Prevalence of suicidal behavior in Medical students

Prevalência de comportamento suicida em estudantes de Medicina

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ABSTRACT

Introduction: Physicians and medical students constitute groups at risk for suicide and suicidal behavior. Suicidal behaviors encompass phenomena ranging from thoughts, planning, and finally death by suicide. Little is known about suicidal behavior among Brazilian medical students.

Objective: The aim of this study was to assess the prevalence of suicidal ideation, planning and suicide attempt in a sample of undergraduate medical students in Brazil, as well as to identify the sociodemographic, student life aspects and health factors most often associated with suicidal behavior.

Method: A total of 722 medical students at Unicamp, during 2017 and 2018, voluntarily and anonymously answered a broad questionnaire, including sociodemographic data, aspects of academic life and suicidal behavior. A statistical analysis was performed using the chi-square test, Mann-Whitney test, and multivariate logistic regression. A statistical significance level of 95% was adopted.

Results: The lifetime prevalence rates of suicidal thoughts, planning and attempts were respectively 196 (27.3%), 64 (8.9%), and 26 (3.6%). In the 30 days prior to the survey, 36 (5%) seriously thought about ending their own lives, and 11 (1.5%) concretely planned to end their own lives. Bullying, presence of mental disorder, seeking mental health care at the university, use of sedatives without a prescription, low socioeconomic level, living alone, religion (atheists, agnostics and spiritualists) and degree of religiousness are the factors that, together, best explain the chance of suicidal behavior.

Conclusion: Medical students show important prevalence rates of suicidal behavior.

Keywords: Suicidal Ideation; Suicide Attempt; Medical Students; Student Health.

RESUMO

Introdução: Médicos e alunos de Medicina são grupos de risco para o suicídio e comportamento suicida. Comportamentos suicidas abrangem fenômenos que vão desde pensamentos, planejamentos, tentativas e até a morte por suicídio. Sabe-se pouco sobre o comportamento suicida entre estudantes de Medicina brasileiros.

Objetivo: Este estudo teve como objetivos avaliar a prevalência de ideação, planejamentos e tentativas suicidas em uma amostra de estudantes de graduação em Medicina do Brasil, e identificar os fatores sociodemográficos, de vida estudantil e de saúde mais associados a esses comportamentos.

Método: Participaram do estudo 722 alunos do curso de Medicina da Unicamp, durante os anos de 2017 e 2018, que responderam de forma voluntária e anônima a um questionário amplo, que incluía dados sociodemográficos, de vida acadêmica e de comportamento suicida. A análise estatística foi realizada por meio do teste de qui-quadrado, do teste de Mann-Whitney e da regressão logística múltipla. Adotou-se o nível de significância estatística de 95%.

Resultado: As prevalências de pensamentos, planejamento e tentativas de suicídio ao longa da vida foram respectivamente 196 (27,3%), 64 (8,9%) e 26 (3,6%). Nos 30 dias que antecederam a pesquisa, 36 (5%) pensaram seriamente em pôr fim à própria vida, e 11 (1,5%) planejaram concretamente colocar fim a própria vida. Bullying, presença de transtorno mental, procura de assistência em saúde mental na universidade, uso de calmante sem prescrição médica, baixo nível socioeconômico, morar sozinho, religião (ateus, agnósticos e espiritualistas) e grau de religiosidade são os fatores que, conjuntamente, melhor explicam a chance de comportamento suicida.

Conclusão: Alunos de Medicina apresentam prevalências importantes de comportamento suicida.

Palavras-chave: Ideação Suicida; Tentativas de Suicídio; Estudantes de Medicina; Saúde do Estudante.

INTRODUCTION

Physicians and health professionals are among the occupational categories that are particularly vulnerable to the risk of suicide[1–3], especially women[4]. Medical residents in training[5,6] and medical students are also a high-risk group for suicidal behavior[7–9]. Psychological stress, depressive symptoms and burnout are more prevalent in the early years of training, but these symptoms are comparatively more prevalent at any stage of the medical career than in other occupations[10].

Medical students are especially vulnerable to mental distress and suicide risk. They have common previous characteristics of high personal demand, competitiveness, and are fresh out of an experience of great commitment, study and stress of the pre-college entrance exam phase[11]. They are faced with the reality of the idealized course, intense class hours, competitiveness, frustration in not maintaining high grades, the need to learn new ways of studying, and contact with serious illnesses, poverty and death[12,13]. Over time, difficulties arise in reconciling social and family life, work shifts, internship difficulties, breach of expectations regarding the profession, frustration with treatments for serious conditions and death[14].

