

Original Article

Smoking habits and quality of life of medical students at a university in the Center-West of Brazil

Hábito de fumar e a qualidade de vida de estudantes de medicina de uma universidade no Centro-oeste do Brasil

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ABSTRACT

Alcohol and tobacco are the most commonly consumed substances by young university students. The industry understands that this group will form an important consumer market in the future. Among university students, especially in the health field, the reasons for consumption are curiosity and social acceptance to make new friends at college, in addition to the anxiety and stress that academic life brings. To evaluate the smoking habit and quality of life of medical students at a university in the Midwest of Brazil. This is an observational, cross-sectional, quantitative study. An electronic questionnaire in Google Forms containing 30 questions and the Medical Outcomes Study 36-item Short-Form Health Survey (SF-36) questionnaire were applied to medical students at the Evangelical University of Goiás – UniEVANGÉLICA. Results: 298 participants, 72.1% women and 27.9% men, aged between 21-30 years, white skin color, and single marital status. Regarding smoking habits, 43.9% had tried some type of tobacco at least once, and of these, 44.3% declared themselves as non-smokers. The average age of smoking initiation was 18.3 years (± 1.9), ranging from 15 to 24 years. Among the types of tobacco, marijuana was cited by 58% of the 131 reports of types of items smoked. The SF-36 indicated that the vitality domain had the lowest average (51.2 ± 18.9); and the functional capacity domain had the highest (90.6 ± 13.4). Most participants had tried some type of tobacco at least once. Being between the ages of 17 and 20 is a risk factor that may influence the experimentation of tobacco. And, when we talk about tobacco, we include, in addition to cigarettes, the various forms, such as electronic cigarettes and hookah. The university represents an educational support environment and must act to provide examples of healthy habits.

RESUMO

O álcool e o fumo são as substâncias mais consumidas pelos jovens universitários. A indústria entende que esse público forma um importante mercado consumista no futuro. Entre os universitários, principalmente da área da saúde, os motivos de consumo são a curiosidade e aceitação social para fazer novos amigos na faculdade, além da ansiedade e estresse que a vida acadêmica proporciona. Avaliar o hábito de fumar e a qualidade de vida de estudantes de medicina de uma universidade no Centro-oeste do Brasil. Trata-se de um estudo observacional,

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Palavras-chave:
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transversal quantitativo. Um questionário eletrônico no *Google Forms* contendo 30 questões e o questionário *Medical Outcomes Study 36-item Short-Form Health Survey (SF-36)*, foram aplicados aos estudantes de medicina da Universidade Evangélica de Goiás – UniEVANGÉLICA. Resultados: 298 participantes, 72,1% mulheres e 27,9% homens, com faixa etária entre 21-30 anos, cor da pele branca, e estado civil solteiro. Sobre o hábito de fumar 43,9% experimentou ao menos uma vez algum tipo de fumo, sendo que destes 44,3% participantes se declararam como não fumantes. A média de idade de iniciação ao tabagismo foi de 18,3 anos ($\pm 1,9$), variando entre 15 e 24 anos. Entre os tipos de fumo a maconha foi citada por 58% dos 131 relatos de tipos de itens fumados. O SF-36 indicou que o domínio vitalidade apresentou menor média ($51,2 \pm 18,9$); e o domínio capacidade funcional a maior ($90,6 \pm 13,4$). A maioria dos participantes experimentou ao menos uma vez algum tipo de fumo. Estar na faixa etária entre 17 e 20 anos é um fator de risco que pode influenciar em experimentar o tabaco. E, quando se fala em tabaco, inclui além do cigarro as diversas formas, como o cigarro eletrônico e o narguilé. A universidade representa um ambiente de suporte educativo e deve agir no sentido de proporcionar exemplos de hábitos saudáveis.

INTRODUCTION

There are records of smoking habits dating back to the early days of humanity. In the 21st century, in addition to cigarettes, other products like hookah and electronic cigarettes (vape, pod, e-cigarette, e-ciggy, e-pipe, e-cigar, heat not burn, among others) have taken the place of cigarette packs freely sold in various locations^{1,2}. The tobacco industry views young people as “apprentices” and future consumers³. Modern society dictates that young people integrate into the high-tech world, with a strong consumerist appeal for brands and products, thereby globalizing customs and trends⁴. Home exposure to cigarettes, within the family environment, at school, and the influence of friends are significant factors associated with tobacco use among youth^{5,6}. Additionally, 90% of smokers started the habit before the age of 19, with issues detected in children and adolescent smokers (such as aggressive and shy behavior disorders) as well as in passive smokers⁷.

