

Low back pain among college students in a public Saudi university: A cross-sectional study

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ABSTRACT

Background: Low back pain (LBP) is the most prevalent orthopedic condition worldwide. University students are more likely to have this issue due to their demanding and time-consuming course load. This study aimed to investigate the prevalence of LBP and the factors that lead to it among students at the Imam Mohammad Ibn Saud Islamic University (IMSIU). **Methods:** This cross-sectional study targeted undergraduate students using an online self-administered questionnaire. A descriptive analysis method was conducted. **Results:** Of the 830 students who completed the survey, 71.4% were females. About two-thirds were aged between 18 and 22 years. Our study shows that 68.2% had complained of recent LBP. The most significant prevalent factor associated with LBP among IMAMU students, 94.2%, was prolonged sitting. Heavy object lifting is 93.2%, and unhealthy seating/body position is 90.2%, which comes in second and third place. Those who complained about the discomfort of their lecture hall seats were shown to be dramatically more likely (5.549 times more) to develop LBP than students who did not. Students with a positive history of depression were significantly more prone (2.565-fold) to LBP. A positive family history of LBP and smoking cigarettes were found to increase the chance of developing LBP. **Conclusion:** LBP among IMSIU students is high, mainly because of prolonged sitting, heavy object lifting, and unhealthy sitting and/or body position. There is a strong association between LBP and a positive family history of LBP, smoking, and uncomfortable seats. Preventive measures, such as an intervention program for university students, are required.

Keywords: College students, low back pain, medical students, prevalence, risk factors

Introduction

The most prevalent orthopedic condition worldwide is low back pain (LBP). According to some estimates, 20–30% of

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the general population experiences LBP at any moment. LBP is a prevalent health issue that family physicians and general practitioners frequently encounter globally. A vital attribute of a primary healthcare physician is their ability to consistently deliver comprehensive care, which is founded on a good rapport with the patient.^[1,2] Many universities and institutions of higher education offer primary healthcare services to their students and staff members. This underscores the significance of identifying the primary determinants contributing to LBP in the general population and university students, given the substantial amount

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of time students dedicate to studying and preparing for recurrent examinations.^[3,4]

LBP affects people of all ages, including children and older adults. Age, gender, obesity, psychosocial factors (stress, anxiety, and depression), level of education, occupational factors, decreased muscle flexibility and mobility, hypermobility, competition sports, the type and method of carrying and transporting weight, postural habits, level of physical activity, smoking, and domestic factors, such as computer and video game use, are the main risk factors for LBP. Moreover, LBP frequently starts in infancy, and teenagers' incidence rates are approaching those of adults.^[5]

Muscle tension is one of the potential causes of LBP, which often affects the lumbar area. For those with LBP, quality of life is a major worry because it immediately impacts them and contributes to their lack of productivity, whether studying or working.^[6] Students in medical school experience stress, academic difficulties, and extended training shifts in wards and clinics. These incidents are regarded as modifiable risk factors for musculoskeletal pain (MSP) that might raise the prevalence of LBP in medical students.^[7] Additionally, LBP is quite common among healthcare professionals, according to many researchers. Some even illustrated that LBP in some of them started before they even started working. However, only some research studies look at back pain among medical students. Moreover, medical students with LBP are more likely to develop it.^[8]

According to research conducted at a Saudi medical school, stress was present in 74.2% of first-year students, 69.8% of second-year students, 48.6% of third-year students, 30.4% of fourth-year students, and 49% of fifth-year students. The third year is the most stressful time in undergraduate education, while another study found that medical students experience substantial psychological discomfort, particularly in the first 3 years.^[9] Undergraduate students' levels of physical exercise are declining as they use computers and laptops more frequently. Bad study posture practices may also be a factor in back pain.^[10] Our study aims to determine the prevalence of back pain among undergraduate students at the Imam Mohammad Ibn Saud Islamic University (IMSIU) and to pinpoint the risk variables connected to back pain.

Materials and Methods

Study design

This cross-sectional study was conducted at IMSIU in Riyadh, Saudi Arabia, in October 2022 to measure the prevalence of LBP among the university students.

Sample size calculation

The number of registered undergraduate students pursuing a bachelor's degree in these majors was 7393 for both genders (3875 were male and 3518 were female). Using calculator.net, the minimal sample size of responses was calculated to be

at least 366 participants to reach a confidence level (CI) of 95% and a margin of error of 5%.

