Atencion Primaria 58 (2026) 103414

Atención Primaria

www.elsevier.es/ap

ORIGINAL ARTICLE

Association between smoking and chronic low back pain among medical students

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Received 26 August 2025; accepted 28 September 2025

KEYWORDS
Smoking;
Chronic low back pain;
Medical students

Abstract
Introduction: On account of their demanding academic environment chronic low back (CLBP) is a common musculoskeletal disorder among medical students, which is particularly worrying. Smoking is a risk factor that is known to cause various health issues, and has been associated with CLBP, but the specific relationship between smoking and chronic low back pain has still not been well explored.
Objective: This study aims to investigate the association between smoking and chronic low back pain among medical students in Iraq.
Design: A descriptive cross-sectional design was employed, involving face-to-face interviews with 200 medical students aged 18 years and older. Data were collected on the demographic characteristics, smoking behaviors, and chronic pain experiences, using a pre-designed questionnaire. Statistical analysis was performed using SPSS (version 25) and employing chi-square tests to assess the association between the smoking status and chronic low back pain.
Site: Baghdad University, College of Medicine.
Participants: Two hundred medical students aged 18 years and older.
Interventions: No intervention.
Main measurements: Demographic characteristics, smoking behaviors, and chronic pain experiences.
Results: A significant proportion of students (51%) reported smoking currently, with cigarettes being the most commonly used product. The prevalence of CLBP was 64%, with an average pain severity of 4.6 ($\pm$1.61). Notably, among smokers, 81 individuals reported experiencing CLBP compared to 47 non-smokers ($p = 0.0001$), indicating a strong association between smoking and the presence of CLBP.

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https://doi.org/10.1016/j.aprim.2025.103414

Conclusion: The findings highlight a significant association between smoking and CLBP among medical students, emphasizing the need for targeted interventions to address smoking cessation and the prevention of CLBP in this high-risk population. Further research is warranted to explore the underlying mechanisms and develop effective strategies for improving student health and well-being.

PALABRAS CLAVE
Tabaquismo;
Dolor lumbar crónico;
Estudiantes de medicina

Asociación entre el tabaquismo y el dolor lumbar crónico en estudiantes de medicina

Resumen Introducción Debido a su exigente entorno académico, el dolor lumbar crónico (DLC) es un trastorno musculoesquelético común entre los estudiantes de medicina, lo cual es particularmente preocupante. El tabaquismo es un factor de riesgo conocido por causar diversos problemas de salud y se ha asociado con el DLC, pero la relación específica entre el tabaquismo y el DLC aún no ha sido bien explorada.
Objetivo: Este estudio tiene como objetivo investigar la asociación entre el tabaquismo y el DLC en estudiantes de medicina en Irak.
Diseño: Se empleó un diseño descriptivo transversal que involucró entrevistas cara a cara con 200 estudiantes de medicina de 18 años o más. Los datos sobre características demográficas, comportamientos de tabaquismo y experiencias de dolor crónico se recopilaron mediante un cuestionario prediseñado. El análisis estadístico se realizó utilizando SPSS® (versión 25) y se emplearon pruebas de Chi-cuadrado para evaluar la asociación entre el estado de tabaquismo y el DLC.
Lugar: Universidad de Bagdad, Facultad de Medicina.
Participantes: Doscientos estudiantes de medicina de 18 años o más.
Intervenciones: No hubo intervención.
Principales mediciones: Características demográficas, comportamientos de tabaquismo y experiencias de dolor crónico.
Resultados: Una proporción significativa de estudiantes (51%) reportó fumar actualmente, siendo los cigarrillos el producto más comúnmente utilizado. La prevalencia de DLC fue del 64%, con una severidad promedio del dolor de 4,6 (±1,61). Notablemente, entre los fumadores, 81 individuos reportaron experimentar DLC en comparación con 47 no fumadores (p = 0,0001), lo que indica una fuerte asociación entre el tabaquismo y la presencia de DLC.
Conclusión: Los hallazgos resaltan una asociación significativa entre el tabaquismo y el DLC en estudiantes de medicina, enfatizando la necesidad de intervenciones dirigidas para abordar la cesación tabáquica y la prevención del DLC en esta población de alto riesgo. Se justifica una mayor investigación para explorar los mecanismos subyacentes y desarrollar estrategias efectivas para mejorar la salud y el bienestar de los estudiantes.