Tobacco derivatives can be used in forms such as inhalation (smoking), snuffing (snuff), and chewing (roll tobacco), all of which are harmful to health, as are other similar products, like Cannabis cigarettes (marijuana)⁸. Another danger lies in the consumption of flavored cigarettes, “Bali ciga-

rettes,” or Gudang Garam, as well as electronic cigarettes⁹. The eugenol present has an anesthetic effect, allowing users to take deep puffs of smoke with a sensation of gentle freshness filling the lungs¹⁰. Users end up smoking extremely strong cigarettes, repeatedly throughout the day, due to the deceptive effect of eugenol³.

The National Tobacco Control Program of the Ministry of Health projects that, by 2025, 10 million individuals may die from diseases caused by smoking habits¹¹. Alcohol and tobacco are the substances most consumed by university students, raising concerns not only among health institutions but also among all who value health¹². Given this context, the present study evaluated smoking habits and the quality of life of medical students at a university in the Midwest of Brazil.

MATERIALS AND METHODS

This was an observational study with a quantitative cross-sectional design. The study population consisted of medical students from the Evangelical University of Goiás – UniEVANGÉLICA (Anápolis – GO), who were recruited voluntarily through an electronic communication invitation (cellular messaging app – WhatsApp).

Volunteers validated their participation by signing an Electronic Free and Informed Consent Form (e-TCLE), and all data collection was conducted through the online platform Google Forms. The study was approved by the Research Ethics Committee of UniEVANGÉLICA (Ethics Certificate of Presentation for Ethical Consideration (CAAE) 30746020.2.0000.5076, Opinion No. 4.600.963, March 19, 2021).

For sample power calculation, 766 medical students enrolled from the 1st to the 8th semester in 2020 were considered. The calculation was conducted using G-Power software (version 3.0), based on the data analysis to be performed (association between categorical variables) with a set power of 95%, a medium effect size of 0.3, a 5% significance level, and a 20% sample loss, necessitating a sample size of 296 students. Students were randomly selected, with at least 37 students chosen from each of the eight semesters through a draw, based on the attendance lists of enrolled students in each class.

An electronic questionnaire was developed on Google Forms (<https://forms.gle/n5EMrxZULFRv74Dn9>) containing 30 questions about sociodemographic data and smoking habits. To assess quality of life, the Medical Outcomes Study 36-item Short-Form Health Survey (SF-36) was used, which is a 36-question questionnaire translated and validated into Portuguese¹³. Data analysis for the SF-36 was conducted according to the instrument's instructions, with scores ranging from 0 to 100 for each of the eight dimensions assessed: functional capacity (10 items); physical aspects (4 items); pain (2 items); general health status (5 items); vitality (4 items); social aspects (2 items); emotional aspects (3 items); and mental health (5 items), as well as two summary measures – physical component (CoF) and mental component (CoM). After this initial phase of data weighting, a second phase calculated the Raw Scale. The question values were converted to scores for each of the eight domains, which range from zero (worst health state) to 100 (best health state) for each domain. After obtaining the quality

of life (QoL) data for each participant, the averages for the analyzed dimensions were calculated.

Medical students, officially enrolled in the course, of both sexes, and of legal age, were included as study participants. Incomplete questionnaires, submissions by minors, or those containing any personal identification were excluded from the analyses. All data were collected in 2021.

All information was tabulated in a Microsoft Excel® spreadsheet and subsequently analyzed using the Statistical Package for Social Sciences (SPSS®) software. Calculations included descriptive statistics (absolute and relative frequencies, mean, standard deviation (\pm), minimum and maximum values, and confidence intervals). The Chi-square test was used to compare prevalence. Students who reported no smoking habits were considered the control group and were used in comparison across analyzed variables. For the SF-36 statistical analysis, a value $\leq 50\%$ was considered as a compromised quality of life domain, while $>50\%$ was considered a good quality of life domain. Data normality was tested using the Kolmogorov-Smirnov test, and analysis of variance (ANOVA) was used to compare mean scores of QoL domains across variables.

This manuscript was translated with the assistance of ChatGPT, an AI language model developed by OpenAI.

RESULTS AND DISCUSSION

At the end of the electronic questionnaire period, 314 participants were obtained. However, 16 were excluded from the sample group for being underage. This left 298 fully completed questionnaires, with 72.1% female and 27.9% male participants. Sociodemographic data indicated that the most prevalent age range was 21-30 years, the most frequently self-reported skin color was white, and the majority were single (**Table 1**).