Study population

The population of this study is college students of IMSIU majoring in medicine, science, and humanitarian streams. Students studying in colleges other than IMSIU, students under 18, and students who have already graduated from IMSIU staff were excluded from this study. Written informed consent was obtained from all participants included in the study.

Data collection tools and procedures

An online self-completed electronic questionnaire has been emailed to a convenient sample of participants provided by the I.T. Deanship. Follow-up reminder emails have been sent to increase the response rate.

Data collection method and variables

Each student had to answer an anonymous questionnaire that included demographic characteristics and habits (age, gender, college major, study year, weight, height, and smoking of cigarettes or electronic cigarettes or shisha), a list of factors associated with LBP, a personal medical history of chronic diseases, and a personal history of LBP, and was sent by e-mail to all registered and attending students of IMSIU.

Statistical data analysis

Descriptive analysis with the mean and standard deviation (SD) was applied to continuous variables, and the frequencies and percentages were used to describe the categorically measured variables. The statistical normality assumption was tested using the Histogram and the Kolmogorov-Smirnov statistical test of normality. The multiple response dichotomies analysis was used to describe the variables measured with more than one option answer. The multivariable binary logistic regression analysis was applied to three of the students' odds of LBP, and the association between predictor variables with the outcome was expressed as a multivariate-adjusted odds ratio (OR) with their associated 95% CIs. The multivariable binary logistic regression was also applied to assess what may explain the students' odds of discomfort with faculty/university seats. The SPSS IBM v21 statistical data analysis program was used, and the alpha significance level was considered 0.50.

Ethical approval

The IMSIU Institutional Review Board (IRB) Committee approved the study (project number 482-2023; approval date, July 01, 2023). All writing was collected in accordance with the ethical principles of the Declaration of Helsinki. The survey link included a brief study description and a more detailed explanation on the front page.

Results

Eight hundred and thirty (830) university students enrolled themselves electively in the study and completed the online survey. Table 1 displays the yielded analysis for their sociodemographic

Table 1: Descriptive analysis of the university students' sociodemographic characteristics and academic level

	Frequency	Percentage
Sex		
Female	593	71.4
Male	237	28.6
Age-group		
18–22 years	543	65.4
23–25 years	201	24.2
>25 years	86	10.4
College		
Medicine	40	4.8
Science	294	35.4
Human sciences (humanities)	496	59.8
Year of study		
First year	158	19
Second year	113	13.6
Third year	165	19.9
Fourth year	179	21.6
Fifth year	215	25.9
Study level		
Junior (first year)	158	19
Sophomore (second and third years)	278	33.5
Senior (fourth and fifth years)	394	47.5
Body weight (Kg), mean (SD)		65.88 (20.33)
Body height (centimeters), mean (SD)		163.42 (8.64)
Body mass index (BMI) score		24.42 (6.36)
Body mass index level		
Underweight	184	22.2
Normal	351	42.3
Overweight	168	20.2
Obese	127	15.3
Do you currently complain of low back pain, which lasts for at least 1 day (with or without pain referred to one or both lower extremities)?		
No	264	31.8
Yes	566	68.2
Cigarette smoking habit		
No	806	97.1
Yes	24	2.9
e-Cigarette use		
No	761	91.7
Yes	69	8.3
Smoking sheesha (hookah)		
No	803	96.7
Yes	27	3.3

characteristics and academic profile. Most of the students in the sample, 71.4%, were females, and 28.6% were males; their age-groups were as follows: 65.4% were aged between 18–22 years, and another 24.2% of them were aged between 23–25 years, and remainder 10.4% of the students were aged >25 years. Regarding the students' colleges, 4.8% of them studied at the College of Medicine, 35.4% studied at the Science College, and 59.8% studied at the College of Humanities. Their study year levels were as follows: 19% were juniors in their preparatory year, another 33.5% were sophomores, and the remainder were senior students.

All in all, two-thirds of the university students (68.2%) complained of recent LBP lasting one or more days with/without pain referral to the lower extremities [Table 1].