Different reviews have found a prevalence rate of depression and depressive symptoms in approximately one-third of medical students, higher than in the general population[15,16]. Among more than 20,000 medical students, in a systematic review with articles from 43 countries, the presence of suicidal ideation (SI) in the last two weeks to the last 12 months, was estimated at around 11%[15], similar to that found in a meta-analysis study that analyzed more than 30,000 students of medical courses in China[17].

The lifetime prevalence of SI among medical students ranged internationally from 2.9% to 53.6%[18]. In the world literature, the prevalence rates of suicidal ideation, planning and suicide attempt (SA) found throughout the lives of medical students varied greatly: in Norway, prevalence rates of 43% of ideation, 8% of planning and 1.4% of suicide attempt were found[7]; in Pakistan, there were prevalence rates of 35.6% of ideation, 13.9% of planning, and 4.8% of SA[19]; China had prevalence rates of 17.9% for ideation, 5.2% for planning and 4.3% for SA[20]; and Nepal showed prevalence rates of 10.7% of suicidal ideation, 1% of planning and 1% of SA[21].

The prevalence rate of lifetime SA also varied among medical students across the globe, with values of 1.9% in the USA[9], 2.2% in Austria[22], 3.9% in Ethiopia[23], 6.4% in Turkey[22], and 6.9% in South Africa[24].

Factors associated with suicidal behavior among medical students internationally were: female gender[19,20,25], low level of maternal schooling[20], neglect/characteristics of the relationship with parents[18–21], little social support[23], financial difficulties[18,26]; relationship status (alone)[7,25], living alone[26], dissatisfaction/worse academic performance[21,23,25,27], being in the first year of the course[19]; attending the clinical semesters[21], poor physical health[26], depression[7,18,23,26,27], anxiety[7,18,23], stress[23], characteristics of psychological functioning[7,20], history of psychiatric disorders[18,19,25], receiving psychopharmacological treatment[26], alcohol consumption[23,26], illicit drug use[18,19,21,25,27], and negative events in life[7].

In Latin America, the prevalence rates of suicidal ideation, planning and suicide attempt throughout life were 34.3%, 22.4% and 19.4%, respectively, among Peruvian medical students[28]. SI and SA rates throughout one's lifetime were 15.7% and 5% among future physicians in Colombia[27]. And suicidal ideation in the last 30 days was 7.8% among Paraguayan medical students[29]. A Latin American review found an SI prevalence of 13.7% among medical students from countries in the region[30], considering different data collection instruments[31].

There is a growing literature on the mental health of future physicians in Brazil[32–35] showing that anxiety and depressive symptoms are more prevalent in this population when compared to the general population[36,37], or a population of corresponding age[38]. Lack of motivation, little emotional support and academic overload were correlated with mental health problems[39].

In Brazil, there are few studies on suicidal behavior in medical students, with the prevalence of SI measured by different standardized instruments (periods between 1 week and 1 month prior to the survey) ranging from 7.5% to 13.4%[40–42] in the studies carried out in the first decade of the 21st century. Two recent studies showed a prevalence of 30% of SI in the last 30 days among Brazilian medical students[43,44]

In the study by Carro et al., on the presence of symptoms of Burnout syndrome among students from a private medical school in southern Brazil, 81.2% of the respondents answered affirmatively when asked about the presence of suicidal thoughts during the medical course[45] (no specific instruments were used to assess suicidal behavior).

The Brazilian literature shows that the factors most often associated with SI among medical students were living alone, thoughts of abandoning the course, moderate or severe depressive symptoms, and probable obsessive-compulsive disorder[46]. A high prevalence of hopelessness was identified among these students[42]. Family dysfunctions[43], burnout[45] and anxiety[44] were associated with the presence of suicidal ideation among Brazilian medical students.

Only one study investigated the prevalence of SA among medical students in Brazil[47]. Factors associated with previous suicide attempts were: female gender; homosexuality; low income; bullying by university peers; childhood or adulthood

trauma; family history of suicide; SI in the previous month; daily tobacco use; and alcohol abuse[47].