Most (31.9%) of the students who participated in the survey started medical school in 2018. The participating students were stratified

according to their enrolled semester into two cycles: the basic cycle, which includes the 1st to 4th semesters, and the clinical cycle, which includes the 5th to 8th semesters of the medical program. A total of 53.2% of students were from the clinical cycle, while 46.8% were from the basic cycle. Additionally, in the analysis regarding relocation for studies, 67.8% of students had to move to Anápolis, Goiás, to attend medical school, with 5.4% of these students coming from other states.

Given that UniEVANGÉLICA is located in Anápolis, the third-largest city in the state of Goiás, a significant portion of students relocated from the state capital, Goiânia, to study and live in Anápolis. However, there were also students from other cities within Goiás and other Brazilian states who moved to Anápolis. In the section of the questionnaire that analyzed smoking habits, 17.8% of students reported that they smoke, and 6.7% identified as former smokers. The average age of smoking initiation was 18.3 years (± 1.9), ranging from 15 to 24 years (**Table 2**).

In the analyses of smoking habits, 43.9% of the total participants (131/298) reported having tried some form of smoking at least once, with 58 of these participants identifying themselves as non-smokers. Among the types of smoking, marijuana was cited by 58% of these 131 reports. Based on these data, the students were subdivided into a smoker group (73), which included those who identified as former smokers, and a non-smoker group (225) for comparison purposes (**Table 3**). Significant differences were found when comparing students who identified as smokers with non-smokers.

When asked how many times they smoke per day, 10% responded that they smoke three times a day, and 14% smoke once a day. Regarding the quantity smoked, assuming a regular pack contains 20 cigarettes, 16.4% reported smoking more than one pack per day. Students were also asked about the feelings they internalize while smoking. In this item, participants could select more than one feeling, and the observed results are presented in **Table 4**.

Another section addressed health and covered four topics (**Figure 1**). The first item asked participants how they would rate their health status over the past month, with the majority considering themselves to be in good health (45.6%). In the item about current health status (on the day the questionnaire was answered), 46.3% reported being in good health. Of the total participants, 15% had been ill in the previous month, and 41.1% were using some type of medication.

The results of the Medical Outcomes Study 36-item Short-Form Health Survey (SF-36), which assesses quality of life, are presented in **Table 5**. In this questionnaire, the questions refer to the last four weeks. Thus, for physical and mental components, the minimum and maximum expected limits were used for the worst (score = 0) and best (score = 100) states, without categorizing those who selected other options. Based on the current study, the response rate to the SF-36 was 100%.

For each domain, the mean and standard deviation were calculated, and the results are described in **Table 6**. In applying the quality of life (QoL) assessment instrument, the SF-36 scores indicate that the “functional capacity” domain had the highest mean, while the “vitality” domain was the most affected, with the lowest mean. The means and standard deviations of the SF-36 domain scores for both smoking and non-smoking student groups are also presented in **Table 6**. There was no significant difference between the groups. Among smokers, the “emotional aspects” domain scored the lowest, whereas among non-smokers, the “vitality” domain was the lowest.

The Pan American Health Organization, along with the World Health Organization, considers smoking to be a global public health issue¹⁴. The consumption of cigarettes, of all types, remains prevalent among Brazilian youth, driven both by nicotine dependence and social interactions, with the university setting being a place of socialization and marked by frequent social interactions and exchange of experiences.

In the present study, a smoking rate of 43.9% was observed among medical students. Similar stud-

Table 1 - Sociodemographic distribution of medical students.

Sexo	% (n)
Female	72,1 (215)
Male	27,9 (83)
Age Range	% (n)
18 - 20 years	31,9 (95)
21 - 30 years	67,4 (201)
31 years or older	0,7 (02)
Skin Color	% (n)
White	76,8 (229)
Mixed race	20,1 (60)
Black	2,3 (07)
Asian	0,8 (02)
Marital Status	% (n)
Single	55,0 (164)
Dating	43,0 (128)
Married	1,3 (04)
Stable relationship	0,7 (02)

Table 2 - Distribution of students according to smoking habits.

Smoking Habit	% (n)
Yes	17,8 (53)
Former smoker	6,7 (20)
No	75,5 (225)
Age of Initiation	% (n)
Before 18 years	37,0 (27)
Between 18 and 20 years	45,2 (33)
21 years or older	17,8 (13)
Family Member Who Smokes	% (n)
Yes	43,9 (131)
No	56,1 (167)
Lives with a Smoker	% (n)
Yes	27,9 (83)
No	72,1 (215)
Influenced by Another Person to Smoke	% (n)
Yes	15,8 (47)
No	84,2 (251)

ies conducted among university students at other universities in Brazil show variation in this rate: 10.1% at the Federal University of Pelotas¹⁵; 18.6% at the Lutheran University of Brazil¹⁶; 14% at the Medical School of the Fluminense Federal University¹⁷; 16.5% at the University of Passo Fundo¹⁸; and 8.1% at the Federal University of Acre¹⁹.