The students' mean weight (in kg) was 65.88 kilograms, SD = 20.33 kgs, and their mean height (centimeters) was 163.42 centimeters, SD = 8.64 cm. The mean body mass index (BMI) for the sample of the students was equal to $24.42 \pm 6.36\%$. Still, considering the levels of their BMI, it was found that 22.2% of the students were considered underweight, 42.3% had average BMI, and 20.2% were overweight. The remaining 15.3% of the students were considered to be obese. Very few of the students (2.9%) smoked cigarettes, and 8.3% of them used e-cigarettes, but 3.3% of them advised that they smoked (sheesha/hookah) tobacco, as shown in Table 1.

The students were asked to state their known comorbidity and/or risk factors. The resulting findings showed that most of the students, 47.3%, had myopia, another 34.7% advised that they had anemia, another 34% of them had generalized anxiety, but 28.5% of them had been diagnosed with sinusitis, and 25.1% had migraine. Also, 18.6% of the students were diagnosed with depression. Another 14.4% of them were diagnosed with asthma, but 14.3% of them had been diagnosed with other medical conditions and 8.9% with other mental illnesses; however, few of them, 4.5%, had been diagnosed with thyroid disease, 2.3% had been diagnosed with rheumatoid disease, and 1.9% arterial hypertension but very few of them had been diagnosed with ischemic heart disease (IHD) and diabetes, as shown in Table 2.

The university students were also asked to list all events/offenders they had experienced before feeling an episode of LBP. The findings showed that the students' top 10 perceived offenders/activities associated with experiencing LBP were prolonged sitting while studying, followed by heavy object lifting. Unhealthy body position/sitting, study-related stresses, and wrong sleeping positions were followed by exposure to cold drafts from air conditioning (A/C) systems and prolonged standing while waiting for busses and services, then sudden exposure to weather (hot/cold) conditions. Still, these were followed by a family history of LBP and housekeeping and home doing daily chores; fewer students reported LBP associated with ironing clothes, recreational sports, washing high windows, sport-related injuries, and injuries acquired at the faculty. Conversely, according to the students, the lowest perceived offenders that caused LBP were excessive walking and driving to and from the university. Only a small number of students reported experiencing lower back pain connected to the menstrual cycle or pregnancy in females, as well as excessive driving or walking. In addition, a small number of individuals reported experiencing lower back pain (LBP) and discomfort specifically caused by the uncomfortable seats in the lecture hall. Conversely, another small group experienced LBP resulting from automobile accidents and previous surgery on their spine [Table 3].

Table 2: Descriptive analysis of the university students' medical history and comorbidity

	Frequency	Percentage
Myopia	292	47.3
Anemia	214	34.7
Generalized anxiety	210	34
Sinusitis	176	28.5
Migraine	155	25.1
Depression	115	18.6
Asthma	89	14.4
Other medical conditions	88	14.3
Other mental/psychiatric illnesses	55	8.9
Thyroid disease	28	4.5
Rheumatic disease	14	2.3
Arterial hypertension	12	1.9
Ischemic heart disease	9	1.5
Diabetes mellitus	6	1

Table 3: Descriptive analysis of the university students' previous exposure to events that were associated with low back pain (LBP)

	Frequency	Percentage
Offenders that were associated with LBP		
Prolonged sitting	780	94.2
Heavy object lifting	523	93.2
Unhealthy sitting/body position	747	90.2
Studying-related stresses	650	78.5
Wrong sleeping position	643	77.7
Air conditioning systems/draft	578	69.8
Prolonged standing while waiting	523	63.2
Weather conditions change (cold/hot)	511	61.7
Family history of LBP	511	61.7
Housekeeping chores	478	57.7
Ironing clothes	280	33.8
Recreational sports	248	30
Washing high windows	238	28.7
Sports injuries	191	23.1
Injuries at faculty	185	22.3
Interpersonal conflicts	168	20.3
Previous spine surgeries	106	12.8
Car accidents	93	11.2
University seats and tables (uncomfortable desks and tables)	55	6.6
Other medical conditions	20	2.4
Menstrual cycle and/or pregnancy	19	2.3
Excess driving and walking	10	1.2

Also, some students reported LBP post-interpersonal conflicts [Figure A].