There is a scarcity of information about suicidal behavior among Brazilian medical students. The aim of this study was to assess the prevalence rates of suicidal ideation, planning and attempts in a sample of undergraduate medical students in Brazil. Moreover, we aimed to identify the association of sociodemographic, student life and health factors with the presence of suicidal thoughts.

METHOD
Study period and location

This study was carried out between 2017 and 2018 with undergraduate students from Universidade Estadual de Campinas (Unicamp). The medical course is offered by the Faculty of Medical Sciences (FCM) and has a rigorous selection process, with vacancies disputed by students from all over the country. Its medical assistance, teaching and research programs are developed in a teaching-assistance complex that includes the Hospital de Clínicas, the Center for Integral Attention to Women's Health (CAISM, *Centro de Atenção Integral à Saúde da Mulher*), the Blood Donor Center, the Gastrocenter, the Hospital Estadual de Sumaré and several Health Units that belong to the public health network of the municipality of Campinas. In all, FCM has 299 teachers, 236 non-teaching staff, 869 undergraduate students, approximately 2,500 graduate students and 1,200 resident physicians and multidisciplinary residents.

Study design and population

This is a cross-sectional, quantitative and descriptive study. FCM has approximately 120 students attending each of the six mandatory years of the medical undergraduate course in Brazil. Of these 120 vacancies, 110 are filled through the Unicamp Entrance Exam and 10 by the Higher Interdisciplinary Training Program (ProFIS, *Programa de Formação Interdisciplinar Superior*). The entrance exam selection provides quotas for candidates who have attended public high schools, and reserve (quotas) of at least 25% of vacancies for black and brown students. ProFis is aimed at students who attended high school in public schools in the municipality of Campinas and obtained the best ENEM (High School National Exam) grades in their respective schools. The dropout rate of the said course is minimal, with only 2 dropouts in the last 10 years.

Due to the two-year collection period, in addition to one class for each year of the medical course, two first-year groups were invited to participate. In total, 722 students enrolled in all years of the medical course chose to participate.

Data collection tool and procedures

The students were invited to voluntarily answer an anonymous and individually filled-out questionnaire in the classroom, after being instructed by the researchers and after reading and signing the Free and Informed Consent Form.

The general questionnaire has open and multiple-choice questions, with questions that are both original and based on pre-established instruments, addressing topics related to sociocultural profile, academic life, social life, habits and leisure activities, and mental, physical, and sexual health issues.

Among the instruments, the AUDIT (Alcohol Use Disorder Identification Test)[48], developed by the World Health Organization and validated in Brazilian Portuguese[49], was used to identify problematic alcohol use. It has 10 questions about alcohol use in the previous year, with values ranging from 0 to 4 (maximum of 40). A final score of eight or higher indicates problematic alcohol use.

Specific questions about suicidal behavior were developed by the research group and collaborators. It consists of 3 main questions:

- Have you ever seriously thought about ending your own life?
- Have you ever made concrete plans to end your own life?
- Have you ever made an attempt to end your own life (suicide attempt)?

They were asked if they had had suicidal thoughts or plans in the last 30 days.

- Did you know someone who committed suicide?

They were asked about the number of attempts, and in how many of these attempts it was necessary to go to the Emergency Room.

About the last suicide attempt, they were asked: how it occurred, when it occurred, if they were under observation for more than 24 hours, if it was necessary to be admitted to the ICU or to undergo surgery.

Students who chose not to participate in the study were not considered in the analysis and those who returned their unfilled questionnaires were excluded.

Data processing and analysis

A database was created using the statistical program "SPSS for Windows", version 22. Data were entered by members of the research team, and fully revised twice. The computer program IBM SPSS Statistics was used to obtain the descriptive and association analyses and chi-square tests were performed to identify these associations. The Odds Ratio was calculated for binary events to measure the strength of these associations. A statistical significance level of 95% was adopted.

Ethical Considerations

The tests were applied by health professionals trained to welcome manifestations of discomfort that might arise among the respondents while filling out the instrument and were able to advise on the search for mental health resources on and off campus. The contact details for emergency services and psychological and psychiatric support for university students were listed at the end of the questionnaire. The database produced was processed anonymously and is protected by the research team. This study and its procedures were approved by the Research Ethics Committee of the university (Opinion number: 1,903,287).