The study by Silva et al. (2020)²³, involving 400 medical students from the same population/university as the present study, showed that 32% of them smoke. Of this total, 6.25% smoke almost

daily, and 17.7% smoke only occasionally, corroborating the findings of the present study. Alves et al. (2023)²¹ analyzed 196 medical students at the University of Rio Verde (UniRV), also located in the Brazilian Midwest, and found that 37.2% of students smoke. Despite the high consumption rate, 90.9% of them do not consider themselves dependent. In this population, 34.6% of users are men aged 23 to 26, are in their first year of study, and the majority do not study medicine in their home city²¹.

Table 3 - Comparison between smoking and non-smoking medical students.

Gender	Smoker % (n)	Non-Smoker % (n)	
Female	58,9 (43)	76,4 (172)	p < 0,0001
Male	41,4 (30)	23,6 (53)	
Type*	% (n)	% (n)	
Regular cigarette	41,0 (30)	8,4 (19)	p < 0,0001
Hand-rolled cigarette	71,2 (52)	17,7 (40)	
Electronic cigarette	75,3 (55)	19,5 (44)	
Hookah	80,8 (59)	20,8 (47)	
Marijuana cigarette	65,7 (48)	12,4 (28)	

* In this specific questionnaire item, participants could select more than one option.

p - Chi-square Test

Table 4 - Distribution of internalized feelings while smoking.

Feelings While Smoking	% (n)
Felt good	78,5 (234)
Felt free	37,2 (111)
Happiness	16,4 (49)
Emotional weaknesses	13 (39)
Sadness	9,7 (29)
Loneliness	6,4 (19)
Feelings After Smoking	% (n)
Need to consume alcohol	27,5 (82)
Thirst	26,2 (78)
Desire to smoke with another person	23,5 (70)

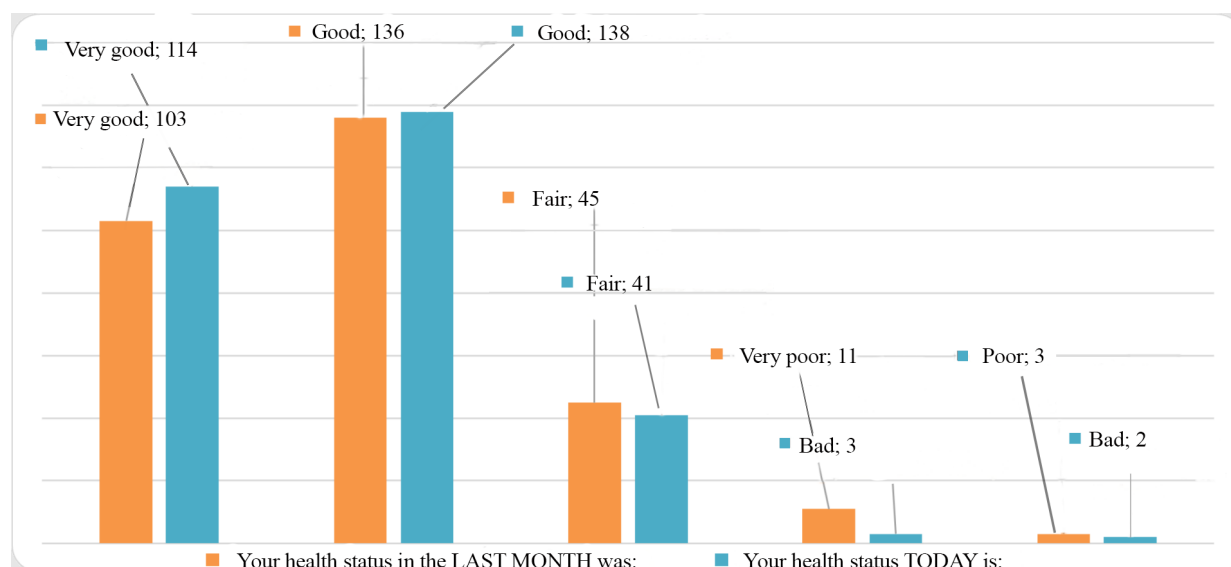


Figure 1. Analysis of Medical Students' Health.

Other studies analyze the prevalence of this harmful health habit in different populations, with many confirming that this habit has increased among university students, especially those in health fields, including medicine. Nicotine, a substance found in all tobacco derivatives, is a drug that leads to dependence, and it is considered psychoactive, causing a pleasurable sensation that can

lead to abuse and dependence²².