Predictors of LBP among students:

To arrive at a better understanding of what may explain the student's experience of recent LBP, the multivariable binary logistic regression analysis was used to regress the student's odds of recent LBP against their sociodemographic and study-related characteristics and comorbidity as well as their perceived offenders

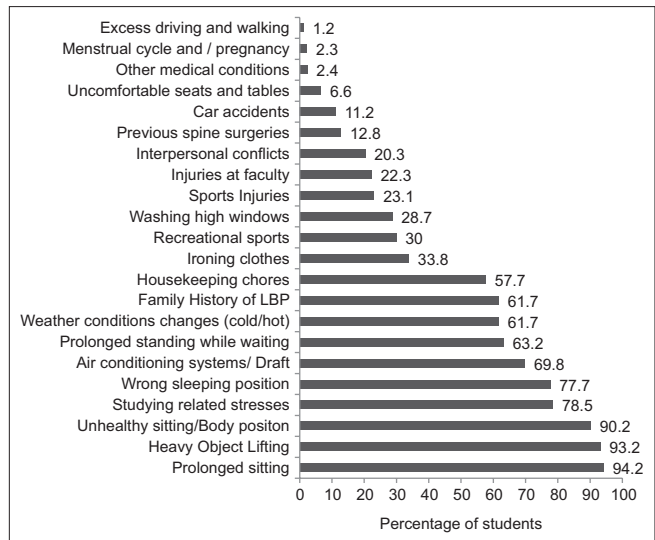


Figure A: University students perceived offenders that preceded low back pain experience

of LBP. The yielded analysis findings [Table 4] showed that the university students measured factors (namely their sex, age, BMI, and smoking habit) did not converge significantly on their odds of experiencing recent LBP, but the students who had a positive history of depression were found to be significantly more predicted (2.565 times more) for LBP compared to those who do not have a positive history of depression on average, P value = 0.036. Also, the analysis model showed that the students with a positive medical history of anemia were found to be significantly more predicted (1.601 times more or 60.1% times higher) for LBP compared to those who are not anemic on average, P value = 0.022. Moreover, the analysis model indicated that the students with myopia were found to be significantly more predicted to LBP (1.402 times more) compared to students with no history of myopia, P value = 0.050. Not only so, but also the analysis model showed that the students who experienced study-related stresses were found to be significantly more predicted (2.12 times more) for LBP compared to those who had no study-related stresses on average, P value < 0.001. Also, the students who complained of uncomfortable lecture hall seats were found to be significantly more predicted (5.549 times more) to LBP compared to students who had not complained of discomfort from college/lecture hall chair use, P value < 0.001. The students of the Science college were found to be significantly more predicted (2.525 times more) to LBP compared to medical students, P value = 0.011, and the students of the Human Science College were also found to be significantly more predicted to LBP compared to medical college students on average, P value = 0.005. The students with a positive family history of LBP were at increased risk for LBP compared to students with no family history of LBP, but the difference between them was not statistically significant; however, P value = 0.066.

Predictors of faculty seat discomfort:

Because some of the university students had complaints of LBP after using the university lecture hall chairs and housing

chairs, the researchers had an interest in getting more insight into what may explain the student's experience of college chairs and desk-related LBP as such the multivariable logistic regression analysis was applied to patients' odds of complaints of chair-related LBP, and the yielded findings [Table 5] showed that male students were found to be significantly more predicted (2.454 times more) to complain of LBP associated with college chair use compared to female students on average, *P* value = 0.003. The student's age and specialty did not correlate significantly with their experience of lecture hall chair-related low back discomfort. Still, the student's BMI has considerably correlated positively with their odds of experiencing LBP associated with faculty chair use. For each additional 1% rise in the student's BMI score, their odds of complaining about the uncomfortable chairs tended to rise by a factor equal to 3.9% times higher on average, *P* value = 0.039 (note Figure B). Also, the students with previous faculty-related injuries were significantly more predicted (2.200 times more) to complain about the uncomfortable chairs at the College compared to those with no such injuries, *P* value = 0.009.