Introduction

Chronic low back pain (CLBP) is a prevalent musculoskeletal condition that affects a significant proportion of the global population. It is one of the leading causes of disability, with substantial impacts on the quality of life, productivity, and healthcare utilization.[1] Among medical students, the occurrence of CLBP is particularly concerning due to their demanding academic environment, which often involves prolonged periods of sitting, stress, and irregular physical activity. Additionally, smoking, a well-known health risk factor, has been identified as a potential contributor to the development and persistence of CLBP.[2] This study aims to explore the association between smoking and CLBP among medical students.

Chronic low back pain

Chronic low back pain is typically defined as pain that persists for 12 weeks or longer, even after the initial injury or the underlying cause has been treated.[3] It can significantly interfere with daily activities and may lead to long-term physical and psychological consequences. Although CLBP affects individuals of all ages, medical students may be particularly vulnerable due to the physical and mental demands of their studies. The sedentary lifestyle often associated with intense academic work, coupled with stress and lack of proper ergonomics, increases the risk of developing CLBP.[4] Understanding the contributing factors, including lifestyle behaviors, such as smoking, is essential for developing effective prevention strategies.

Smoking and its health impacts

Smoking is a major public health issue and a well-established risk factor for a wide range of diseases, including cardiovascular disease, respiratory illnesses, and cancer.[5] However, smoking has also been implicated in musculoskeletal disorders, including CLBP.[6] Nicotine and other harmful substances in tobacco can impair blood flow to the vertebral discs, leading to disc degeneration and an increased risk of back pain.[7] Additionally, smoking has been associated with increased pain perception, which may exacerbate the experience of CLBP.[8] Despite the widespread knowledge of smoking's adverse effects, it remains prevalent among medical students, who are often under high levels of stress, potentially using smoking as a coping mechanism.[9]

Association between smoking and chronic low back pain

The relationship between smoking and CLBP has been the subject of numerous studies, with many indicating a positive association between the two. Smoking is thought to contribute to CLBP through several mechanisms. First, the reduction in blood supply to the spinal tissues, as smoking may lead to hypoxia and degeneration of the intervertebral discs.[10] Second, smoking has been linked to a pro-inflammatory state, which can exacerbate pain and delay recovery from musculoskeletal injuries.[11] Finally, lifestyle factors associated with smoking, such as, lower physical activity levels and poor posture, may further contribute to the risk of developing CLBP.[12]

Medical students represent a distinct group for examining this association, as they often experience significant academic stress, having limited time for physical activity, and may adopt unhealthy coping mechanisms, such as smoking.[13] Investigating the link between smoking and CLBP in this group could provide valuable insights into prevention and intervention efforts, particularly in promoting healthy lifestyle habits among future healthcare professionals.

Rationale for the study

The prevalence of both smoking and CLBP among medical students is a growing concern. Understanding the factors that contribute to CLBP in this population is crucial, as it can affect their academic performance, mental health, and future careers in the healthcare field.[14] Even as previous research has established a general association between smoking and musculoskeletal pain, there is limited data that specifically examines this relationship among medical students. By exploring this association, this study aims to provide evidence that can guide the development of targeted interventions to reduce both smoking rates and the incidence of CLBP in this population.

Research objectives

This study seeks to explore the relationship between smoking and CLBP among medical students, with the following specific objectives:

1. To assess the prevalence of smoking and CLBP among medical students.
2. To investigate the association between smoking and the severity of CLBP.

Materials and methods

Study design

This study employs a descriptive cross-sectional design to investigate the association between smoking habits and CLBP among Iraqi medical students. Data were collected through face-to-face interviews, by direct interviewing of all students studying in Baghdad College of Medicine accepting to give comprehensive information on their smoking behaviors, chronic lower back pain experiences, and various demographic and lifestyle factors. The students have the right to accept or decline giving their information and they are informed about their right to withdraw from the study at any time and that their personal information collected is confidential. The selection of the students was random, no intended predilection of any student with a symptom or demographic and lifestyle factors.

