronic devices per day, duration of exercise (in hours per week) and family history of Low back pain (p<0.05) (Table 4).

**Regression model for low back pain risk factor analysis**

Logistic regression was performed to predict the risk factors for low back pain in medical students. Phase 3 (part 2) MBBS (OR=2.53, 95% CI: 1.34-4.65), overweight (OR=3.03, 95% CI: 1.42-6.50), coffee consumption regularly (OR= 1.77, 95% CI: 1.01-3.10), family history of LBP (OR=5.90, 95% CI: 3.18-10.94), duration of exercise/sports 1-2 hours per week (OR=1.69, 95% CI: 1.02-2.80), spending >8 hours for electronic gadgets daily (OR=2.02, 95% CI: 1.14-3.58) were found to be independently associated with low back pain (Table 5).

**Table 3: Relationship between frequency and associated features of low back pain.**

Characteristics	Frequency	Percentage	
<b>Have you done surgery for LBP?</b>	No	114	100
<b>Smoker</b>	No	114	100
<b>Coffee consumption</b>	No	76	67.2
	Yes	38	32.8
<b>Family history of LBP</b>	No	60	53.4
	Yes	54	46.6
<b>Practice any exercise/ sports</b>	No	60	53.4
	Yes	54	46.6
<b>Duration of exercise/sports (hours in a week)</b>	1-2 hours	66	58.6
	3-4 hours	32	27.6
	5-7 hours	16	13.8
<b>Electronic device usage (hours/daily)</b>	<8 hours	76	67.2
	>8 hours	38	32.8
<b>In which position do you use your electronic device?</b>	Recumbent position	26	24.1
	Sitting position	88	75.9
<b>Do you feel any back discomfort while in bed?</b>	No	74	65.5
	Yes	40	34.5
<b>How many hours do you sleep per night?</b>	>8 hours	11	9.5
	4-6 hours	25	21.6
	6-8 hours	78	68.9
<b>Has LBP affected your work or daily routine?</b>	No	72	63.8
	Yes	42	36.2
<b>Have you received any non-pharmacological treatment for LBP</b>	Home remedies -cold/heat application	52	44.9
	Nothing	31	28.4
	Physiotherapy	15	12.9
	Massage therapy	14	12.1
	Chiropractic	1	0.9
	Acupuncture	1	0.9
<b>In the past have you taken any medications for LBP?</b>	No	73	64
	Yes	41	36
<b>If yes choose the NSAID.</b>	Aceclofenac	20	18.8
	Diclofenac	11	9.5
	Paracetamol	7	6
	etoricoxib	2	1.7
	Mefenamic acid	1	0.9
<b>How long did you take the drug for?</b>	<1 week	39	37.1
	>1 week	2	1.7
<b>Did you experience adverse effects while taking the above medication?</b>	No	25	21.5
	Yes	16	13.8
<b>If yes, choose the adverse effect</b>	Nausea	7	6.0
	Upper abdominal pain	5	4.3
	heartburn	4	3.4
<b>Have you taken any muscle relaxants for the LBP?</b>	No	20	17.2
	Yes	21	18.1
<b>If yes choose the muscle relaxant.</b>	Thiocolchicoside	14	12.1
	Chlorzoxazone	6	5.2
	Metaxalone	1	0.9
<b>How long did you take the drug for?</b>	<1 week	20	17.2
	>1 week	1	0.9
<b>Did you experience adverse effects while taking the above medication?</b>	No	7	6
	Yes	14	12
<b>If yes, choose the adverse effect</b>	Drowsiness	11	9.5

Continued.

Characteristics	Frequency	Percentage
Headache	2	1.7
Dry mouth	1	0.9
Abdominal pain	1	0.9