RESULTS

Respondents' sociodemographic characteristics

Seven hundred and twenty-two medical students answered the questionnaire. A slight majority were women 401 (55.7%), with a mean age of 22.4 (±3.2SD) years, median of 22 and mode of 20 years. They were mostly single (94.4%) and white (73.4%). The respondents comprised students from all years of the medical course, and 215 (30%) were attending the first year.

Prevalence of suicidal thoughts, planning and suicide attempts

The prevalence rates of suicidal thoughts, planning and suicide attempts throughout the respondents' lifetime were respectively 196 (27.3%), 64 (8.9%), and 26 (3.6%). In the 30 days preceding the survey, 36 (5%) seriously thought about ending their own lives, and 11 (1.5%) concretely planned to end their own lives. Among them, 185 (25.9%) knew someone who had already died by suicide.

Among those who attempted suicide, 17 (68%) tried it once throughout their lifetime and seven (29.2%) had to go to the Emergency Room. In the last suicide attempt, three (11.5%) needed observation for at least 24 hours, whereas only one (4.2%) needed to be admitted to an ICU bed.

Factors associated with suicidal behavior

Among the respondents' sociodemographic characteristics, low socioeconomic level was significantly associated with the presence of SI, showing that poorer students have more suicidal ideation (Table 1).

Factors related to aspects of student life, sexuality, relationships and religious practice were associated with the presence of IS among students and can be seen in Table 2.

Factors related to mental health aspects were closely associated with the presence of SI among the students, whereas substance abuse was not. These results are shown in Table 3.

Multiple logistic regression

Table 4 shows the result of the multiple logistic regression. Based on this table, it can be seen that bullying during one's lifetime, mental disorder, seeking mental health care at the university, use of non-prescription tranquilizers, socioeconomic status, with whom they live, religion and degree of religiousness are the factors that, together, better explain the chance of suicidal behavior.

It can be observed that the highest risk of suicidal behavior occurs in the group of students who has suffered bullying, has a mental disorder, has sought mental health care at the university, uses non-prescription tranquilizers, is of socioeconomic status C/D/E, compared to the level A, lives with parents or alone, is an atheist, compared to Catholics, and has a degree of religiousness between 1 and 10 times a year, compared to no degree of religiousness.

Table 1. Sociodemographic characteristics.

		Have you thought about suicide?	OR (95%CI)	*p-value*	Total (N)
Gender	Female	119 (29.8%)	0.75 [0.5-1.0]	*0.09*	719
	Male	77 (24.1%)			
Age	22.4 (±3.2SD) years			*0.56*	718
Marital status	Single	182 (26.9%)	1.6 [0.6-2.3]	*0.67*	716
	Not single	12 (30%)			
Socioeconomic level (ABEP)	A	89 (24.5%)		*0.035*	718
	B	89 (28.3%)			
	C/D/E	18 (42.9%)			
Ethnicity or skin color	White	132 (26.4%)		*0.66*	711
	Black or Brown	33 (26.8%)			
	Asian	24 (33.3%)			

OR: Odds Ratio, 95%CI: 95% Confidence Interval.
Source: prepared by the authors.

Table 2. Aspects related to the academic life, students' behavior and lifestyle.

		Have you thought about suicide?	OR (95%CI)	p-value	Total (N)
Year of the medical course	1st and 2nd	86 (26.9%)			
	3rd and 4th	57 (27.7%)		0.98	715
	5th and 6th	51 (27.0%)			
Bullying	Yes	115 (38.6%)	2.7 [1.9-3.8]	<0.001	716
Self-assessment of academic performance	Above average	60 (20.8%)			
	Average	87 (29.2%)		0.004	718
	Below average	46 (37.4%)			
	I don't know	2 (22.2%)			
With whom do you live?	Parents	50 (29.6%)			
	Alone	68 (35.4%)		0.002	719
	With other people	78 (21.8%)			
LGBTQIA+*	Yes	51 (40.8%)	2.1 [1.4-3.2]	<0.001	704
Do you suffer discrimination because of your sexual orientation?	Yes	42 (38.9%)	1.9 [1.2-2.8]	0.004	704
Do you have a partner?	Yes	91 (26.5%)	0.9 [0.6-1.3]	0.57	707
Do you follow a religion?	No	85 (33.9%)	1.4 [1.1-1.8]	0.004	706
What is your religious affiliation?	Catholic	34 (17.2%)			
	Evangelical	22 (24.2%)			
	Spiritualist**	46 (36.2%)		0.001	712
	Atheist and agnostic	62 (33.9%)			
	Others / More than one religion	32 (28.3%)			
Degree of religiousness - frequency	None	104 (29%)			
	1-10x a year	59 (32.6%)		0.01	711
	More than 10x a year	33 (19.3%)			