The study by Sirqueira et al. (2020)²³ analyzed 281 medical students from Tiradentes University in Aracaju, SE. Of this total, 32% reported having used tobacco derivatives, with 56.7% being occasional smokers and 2.2% daily smokers. Scapim et al. (2021)²⁴ analyzed 556 medical students from a public university in Bahia, observing

Table 5 - Results of SF-36 Analysis.

Quality of Life Data	
1. In general, would you say your health is:	% (n)
Excellent	21,1 (63)
Poor	2,7 (08)
2. Compared to one year ago, how would you rate your health today?	% (n)
Much better now than a year ago	22,1 (66)
Much worse now than a year ago	2,1 (06)
3. Due to your health today, do you have any difficulty doing activities?	% (n)
Does not limit me at all	26,8 (80)
Yes, limits me a lot	2,7 (08)
4. During the past 4 weeks, have you had any problems with any regular daily activity or at work/school due to your physical health?	% (n)
No	82,9 (247)
Yes	17,1 (51)
5. During the past 4 weeks, have you had any problems with your work/school or other regular daily activity due to an emotional problem?	% (n)

No	53,3 (159)
Yes	46,7 (139)
6. During the past 4 weeks, how much did your physical health or emotional problems interfere with your normal social activities, with family, neighbors, friends, or in groups?	% (n)
Not at all	37,2 (111)
Extremely	2,3 (07)
7. How much bodily pain have you had during the past 4 weeks?	% (n)
None	29,9 (89)
Severe*	3,7 (11)
(*there was no "very severe" response)	
8. During the past 4 weeks, how much did pain interfere with your normal work?	% (n)
Not at all	29,9 (89)
Extremely	0,3 (1)
9a. How often have you felt full of vigor, willpower, and strength?	% (n)
Never	2,7 (08)
All the time	3,3 (10)
9b. How often have you felt very nervous?	% (n)
Never	5,4 (16)
All the time	3,7 (11)
9c. How often have you felt so depressed that nothing could cheer you up?	% (n)
Never	31,9 (95)
All the time	0,3 (01)
9d. How often have you felt calm or peaceful?	% (n)
Never	3,3 (10)
All the time	1,3 (04)
9e. How often have you felt full of energy?	% (n)
Never	4,0 (12)
All the time	3,7 (11)
9f. How often have you felt downhearted and low?	% (n)
Never	12,1 (36)
All the time	2,7 (08)
9g. How often have you felt exhausted?	% (n)
Never	12,7 (38)
All the time	6,7 (20)
9h. How often have you felt a happy person?	% (n)
Never	14,8 (44)
All the time	1,7 (05)
9i. How often have you felt tired?	% (n)

Never	1,7 (05)
All the time	8,4 (25)
10. During the past 4 weeks, how much of the time did your physical health or emotional problems interfere with your social activities?	
None of the time	42,6 (127)
All of the time	2,3 (07)
11. How true or false is each of the following statements for you?	
a. I seem to get sick a little easier than other people	
Definitely false	48,0 (143)
Definitely true	4,0 (12)
b. I am as healthy as anybody I know	
Definitely false	32,2 (96)
Definitely true	5,7 (17)
c. I expect my health to get worse	
Definitely false	44,6 (133)
Definitely true	5,0 (15)
d. My health is excellent	
Definitely false	25,5 (76)
Definitely true	4,4 (13)

a 4.8% prevalence of smoking, with males being the primary consumers (6%).

The study by Staedele et al. (2021)²⁵, which analyzed 299 medical students from the Regional University of Blumenau-SC, found that 45.48% reported having used tobacco derivatives at least once in their lifetime. However, 52.51% stated that they had never used and had no interest in using, 37.36% confirmed having used it at some point, and 5.02% reported habitual use. Comparing genders, 46.30% of males had used tobacco in the past 3 months, compared to 19.37% of females. The authors also noted that individuals diagnosed with clinical depression had a higher association with tobacco derivative use²⁵.

As observed in the present study, students reported experiencing sensations of freedom, happiness, and, conversely, feelings of sadness while smoking. When inhaled, nicotine causes changes in the central nervous system, altering the emotional and behavioral state of the individual²⁵.

Shortly after its effect on the brain, several substances responsible for stimulating pleasurable sensations are released, explaining the positive feelings smokers experience when smoking²⁶. After smoking, students described the effects of these emotions, such as the desire to smoke with another person.