**Table 4: Relationship between the association of low back pain and baseline characteristics.**

Variable		Low back pain		P value	
		No	Yes		
<b>Gender</b>	Female	N	60	49	0.857
		%	44.1	43	
	Male	N	76	65	
		%	55.9	57	
<b>Body mass index</b>	Underweight	N	14	11	0.033
		%	10.3	9.6	
	Normal	N	107	76	
		%	78.7	66.7	
	Overweight	N	11	24	
		%	8.1	21.1	
Obese	N	4	3		
	%	2.9	2.6		
<b>Academic year</b>	Phase 1 MBBS	N	40	30	0.017
		%	29.4	26.3	
	Phase 2 MBBS	N	42	23	
		%	30.9	20.2	
	Phase 3 (part 1) MBBS	N	33	25	
		%	24.3	21.9	
Phase 3 (part 2) MBBS	N	21	36		
	%	15.4	31.6		
<b>Duration of LBP</b>	<3 months	N	32	82	0.000
		%	28.1	71.9	
	>3 months	N	82	32	
		%	71.9	28.1	
<b>Cause for LBP</b>	No diagnosis or non-specific	N	42	72	0.000
		%	36.8	63.2	
	Muscle strain	N	79	35	
		%	69.3	30.7	
Ligament sprain	N	109	5	0.014	
	%	98	2		
<b>Factors aggravating LBP</b>	Stress	N	104	10	0.001
		%	91.2	8.8	
	Inappropriate lifting	N	110	4	0.028
		%	96.5	3.5	
	Long hours of sitting	N	52	62	0.000
		%	45.6	54.4	
	Intense sports activity	N	107	7	0.003
		%	93.9	6.1	
	Long hours of sitting	N	52	62	0.000
		%	45.6	54.4	
Physical inactivity	N	106	8	0.002	
	%	93	7		
Wrong sleeping position	N	98	16	0.000	
	%	86	14		
Backpack	N	110	4	0.028	
	%	96.5	3.5		
<b>Associated factors</b>	Coffee consumption regularly	N	182	68	

Continued.

Variable	Low back pain		P value	
	No	Yes		
	%	72.8 27.2	0.046	
Family history of LBP	N	178 72	0.000	
	%	71.2 28.8		
Duration of Usage of electronic devices	< 8 hours	N	65 185	0.016
		%	26 74	
	> 8 hours	N	185 65	
		%	74 26	
Duration of exercise (hours/week)	1-2	N	123 127	0.040
		%	49.2 50.8	
	3-4	N	172 78	0.328
		%	68.8 31.2	
	5-7	N	205 45	0.135
		%	82 18	

**Table 5: Regression model for low back pain risk factor analysis.**

Variable	Odds ratio	Confidence interval (95%)		P value
		Lower limit	Upper limit	
<b>Phase 3 (part 2) MBBS</b>	2.53	1.34	4.65	0.003
<b>Overweight (BMI &gt;25)</b>	3.03	1.42	6.50	0.004
<b>Coffee consumption regularly</b>	1.77	1.001	3.10	0.047
<b>Family history of LBP</b>	5.90	3.18	10.94	0.000
<b>Duration of exercise/sports (hours in a week)</b>				
<b>1-2</b>	1.69	1.02	2.80	0.041
<b>3-4</b>	1.31	0.76	2.25	0.329
<b>5-7</b>	1.66	0.85	3.24	0.138
<b>Usage of electronic devices daily (&gt;8 hours)</b>	2.02	1.14	3.58	0.016
<b>Use of electronic devices by posture</b>				
<b>Sitting position</b>	1.13	0.63	2.03	0.686
<b>Recumbent position</b>	0.92	0.51	1.66	0.787

**DISCUSSION**

The current study aimed to assess the frequency and factors associated with low back pain among medical students. According to our research, low back pain was common among medical students, with 45.6% reporting low back pain and 63.2% of those were related to non-specific diagnosis. These findings from previous studies that demonstrated higher frequency of low back pain in medical students, which can have a significant impact on their quality of life and academic performance.<sup>1-6</sup>

Long hours of sitting (54.4%) were found to be a substantial risk factor for low back pain among medical students. This result confirmed by previous research has shown that long hours of sitting are associated with an increased risk of musculoskeletal disorders like low back pain.<sup>2-6</sup> One of the main reasons for low back pain among medical students is that they spend a lot of time sitting through lectures and studying. So, interventions that focus on reducing sitting time and encouraging breaks for physical activity can help prevent low back pain.

Another key finding in our study was that physical inactivity was a major contributing factor to low back pain. Previous research has demonstrated that physical inactivity increases the risk of musculoskeletal disorders.<sup>3-7</sup> One of the reasons medical students may be prone to low back pain is that they are more likely to be physically inactive due to the high demands of their studies. They may not have many opportunities to exercise, so interventions that encourage physical activity like exercises may help reduce low back pain among medical students.

Our study also identified stress, inappropriate lifting, intense sports activity, wrong sleeping position, coffee consumption, and family history as major causes of low back pain.<sup>8,9</sup> Stress management strategies, lifestyle changes, and proper sleep hygiene can reduce the incidence of low back pain among medical students.