OR: Odds Ratio, 95%CI – 95% confidence interval.
*Lesbians, Gays, Bisexuals, Transsexuals, Transvestites, Queers, Intersex, Asexuals; the '+' is used to include other groups and variations of sexuality and gender.
**Kardecism + diffuse spirituality + *ayahuasca* + *Umbanda* + *Candomblé* + Buddhism + other oriental religions.
Source: prepared by the authors.

Table 3. Mental health and psychoactive substance use.

		Have you thought about suicide?	OR	p-value	Total (N)
Mental disorder?	Yes	106 (49.1%)	4.6 [3.2-6.5]	<0.001	711
Psychological treatment?	Sim	121 (37.3%)	2.6 [1.8-3.6]	<0.001	716
Psychiatric treatment?	Sim	84 (50.6%)	4 [2.8-5.8]	<0.001	716
Have you taken or are taking psychiatric medications??	Sim	74 (47.4%)	3.2 [2.2-4.7]	<0.001	715
Did you seek mental health care at the University?	Sim	89 (45.9%)	3.4 [2.4-4.9]	<0.001	711
Has anyone in the family had a mental health problem?	Sim	122 (31.4%)	1.5 [1.1-2.1]	0.02	705
Alcohol use (AUDIT >7)		70 (32.3%)	1.4 [1.0-2.0]	0.048	719
Smoking	At least 1x in the last year	100 (33.9%)	1.7 [1.2-2.4]	0.001	711
Marijuana	At least 1x in the last year	95 (29.3%)	1.2 [0.9-1.7]	0.21	711
Non-prescription tranquilizers	At least 1x in the last year	38 (38.8%)	1.8 [1.2-2.9]	0.007	708
Solvents	At least 1x in the last year	48 (32.2%)	1.4 [0.9-2.0]	0.13	705
Ecstasy	At least 1x in the last year	34 (29.3%)	1.1 [0.7-1.7]	0.58	705

OR: Odds Ratio, 95%CI – 95% confidence interval.
Source: prepared by the authors.

Table 4. Multiple Logistic Regression (N=677).

Factor	OR	LL	UL	p-value
Bullying	1,87	1,27	2,77	0,002
Mental disorder?	3,12	2,07	4,73	0,000
Has sought mental health care at the university	2,05	1,34	3,13	0,001
Uses non-prescription tranquilizers	1,53	1,03	2,29	0,037
Socioeconomic level B	1,27	0,85	1,90	0,239
Socioeconomic levels C/D/E	2,43	1,12	5,18	0,022
With whom do you live? Parents	1,69	1,03	2,76	0,036
With whom do you live? Alone	2,01	1,27	3,19	0,003
Do you have a religion? Catholic	0,45	0,23	0,87	0,018
Do you have a religion? Spiritualist*	1,05	0,59	1,85	0,870
Do you have a religion? Evangelical	0,82	0,37	1,81	0,634
Do you have a religion? Others / More than one religion	0,81	0,44	1,46	0,481
Degree of religiousness. Yes, more than 10 times a year	0,99	0,51	1,89	0,970
Degree of religiousness. Yes, from 1 to 10 times a year	1,73	1,03	2,90	0,038

LL and UL are the lower and upper limits, respectively, the 95% confidence interval of the OR.
* Kardecism + diffuse spirituality + *ayahuasca* + *Umbanda* + *Candomblé* + Buddhism + other oriental religions.
Source: prepared by the authors.

DISCUSSION

This study was carried out with medical students attending all six years of a Brazilian public medical school. In addition to the prevalence rates of suicidal thoughts, planning and previous suicide attempts, information on sociodemographic characteristics, student life and mental health factors of students and their association with the presence of suicidal behavior reported by students were also investigated.

The prevalence rate of SI among medical students has been assessed using several instruments in recent years, with different periods and methods of collection. Sometime throughout one's life, in the last twelve months (General Health Questionnaire item 28; and Composite International Diagnostic Interview, CIDI), in the last month (MINI International Neuropsychiatric Interview, MINI), in the last two weeks (Beck Scale for Suicide Ideation, BSI; and Patient Health Questionnaire item 9, PHQ-9) and in the last week (Beck's Depression Inventory, BDI item 9) are the most often investigated periods.