Places like bars and parties are the main settings where self-identified non-smokers are likely to try some form of cigarette, even with laws prohibiting smoking in both closed and open spaces. Among those university students who declared themselves non-smokers but said they smoke some type of cigarette only at parties or with friends, this is often how an addiction—and a future chronic disease, such as smoking addiction—begins¹⁸. Even if occasional, smoking is a practice that carries risks. One risk is that the “weekend smoker” may eventually become a regular smoker.

There is no such thing as a “social smoker,” someone who smokes only on specific occasions.

Table 6 - Distribution of SF-36 Analysis Between Smoking and Non-Smoking Students.

DOMAINS	SMOKER	NON-SMOKER	TOTAL	p
Functional Capacity	89,9 ± 14,9	90,9 ± 13,0	90,6 ± 13,4	0,8
Physical Aspects	80,5 ± 31,8	81,1 ± 32,0	81,0 ± 31,9	0,9
Pain	53,2 ± 5,7	51,7 ± 6,0	52,0 ± 6,0	0,6
General Health Status	68,6 ± 18,6	74,7 ± 17,5	73,3 ± 18,0	0,1
Vitality	50,8 ± 17,8	51,3 ± 19,3	51,2 ± 18,9	0,1
Social Aspects	51,2 ± 14,5	51,5 ± 12,9	51,4 ± 13,3	0,5
Emotional Aspects	49,3 ± 42,3	54,9 ± 43,8	53,6 ± 43,5	0,8
Mental Health	62,0 ± 18,6	62,4 ± 18,5	62,3 ± 18,5	0,1

Mean ± standard deviation; p'ANOVA

There is no “safe” level of nicotine consumption. If a person smokes every weekend, within a few months, they will have reached the equivalent level of a regular smoker due to increased frequency³. The greater the exposure to tobacco, the higher the risk of developing any disease associated with smoking.

Additionally, many associate smoking with alcohol consumption. Alcohol initially acts as a stimulant, but soon after, it begins to depress the central nervous system, while nicotine consistently acts as a stimulant. The combination of alcohol and nicotine produces a sense of balance in the level of consciousness. Alcohol reduces the duration of nicotine's effects, leading to increased tobacco consumption^{24,26}. Consequently, this mixture raises the likelihood of diseases related to both tobacco and alcohol use. Again, the greater the exposure, the higher the risk.

Continuous inhalation of nicotine leads to neural adaptation, causing the brain to require increasingly larger doses to maintain the initial level of satisfaction, an effect known as tolerance. It is observed that over time, the smoker needs to consume more and more cigarettes. With dependence, the risk of developing non-communicable chronic diseases also increases, which can lead to disability and death²⁰.

Smoking is a significant cause of health deterioration. It is associated with the develop-

ment of a series of respiratory, cardiovascular, and neoplastic diseases. It is estimated that overall mortality is twice as high in smokers compared to non-smokers²⁶. Despite being an important risk factor whose elimination significantly impacts the reduction of morbidity and mortality, the data associated with the prevalence of smoking in the Brazilian population are inconsistent, even with numerous studies on this topic.

The VIGITEL conducted in 2023²⁷ found that the frequency of adults who smoke varied between 4.8% in Manaus and 13.8% in Porto Alegre. The highest frequencies of smokers among men were found in Curitiba (18.0%), Florianópolis (17.1%), and Campo Grande (16.9%); among women, in Porto Alegre (15.6%), Florianópolis (10.6%), and Rio de Janeiro (10.2%). In Goiânia, it was observed that 11.1% of the population smokes, with a frequency of 16.1% among men and 6.8% among women²⁷.

Among the types of cigarettes present in smoking habits, hookah is very popular among younger individuals. It is very common to use aromatizers and flavorings in tobacco, which makes the product more palatable, providing a pleasant taste during smoking sessions.²⁸ In the present study, 35.6% of participants said they smoke or have tried hookah (106/298). A specific study on the use of hookah by medical students in Goiânia identified 59.6% users of this type of smoking²⁹. Moreover, as reported by the authors, this fre-

quency was higher than that found among students of medical schools, such as in a medical course in São Paulo, which observed hookah experimentation rates of 47.32%.³⁰

This strategy by the tobacco industry of using scents and flavors reinforces smoking behavior and can attract new users, particularly younger ones, thereby promoting the spread of smoking devices³¹. Additionally, hookah has a unique characteristic: a single pipe is shared by several people simultaneously³². In the context of the COVID-19 pandemic, sharing a hookah mouthpiece with multiple people increases the risk of contracting the virus, among other diseases, due to contact with oral secretions⁸.