Study population

The study involves medical students enrolled in Baghdad College of Medicine in Iraq, from first to sixth year of medical study selected randomly without intended predilection of any study year or student sex or age or social or demographic factor.

Inclusion criteria

- Medical students aged 18 years and older.
- Students currently enrolled in the medical program.
- Students willing to provide informed consent for participation.

Exclusion criteria

- Students with pre-existing chronic conditions unrelated to smoking or chronic lower back pain, for example depression, rheumatoid arthritis, inflammatory bowel disease, end stage renal diseases, etc.

Sampling technique

Medical students were approached randomly during their classes and in common areas within the medical institution. Those who met the inclusion criteria and provided informed consent were included in the study.

Sample size

The sample size consisted of 200 medical students. The sample size was determined based on the availability of students during the data collection period and was designed to ensure sufficient power for statistical analysis.

Data collection

Data collection occurred through structured face-to-face interviews conducted by trained researchers. A pre-designed questionnaire was utilized to gather the following information:

1. *Demographic characteristics*: Age, year of study, sex, and smoking status.
2. *Smoking details*: Current smoking habits, type of smoking products used (cigarettes, vaping, cigars, hookah), frequency of use, and attempts to quit smoking.
3. *Chronic pain assessment*: Presence of chronic lower back pain, severity of pain (measured on a scale from 0 to 10), duration of pain, frequency of pain during daily activities, and interference with daily activities.
4. *Other lifestyle factors*: Hours spent sitting per day, regular physical exercise, frequency of exercise per week, and family history of chronic lower back pain (CLBP).

The questionnaire was administered in Arabic, the participants' native language, and responses were recorded by trained interviewers.

Data analysis

Data were analyzed using the IBM SPSS Statistics software (version 25). Descriptive statistics, including frequencies, percentages, means, and standard deviations were calculated, to summarize demographic characteristics, smoking behaviors, and chronic pain details.

For inferential statistics, chi-square tests were employed to assess the association between smoking status and CLBP. The strength of the association between various factors (such as hours spent sitting, exercise frequency, and family history) and CLBP was also evaluated. A p-value of less than 0.05 was considered statistically significant.

Results

Demographic characteristics

Table 1 provides a summary of demographic characteristics for a group of medical students.

The average age of the students is 21.64 years, with a standard deviation of 1.6 years, indicating a relatively young population.

When looking at the year in medical studies, the distribution was as follows: five students (2.5%) were in their first year, 21 students (10.5%) were in their second year, and 43 students each (21.5%) were in their third and fourth years. There were 19 students (9.5%) in their fifth year, while the largest group, composed of 69 students (34.5%), was from the sixth year.

In terms of gender, the population was almost evenly split, with 95 students identified as female (47.5%) and 105 identified as male (52.5%).

Table 1 Demographic characteristics of medical students.

Variables	Count	Percent
Age	21.64 ± 1.6	
Year in medical studies		
1st year	5	2.5%
2nd year	21	10.5%
3rd year	43	21.5%
4th year	43	21.5%
5th year	19	9.5%
6th year	69	34.5%
Sex		
Female	95	47.5%
Male	105	52.5%

Table 2 Smoking details among medical students.

	Count	Percent
Currently smoking		
No	99	49%
Yes	101	51%
Type of smoking products used		
Cigarettes	34	17%
Vaping	23	12%
Cigarettes and vaping	13	7%
Cigarettes, vaping, and hookah (shisha)	10	5%
Cigarettes and hookah (shisha)	6	3%
Cigarettes, cigars and vaping	4	2%
Vaping and hookah (shisha)	2	1%
Cigarettes per day		
1–5 times	37	19%
6–10 times	14	7%
11–15 times	12	6%
16–20 times	3	2%
More than 20	3	2%
Frequency of vaping per day		
Less than once	4	2%
1–3 times	24	12%
4–6 times	22	11%
7–9 times	10	5%
More than 10 times	6	3%
Years of smoking		
Less than one year	21	11%
1–2 years	38	19%
3–5 years	38	19%
6–10 years	4	2%
More than 10 years	1	1%
Tried to quit smoking		
No	32	16%
Yes	69	35%

Smoking details

Table 2 summarizes smoking behaviors among participants. Half of them (51%) are current smokers, while 49% do not smoke. Cigarettes are the most common product used, with

Table 3 Chronic pain details among medical students.