The prevalence rates and time periods of SI among medical students at Brazilian universities found in the literature are quite diverse. Studies that used BDI and BSI[40,42,46] (1 and 2 weeks) found rates between 7.2% and 13.4%. Studies that considered longer periods of time[41,43,44] (MINI - 1 month) had a greater variation (7.5% to 30.2%). In the present study, respondents showed a considerable prevalence of suicidal thoughts throughout one's lifetime (27.3%), but with much lower rates in the last 30 days (5%) compared to more recent Brazilian studies[43,44] (28.7% and 30.2%).

This prevalence rate of suicidal thoughts throughout one's lifetime (27.3%) is higher than that of Serbia[25] (2.9%), Germany[50] (7.4%), United Arab Emirates[51] (17.5%), China[20] (17.9%), and Nepal[21] (18.4%), but lower than that found in India[52] (53.6%), and similar to South Africa[24] (32.3%). These disparate results are probably explained by cultural and religious differences, different attitudes towards suicide globally, in addition to the different data collection methodologies used in the studies.

Marcon et al. carried out an online survey with 4,840 medical students from all over Brazil, 8.9% of which said they had already performed at least one SA during their lifetime[47], a value greater than that found in our study (3.6%), which is closer to rates found in other developing countries, such as Ethiopia 3.9%[23], China 4.3%[20] and Pakistan 4.8%[19]. A possible explanation for this discrepancy would be the use of a broader definition of suicide attempt, compatible with that by the WHO, which would include the phenomenon that the DSM-5 labels "nonsuicidal self-injury" (defined as the deliberate and self-inflicted destruction of body tissue without suicidal intent). Moreover, online surveys tend to assess subjects that are less representative of the general sample universe[53].

The presence of "suicidal thoughts" was chosen to carry out the correlation analyses between suicidal behavior and possible associated factors. This decision allows studying a larger number of students, using a larger N for statistical analyses, and it is an important point for discussion with the scientific literature on the subject.

In our study, gender, age, marital status and ethnic identity were not related to a higher prevalence of SI, but the socioeconomic level was associated with this phenomenon. This association remained very relevant after multiple logistic regression (OR 2.43 [1.12-5.18]). Poverty, financial difficulties, stress, and concerns about how to support oneself during university are possible factors associated with suicidal behavior among medical students internationally[18]. A low financial income was associated with a higher prevalence of suicide attempts among Brazilian medical students[47]. The university assessed in the present study has its own student support service with several actions aimed at the support of students with financial difficulties, such as social assistance grants, housing aid grants, student housing program and food and transportation aid.

The fact of being bullied was associated with a higher prevalence of SI[43], as well as having carried out a previous SA[47] among Brazilian medical students. More than half of our respondents who showed suicidal behavior reported a previous history of this type of violence. The presence of bullying at any point throughout one's lifetime remained strongly associated with suicidal behavior after multiple logistic regression (OR 1.87 [1.27-2.77]). Interventions in the culture of institutions, identifying relationship problems among the students, separating victims from their bullies, promoting interpersonal relationship strategies and resolving disputes among students can be approaches to address this problem.

Dissatisfaction with academic performance was associated with the presence of depressive symptoms among medical students[54,55], including the Brazilian students[33]. This study found an association between the presence of SI and low self-assessment of academic performance (Table 2). SI is related to the perception of low or average performance[27], dissatisfaction with one's own performance[21] and the average grades[25] of medical students. Medical students have gone through rigorous university entrance exams, have high personal demands, competitiveness and frequent obsessive traits, which can contribute to a self-assessment that is in disagreement with their actual performance.

Living alone was a factor that remained significantly associated with the presence of SI after multiple logistic regression (OR 2.01 [1.27-3.19]). National and international studies associate this factor with suicidal behavior among medical students[26,46]. People who decide to live alone may already have a predisposition to isolation, difficulty in interpersonal relationships, or even be going through emotional situations, or life events, in which they seek to remain alone. Students who live alone and far from their families, often have a reduced network of people and care, which impairs surveillance and care actions.