The act of sharing strengthens socialization, something especially attractive to young people seeking to “fit in.” After a 45-minute hookah session, plasma concentrations of nicotine, expired carbon monoxide, and heart rate increase, equating to inhaling 100 cigarettes and leading to higher exposure to heavy metals that are highly toxic and difficult to eliminate, such as cadmium³³. In this case, the culprit is not only the tobacco and its specific composition for this product but also the flavoring essences and charcoal used to heat the mixture³⁴.

Among the types of cigarettes, the electronic device is a mechanical-electronic device powered by a battery, containing a compartment for inserting a cartridge or refill of liquid nicotine, available in concentrations ranging from zero to 36 mg/mL or more in some cases. The atomizer heats and vaporizes the nicotine. During inhalation, the sensor activates, triggering the microprocessor responsible for powering both the battery and the LED light (a small light-emitting device) located at the tip of the device, simulating a burning ember during inhalation⁹.

These electronic smoking devices, created in 2003, have evolved through various versions: from single-use disposable devices; to refillable systems with liquid cartridges (primarily containing propylene glycol, glycerin, nicotine, and flavoring agents) in open or closed systems; heated tobacco

products, which use an electronic device with a tobacco refill; and “pod” systems, which contain nicotine salts and other substances diluted in liquid and resemble USB drives, among others⁷.

The use of electronic cigarettes has led to the development of a new disease known as EVALI (E-cigarette or Vaping product use-Associated Lung Injury), first described in 2019 in the United States²⁶. This electronic device-induced lung injury causes symptoms such as cough, shortness of breath, and hemoptysis. Vitamin E acetate, a sticky, oily chemical, acts as a thickening agent that suppresses physiological pulmonary surfactant mechanisms. This increases alveolar surface tension, resulting in dyspnea and other inflammatory processes in this tissue.

In the present study, 33.2% of participants reported smoking or having tried electronic cigarettes (99 out of 298 participants). This type of smoking device is becoming increasingly popular³¹. Like hookahs, vapers cause harm to the health of the smoker. Several cases of counterfeit e-liquids resulted in deaths among young users in the U.S. in 2019, due to a little-known “Lung Disease” (EVALI described above). The marketing, importation, and advertising of all types of electronic smoking devices are prohibited in Brazil, through the Collegiate Board Resolution of Anvisa: RDC No. 46, of August 28, 2009³⁵. This decision was based on the precautionary principle, due to the lack of scientific data proving the claims attributed to these products³. Despite this, the real effects of these products on users’ health are still not fully known, even though recent cases of deaths and respiratory diseases in the U.S. and Brazil associated with them have helped raise suspicions against electronic cigarettes³⁶.

Medical students, despite receiving technical information during their training about the harms of tobacco consumption, still show high rates of consumption of this and other drugs like alcohol³⁷. They use it as a “valve of escape” for academic and personal problems in the face of a stressful study routine. Factors such as moving away from their hometown to pursue their degree,

living alone, anxiety, and the existing competition in the academic environment end up interfering with the mental state of these students.

Among university students, especially in the health field, the reasons for tobacco consumption are imitation, curiosity, and social acceptance^{7, 38}. Students are aware of the harms caused by tobacco; however, they do not abandon the habit. Awareness-raising actions regarding tobacco use are relevant not only for their own health but also for public health, which will be served in the future by these professionals. In general, education still focuses on dependence and does not prioritize prevention, which is a deficiency in the qualification and training of professionals to face problems related to drug use. This gap needs to be addressed in the curriculum of undergraduate health programs.

Regarding the quality of life of medical students, the Medical Outcomes Study 36 – Item Short-Form Health Survey (SF-36) evaluates both the positive and negative aspects of health and well-being; it does not present specific concepts for a particular age, disease, or treatment group; it considers individuals' perceptions, encompassing the most representative aspects of their own health status and allowing comparisons between different groups of people. The SF-36 proposes a generic assessment, encompassing health in a broad sense, covering not only aspects related to the presence or absence of symptoms of dysfunctions or impairments but also aspects related to limitations that may interfere with the individual's well-being or hinder daily activities, in addition to positive aspects of health^{12, 39}.

Regarding the analyses of the quality of life of medical students, the domain with the lowest average was the vitality dimension among the surveyed students. This dimension assesses the level of energy and fatigue, and low scores indicate a constant feeling of tiredness and exhaustion. An average below 50 was observed in the study conducted with medical and nursing students in São Paulo⁴⁰, demonstrating a concern with the emotional aspect, especially among medical students.

It is believed that the low scores in this dimension are related to the fact that the medical course is full-time, which overloads students with activities specific to their degree, in addition to other extracurricular activities, leading them to fatigue and exhaustion.