Variables	Count	Percent
Chronic low back pain		
No	72	36%
Yes	128	64%
Severity of the chronic low back pain	4.616 ± 1.61	
Duration of the chronic low back pain		
Less than 6 months	55	28%
6–12 months	42	21%
1–2 years	17	9%
More than 2 years	14	7%
Frequency of the chronic low back pain with daily activities		
Once in the morning or less	2	1%
Daily	12	6%
Once a week	26	13%
Several time a week	30	15%
Once a month or less	16	8%
Several time a month	43	22%
Interference of the chronic low back pain with daily activities		
Not at all	23	12%
A little	67	34%
Moderately	36	18%
A lot	2	1%

17% smoking them exclusively, while others use combinations of cigarettes, vaping, cigars, and hookah. Vaping alone accounts for 12% of product use.

Cigarette consumption varies, with 19% smoking 1–5 times a day, while smaller percentages smoke more frequently. Vaping frequency shows a similar variation, with 12% vaping 1–3 times daily.

Most participants (38%) have been smoking for 1–5 years, with fewer smoking for longer periods. Of the smokers, 35% have tried to quit, while 16% have not attempted to quit.

Chronic pain details

Table 3 outlines the prevalence, severity, and impact of CLBP among the participants. A majority, 64%, experience CLBP, with an average reported severity of 4.6 (±1.61).

Regarding the duration of pain, 28% have been experiencing it for less than six months, while 21% have had it for 6–12 months. Nine percent have dealt with the pain for one to two years, and 7% for over two years.

The frequency of pain during daily activities varies: 22% report experiencing pain several times a month, 15% several times a week, and 13% once a week. Once a month or less pain is reported by 8%, 6% experiences it daily, while 1% experiences it once in the morning or less.

As for how the pain interferes with daily activities, 34% report it interferes ''a little,'' while 18% experience moderate interference. However, 12% say it does not interfere at all, and 1% experiences a lot of interference.

Table 4 Association between smoking and chronic low back pain among medical students.

Currently smoking	CLBP		*p*-Value
	No	Yes	
Non-smokers	52 (53%)	47 (47%)	0.0001
Smokers	20 (20%)	81 (80%)	

Association between smoking and chronic low back pain

Table 4 compares the relationship between smoking status and the presence of CLBP, and shows a significant association between the two. Among non-smokers, 52 individuals do not have CLBP, while 47 do. In contrast, among smokers, a much larger proportion – 81 individuals – experience CLBP, compared to only 20 who do not. The *p*-value of 0.0001 suggests that the difference between these groups is statistically significant, indicating a strong link between smoking and the presence of CLBP.

Other factors affecting chronic back pain

Table 5 shows data compares factors related to CLBP among individuals who do and do not experience this condition.

Hours spent sitting per day: Most respondents sit for varying durations. Those without chronic pain primarily sit for 4–6 h (21 individuals) and 6–8 h (29 individuals), while those with pain report higher numbers in these categories as well. The *p*-value of 0.12 indicates no significant association between sitting hours and CLBP.

Regular physical exercise: A higher number of individuals with chronic pain (66) do not exercise regularly compared to those without pain (44). However, more individuals without chronic pain (28) engage in regular exercise than those with chronic pain (62). The *p*-value of 0.193 suggests no significant relationship between exercise and CLBP.

Frequency of exercise per week: The data shows that most individuals exercise infrequently, with the highest participation in the ''4–6 times a week'' category (8 without pain vs. 30 with). The *p*-value of 0.234 indicates no significant correlation between exercise frequency and CLBP.

Family history of CLBP: There is a notable difference in family history; Seventy-eight individuals with chronic pain report no family history, while 50 with chronic pain do. The *p*-value of 0.002 suggests a strong association between family history and CLBP.