Discussion

Our study showed that the prevalence of LBP among IMSIU students is 68.2%. The students of the Science College were found to be significantly more predicted (2.525 times more) to LBP compared to medical students, *P* value = 0.011, and

the students of the Human Science College were also found to be significantly more predicted to LBP compared to medical college students on average, *P* value = 0.005; this finding was in contrast with a previous study,^[11] which determined no difference in LBP in medicine and other colleges; also, this finding was in contrast with physiotherapy students,^[12] and

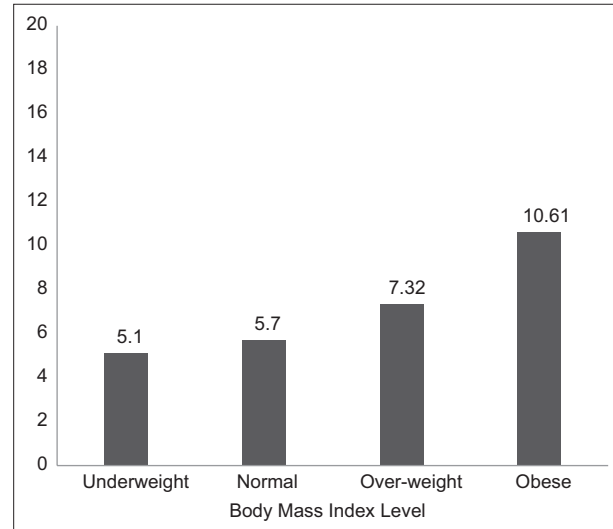


Figure B: Association between the students' BMI score and their model mean predicted probability (%) of experiencing LBP due to uncomfortable college chair

Table 4: Multivariable logistic binary regression analysis of the university students' odds of low back pain (LBP)

	Multivariate-adjusted odds ratio	95% C.I. for OR		P
		Lower	Upper	
Sex=male	0.795	0.544	1.162	0.236
Age-group	1.113	0.877	1.412	0.378
Body mass index (BMI) score	0.981	0.957	1.007	0.145
Smoking cigarettes	2.565	0.816	8.057	0.107
History of depression=positive	1.736	1.037	2.906	0.036
History of anemia=positive	1.601	1.072	2.392	0.022
Diagnosed with myopia	1.402	1.000	1.966	0.050
Experiences study stress	2.120	1.457	3.084	<0.001
Complains of uncomfortable college seats	5.549	2.236	13.766	<0.001
College=Science	2.526	1.238	5.151	0.011
College=Humanities	2.703	1.343	5.438	0.005
Positive family history of low back pain	1.359	0.980	1.885	0.066
Constant	0.412			0.084

Dependent variable=complaint of recent LBP (no/yes)

Table 5: Multivariable logistic binary regression analysis of the university student's perception of college seats as a source of LBP

	Multivariate-adjusted odds ratio	95% C.I. for OR		P
		Lower	Upper	
Sex=male	2.454	1.368	4.402	0.003
Age-group	0.692	0.435	1.101	0.121
College	1.115	0.697	1.782	0.650
Body mass index score	1.039	1.002	1.078	0.038
Experienced previous injury at the faculty	2.200	1.221	3.964	0.009
Constant	0.019			<0.001

DV=Experienced LBP after use of faculty seats (no/yes)

other studies previously reported that students of medical departments are at higher risk of LBP than students of different departments.

Also, our study showed that the university students' measured factor (sex) did not converge significantly on their odds of experiencing recent LBP; this result was in contrast with a previous survey conducted in four Saudi medical schools,^[13] that found an association between LBP and gender, with a high prevalence of LBP reported among females. Another similar association has been reported in Australian and Brazilian medical students.^[14,15] Still, we also found that those male students were found to be significantly more predicted (2.454 times more) to complain of LBP associated with college chair use compared to female students on average.

Moreover, the yielded analysis findings of our study showed that the university students' BMI did not converge significantly on their odds of experiencing recent LBP. In contrast, a study conducted among medical staff of an Ethiopian hospital^[16] found that obesity is a risk factor for LBP, and this can be explained by the fact that an increase in weight puts strain on the weight-bearing spinal elements. Also, this study showed an association between overweight/obesity and a higher prevalence of LBP among the respondents. This result is similar to the results of another study conducted among healthcare workers in tertiary health institutions in Sokoto, Nigeria,^[17] which found that obesity was significantly associated with LBP among the participants in this study. We also found in our research that the students' BMI has considerably and positively correlated with their odds of experiencing LBP associated with faculty chair use.