Picanço Júnior et al. (2021)⁴¹ evaluated 112 medical students from the State University of Pará – UEPA, Santarém Campus. They observed that the most compromised domains were vitality in the basic cycle (39.1 ± 18.9) and clinical cycle (43.4 ± 18.3), and emotional aspects (33.8 ± 40.1 and 44.2 ± 44.3 , respectively). A significant statistical association was observed between physical aspects and poor sleep quality. Having a low quality of life index, specifically in the physical aspects domain, is related to an approximately 3.5 times higher chance of compromised sleep among basic cycle students. The best domain was Functional Capacity (80.0 ± 16.7 and 79.4 ± 19.2)⁴¹.

Spina et al. (2023)⁴⁰ analyzed 171 medical students from a private university in the interior of São Paulo. The lowest scores were observed in the domains of Vitality (43.68 ± 19.79) and Emotional Aspects (31.96 ± 39.61). The best domain was Functional Capacity (90.08 ± 14.01). The authors emphasize that the concept of quality of life is the degree of satisfaction with life and the control one exerts over it⁴⁰.

It is essential to consider the variability of factors that can enhance stress in academic life⁴². Each human being reacts to daily pressures in their own way, and cultural and social aspects to which individuals are subjected should also be taken into account in these analyses. Events such as personal/family problems, financial difficulties, illnesses, deaths, and numerous others are experienced and faced differently by each person, even if they are in the same historical, cultural, and social context. Furthermore, problems in the social order of the country can exacerbate pathological stress in various individuals. Many researchers in the field agree that academic life generates a stressful potential for students.

The university provides experiences that

can affect quality of life (QV) and personal satisfaction. In the promotion, extracurricular activities, the teacher-student relationship, and relationships among peers were cited. Factors that hinder or decrease QV include the lack of support from teachers (impersonality), little integration between the team and students from other courses, and the excessive study hours, especially for working students⁴⁰. A university student's life can evoke feelings such as anguish, insecurity, fear, and anxiety. In the case of medical students, when they come into contact with sick individuals, these students experience situations related to specific procedures and care. This can often have a significant impact on academic performance, resulting in low satisfaction and leading to personal health problems.

Other studies have observed a higher frequency of depression among smokers than among those who have never smoked; such results corroborate the literature indicating that individuals who smoke and have difficulty quitting the habit show a higher prevalence and severity of various dysphoric symptoms and vegetative/melancholic symptoms compared to patients without a history of nicotine dependence⁴². Smokers are more likely to exhibit symptoms of depression and anxiety than those who have never smoked. According to the self-medication model, regarding smoking, the properties of nicotine alter mood and are especially reinforced in depressed individuals, who are prone to negative affect experiences.

Among the limitations of the present study, it stands out that students were invited to participate in this research during the COVID-19 pandemic in 2021, which may have influenced the results. Additionally, this was a cross-sectional study conducted at a private institution, involving students from the 1st to the 8th semesters of the medical course. It did not evaluate students in the internship (9th to 12th semesters of medical school), as they were in a hospital environment and involved in pandemic-related care. Another limitation was the lack of assessment of response variation between different semesters of the medical course.

The majority of participants in this research were women. The female gender has seen a marked increase in the medical profession over the last few decades. Another fact observed in the study population is that most students are single and without children. This reflects the current Brazilian reality, where young people are choosing to marry or have children later, prioritizing their professional training and entry into the job market. Many participants reported having experimented with some form of tobacco at least once (43.9%). Being in the age range of 17 to 20 years is a risk factor that can influence tobacco experimentation. The average age of initiation into smoking was 18.3 years, with a minimum age of 15 years and a maximum age of 24 years. These results point to the need for strengthening public policies to prevent tobacco experimentation, as well as ensuring adequate treatment for smokers, such as promoting cessation actions.

The university environment offers various opportunities for tobacco use, such as frequent university parties. The challenges of academic life, such as the amount of activities to be developed and the greater responsibility, potentiate experimentation. When talking about tobacco, it includes not only cigarettes but also various forms such as electronic cigarettes and hookahs. The university represents an educational support environment and should act to provide examples, especially among its members.

The analysis of Quality of Life using the SF-36 instrument showed that medical students presented the vitality dimension with the lowest average and functional capacity with the highest. However, it has the limitation of not sufficiently encompassing the broad spectrum of aspects related to the comprehensive construct of quality of life. Still, the use of this instrument was chosen due to the scarcity of investigations on the quality of life of medical students in the Brazilian Midwest. New studies should be conducted using this instrument on quality of life and others to corroborate scientific findings.

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