Discussion

In this study sample, there is a high prevalence of smoking habits among Iraqi medical students (51%); a finding is also present in another study done by Al-Kaabba et al.,[15] who found a high prevalence of smoking in Saudi medical students.

This finding may reflect the stress experienced by medical students and their lack of participation in anti-smoking initiatives, whether in the general population or within the

Table 5 Other factors affecting chronic back pain.

Variables	Chronic low back pain		*p*-Value
	No	Yes	
Hours spent sitting per day			
Less than 2 h	0 (0%)	5 (100%)	
2–4 h	12 (57%)	9 (43%)	
4–6 h	21 (34%)	41 (66%	0.12
6–8 h	29 (36%)	51 (64%)	
More than 8 h	10 (31%)	22 (69%)	
Regular physical exercise			
No	44 (40%)	66 (60%)	
Yes	28 (31%)	62 (69%)	0.193
Daily	2 (20%)	8 (80%)	
Frequency of exercise per week			
Once a week	8 (50%)	8 (50%)	
1–3 times a week	10 (38%)	16 (62%)	0.234
4–6 times a week	8 (73%)	3 (27%)	
Family history of chronic low back pain			
No	59 (43%)	78 (57%)	0.002
Yes	13 (21%)	50 (79%)	

college environment; both may be responsible for this unexpectedly high prevalence of smoking habits.

Also, there is a high prevalence of CLBP (64%) in medical students, a finding similar to the findings of Taha et al.,[16] who found a very high prevalence of chronic back pain in medical students in Saudi Arabia and related it mostly to sitting and stress.

In our study sample, the statistical analysis did not show a significant association with sitting, but a significant association with a family history of chronic backache.

Our study sample shows a statistically significant association between smoking and chronic low back pain; this finding was also shown by Shiri et al.,[17] who found a highly prevalent chronic backache in former and current smokers, in a meta-analysis study.

This study shows a highly prevalent smoking habit, a risky behavior in a young age group, which is associated with many short- and long-term health complications, one of which is CLBP. This revealed a statistically significant association with smoking in this study sample.

Training medical students in good reading habits, anti-stress activities, encouraging regular healthy exercise, and establishing effective programs to assist in quitting smoking, seem to be important steps to provide a healthier environment for medical students.

Conclusion

The study sample of medical students exhibited a high prevalence of smoking. Similarly, a high prevalence of chronic low back pain was observed within this population. Statistical analysis revealed a significant association between smoking behavior and the occurrence of chronic low back pain. This finding of high prevalence of smoking in this young age population with its association with chronic low back pain among them underscores the importance of tailored strategies aimed at increasing physical activity, and anti-smoking activities. Adopting these measures may ease the impact of low back pain and enhance the overall well-being and quality of life of medical students.

Recommendations

Conducting further studies, including more students from other universities, for further evaluation of the problem. Training medical students in good reading habits, anti-stress activities, encouraging regular healthy exercise, and establishing effective programs to assist in quitting smoking, seem to be important steps to provide a healthier environment for medical students.

CRediT authorship contribution statement

Amar Kasim: Writing – review & editing, Methodology, Conceptualization.

Zahraa Muhammed: Writing – review & editing, Formal analysis.

Safa Ibrahim: Writing – review & editing, Writing – original draft, Data curation.

Maryam Loay: Writing – review &editing.

All authors participate in drafting the article and revising it critically for important intellectual content.

All authors approve the final version of the manuscript that is to be published.

All authors take public responsibility for the work and must ensure that they would respond to the questions regarding accuracy and integrity of the work.

Ethical statement

Informed consent in this study was obtained for the collection and publication of clinical outcomes by human subjects. The privacy right of human subjects in this study was meticulously observed. Ethical approval was taken from University of Baghdad/College of Medicine, Institutional Review Board issue number 1 in 6/3/2024.

Funding

No source of funding, authors self-funds their work.

Conflict of interest

All authors have no any financial and personal relationships with other people or organizations that could inappropriately influence (bias) our work.

Acknowledgements

To medical students participate in this study.

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