It is interesting to note that academic year, BMI, usage of electronic gadgets daily and duration of sleep per night were associated with low back pain in our study. This

result supported by previous research has shown higher frequency rates of low back pain in students in higher academic years.<sup>8,9</sup> The association may suggest that low back pain necessarily correlates with academic performance in this population. However, more research needs to be done to fully understand the mechanisms that contribute to low back pain in medical students.

A significant association was found between low back pain and non-pharmacological treatment (heat or cold application 44.9%, massage therapy 12.1% and physiotherapy 12.9%) and with pharmacological treatment (aceclofenac 18.8%, diclofenac 9.5%, paracetamol 6% thicolchicoside 12.1%, chlorzoxazone 5.2%).<sup>10,11</sup> This signifies that non-pharmacological treatment is the priority among them.

Despite the positive results, there are a few limitations to consider when interpreting the findings. The study design is cross-sectional and was conducted at a single medical college which restricts our ability to make causal inferences. Self-reported measures may be subject to recall and subjective bias. The study did not evaluate the impact of psychological variables on low back pain. The lack of objective measures (e.g. imaging or physical examination) may result in underestimating the frequency and intensity of low back pain in the medical student population. These limitations emphasize the need for further study to confirm and expand the current findings and to identify effective strategies to prevent and manage low back pain.

## CONCLUSION

The summary of this survey revealed that over 45.6% of medical students reported having low back pain (LBP) mainly linked to high BMI, physical inactivity and extended electronic device use. Low back pain is one of the most common health issues among medical students. This study outlines several risk factors, conditions, and impacts associated with low back pain. It emphasizes the importance of addressing this issue through targeted interventions, such as physical activity, reducing sitting time, managing stress, and promoting good posture. Medical schools can play an important role in providing these interventions to support students physical and academic health. By preventing and managing low back pain, medical schools can improve students quality of life and overall performance. More research is needed to assess the impact of these interventions, as well as explore additional strategies for addressing this common health issue.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee (No: BMCRI/EC/22/23-24)*

## REFERENCES

1. Alwashmi AH. prevalence of low back pain and associated factors among Qassim University Medical Students: a cross-sectional study. *Cureus*. 2023;15(9).
2. Bansal D, Asrar MM, Pharm M, Ghai B, Pushpendra D. Prevalence and impact of low back pain in a community-based population in northern India. *Pain Physician*. 2020;23(4):E389.
3. Aggarwal N, Anand T, Kishore J, Ingle GK. Low back pain and associated risk factors among undergraduate students of a medical college in Delhi. *Education Health*. 2013;26(2):103-8.
4. Taha YA, Al Swaidan HA, Alyami HS, Alwadany MM, Al Swaidan MH, Alabbas YH, et al. The prevalence of low back pain among medical students: a cross-sectional study from Saudi Arabia. *Cureus*. 2023;15(5).
5. Moroder P, Runer A, Resch H, Tauber M. Low back pain among medical students. *Acta Orthopaedica Belgica*. 2011;77(1):88.
6. Sany SA, Tanjim T, Hossain MI. Low back pain and associated risk factors among medical students in Bangladesh: a cross-sectional study. *F1000Research*. 2021;10.
7. Nagaraj BN. Prevalence of low back pain in college students: A cross-sectional study. *Int J Orthopaed*. 2021;7(1):415-7.
8. Alshammari KF, Alassaf OM, Alomaim HY, Alnais IA, Alswayda SH. Prevalence of low back pain and its relation to stress and study hours among medical students in the University of Hail in Saudi Arabia. *Med. Sci*. 2021;25:432-9.
9. Hendi OM, Alturkistani LH, Bajaber AS, Alhamoud MA, Mahfouz ME. Prevalence of musculoskeletal disorder and its relation to stress among medical students at Taif University, Saudi Arabia. *Int J Prevent Medi*. 2021;12(1).
10. Cashin AG, Wand BM, O'Connell NE, Lee H, Rizzo RR, Bagg MK, et al. Pharmacological treatments for low back pain in adults: an overview of Cochrane Reviews. *Cochr Datab System Revi*. 2023;(4).
11. Chou R, Qaseem A, Snow V, Casey D, Cross Jr JT, Shekelle P, Owens DK. Clinical Efficacy Assessment Subcommittee of the American College of Physicians and the American College of Physicians/American Pain Society Low Back Pain Guidelines Panel. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Inter Medi*. 2007;147(7):478-91.

**Cite this article as:** Viswanathan S, Geetha A, Prasanna MKV. Assessment of frequency and factors associated with low back pain among undergraduate medical students in Bangalore Medical College and Research Institute: a cross-sectional study. *Int J Basic Clin Pharmacol* 2024;13:351-7.