We found that the students with a positive family history of LBP were at increased risk for LBP with no family history of LBP. However, the difference between them was not statistically significant. This finding is consistent with earlier research that LBP sufferers were much more likely to have a family history of musculoskeletal problems.^[18] This result also aligns with the study of medical students in Delhi.^[11] In contrast, there is no statistically significant link between a family history of LBP and the condition, according to a previous Saudi survey.^[17] Similarly, according to a study conducted among Pakistani medical students, there is no connection between the prevalence of LBP and a family history of musculoskeletal disorders.^[19]

In addition, the yielded analysis findings of our study showed that the university students' smoking habit did not converge significantly on their odds of experiencing recent LBP. In contrast, cigarette smoking was associated with a higher risk for LBP in a study conducted in Serbia.^[8] Also, a study conducted among undergraduate students at Taif University—Saudi Arabia^[18] found that smoking appeared as a factor that increases LBP in university students as LBP was significantly associated with smoking. This result is similar to the results of other studies, which reported a relationship between daily smoking amount

and chronic LBP in young adults.^[20] Also, previous findings among automobile assembly workers in China had reported a relationship between smoking and MSP.^[21]

According to some experts, smoking lowers bone mineral density, and when combined with osteoporosis, which can occur as a result of this loss, smoking and LBP can lead to microfractures in the vertebrae. According to some experts, this could result in degenerative alterations to the spinal column. Another hypothesis is that smoking increases coughing, which raises intradiscal and intraabdominal pressure. In some circumstances, the increased pressure could result in disk herniation.^[22]

Our results showed that a history of psychological problems was significantly associated with LBP, and these data were also reported among the general population in both a cross-sectional and prospective analysis in a European survey.^[23] Psychological job aspects significantly influence future back pain issues. However, their work methods still need to be fully understood. These findings imply that we must alter how we approach back pain.

Applying psychological understanding might improve both prevention and recovery. In addition, the results show that there is a significant association between unhealthy sitting/body position and prolonged sitting and LBP. This is consistent with other findings that there is a relationship between prolonged sitting and LBP. The significant correlation between posture and the 1-month prevalence of LBP raises the possibility that this may be a factor in LBP among students.^[24]

We anticipated that poor posture when sitting, improper lifting techniques, and overuse of the lower back muscles would all contribute to low back discomfort, and this was consistent with the research results. Our finding shows that sitting at uncomfortable desks and tables is significantly associated with LBP.^[25] The heights of Saudi school equipment, such as the chairs and tables, were either too low or too high for the body, leading to increased pain and tension in the L5/S1 joint. Furthermore, this was consistent with our research results. In this study, the wrong sleeping position shows a high risk of LBP, as reported by a Saudi study among health sciences students, that being uncomfortable in bed was linked to LBP.^[26]

The survey study unveiled the factors linked to back pain among university students. These findings provide valuable insights into primary and family healthcare physicians' interactions with student patients. By identifying the underlying causes of this issue, healthcare professionals can adopt a comprehensive approach to managing chronic pain. This approach extends beyond the use of analgesic medications and encompasses the provision of medical guidance.

This study has revealed several elements, including preventive recommendations about healthy sitting and sleeping, effective strategies for managing psychological stresses and tensions

associated with testing, the duration of the study session, and other relevant factors.

Limitations

The data were collected using a self-administered questionnaire, which may be subject to recall bias or missing data. Further, the questionnaire includes clinical information, which may lead to personal bias. Some participants may need to be more honest in reporting their information, as some may be shy from reporting smoking, and others may report different lengths and weights.

Conclusion

The study concluded that the prevalence of LBP among university students is slightly high, with some difficulties associated with college class chairs, about which the majority of students complain about the manufacturing and how they do not fit the body posture correctly. Prolonged sitting and lifting of heavy objects were found to be connected with a rise in prevalence. Male students were found to be substantially more likely than female students to report LBP associated with college chair use. The research has shed light on the issue of LBP among university students. This study should be expanded to other Saudi colleges for a more comprehensive picture of the LBP problem among Saudi university students. As there is a high prevalence of students suffering from this condition, we suggest that chairs and desk comfort should receive more focus. We also recommend that researchers develop and improve an intervention program to treat this problem among university students and prevent it from happening.

Acknowledgment

The authors thank all college students who participated in the survey.

Author contributions

All authors participated in the concept, design, analysis, interpretation of data, writing, and manuscript review. They have seen and approved the final version of the manuscript.

Ethical approval

The IMSIU IRB Committee approved the study (project number 482-2023; approval date, July 01, 2023). All writing was collected in accordance with the ethical principles of the Declaration of Helsinki. The survey link included a brief study description and a more detailed explanation on the front page.

Informed consent

Written informed consent was obtained from all participants included in the study.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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