It was found that being an LGBTT medical student is more often associated with the presence of SI. A significant prevalence of SI was found among LGBTT students from several undergraduate courses at a Brazilian university (22% of significant suicidal ideation in the previous week)[56]. In an American study, only non-heterosexual university students showed an increase in SI during the Covid19 pandemic[57]. Being homosexual was associated with a higher prevalence of suicide attempts among Brazilian medical students[47]. Prejudice and discrimination seem to play an important role in this phenomenon; in the present study, approximately 40% of the students who reported having suffered discrimination due to sexual orientation also had SI (Table 2).

Having a religion is considered a protective factor against suicidal behavior[58]. In our study, it was found that having a religion and a higher degree of religiousness (worship frequency) are associated with a lower prevalence of SI. The difference between SI prevalence rates according to religious affiliation was statistically significant. Evangelicals and Catholics showed lower prevalence rates when compared to Atheists and Agnostics, and those professing other Brazilian religions (*Candomblé*, *Umbanda*, Kardecism, Spiritualism, *Ayahuasca*, Buddhism and other oriental religions). This statistical association remained significant after multiple regression, both between the different religious affiliations and the degree of religiousness (Table 4). Different religious dogmas regarding suicide, belonging to minorities with overlapping factors associated with suicidal behavior, and having psychological characteristics related to the search for religious affiliations outside the "mainstream" ones are possible explanations for the differences found in the study.

As shown in Table 3, all factors related to a past history of mental disorders, psychological or psychiatric treatment, use of psychiatric medications were strongly associated with the presence of SI among medical students.

Mental health problems are prevalent among medical students in Brazil[39]. Depression, anxiety and burnout are more prevalent in this group when compared to the general population[34,35,45]. The respondents showed a high prevalence rate of mental health problems, previous psychiatric and psychological treatments and frequently sought specialized services, which is in line with the current literature. Having a diagnosis of mental disorders and having sought the university mental health services were strongly associated with suicidal behavior (OR = 3.12 [2.07-4.73] and 2.05 [1.34-3.13] respectively).

Suicide among medical students was the reason for the creation of several of these services specialized in psychological and psychiatric support[14], and this was also the reason for the creation of the mental health service for medical students at this

university[11]. These services are essential for such a vulnerable population. Its expansion and improvement, involving strategies of education, prevention and change of occupational culture, in addition to the traditional psychological and psychiatric care, are viable strategies to face this problem.

Among the causes identified for psychological illness related to the risk of suicide in this population are specific professional experiences, workload, sleep deprivation, difficulty in relationships with patients, unhealthy environments, financial concerns and information overload[59]. The medical course curriculum at UNICAMP includes a longitudinal axis on medical ethics, communicating difficult news and reactions to death. However, the workload of subjects related to becoming ill and death is still low.

Institutional violence and the negative aspects of the hidden curriculum are progressively more studied and discussed topics within medical schools[60]. Verbal abuse, public humiliation, ethnic and gender discrimination, in addition to a constant separation between clinical skills and humanistic qualities contribute to the feeling of low performance and the feeling that there are few opportunities to practice one's clinical skills[61]. These negative aspects in the educational environments have an impact on future professional conduct and the quality of life of students[62].

Listening to music, maintaining high-quality affective relationships, resting and practicing sports are common methods to deal with suicidal thoughts[63]. It is necessary to search for an academic environment of individual and humanistic growth that accompanies technical excellence in knowledge. Within the medical course there should be room for leisure, art, sports and the promotion of healthy bonds between the student and the academic community.

The consumption of psychoactive substances is common in this population; more than half of the students consume alcohol on a regular basis, and 5% use tobacco products[29]. In a recent study, 11.4% to 18% of students reported alcohol use "beyond the usual consumption"[64], and in another survey, 15% of students reported frequent use of marijuana[65]. Alcohol, smoking and the use of other psychoactive substances are associated with depressive symptoms in Brazilian medical students[33]. Alcohol and tobacco consumption were associated with mental health problems[39], and suicide attempts[47] among these students. SI and suicidal behavior among medical students have been associated with alcohol consumption[23,26,28], illicit substance use[27], and drug abuse[21].

Respondents showed significant prevalence rates for the risky use of alcohol (AUDIT>7 = 30.1%), and occasional use of tobacco (41.4%) and marijuana (45.1%). Among the assessed substances, only tobacco use, non-prescription tranquilizers

and risky use of alcohol (AUDIT>7) were associated with a higher prevalence of SI. After the multiple logistic regression, the use of non-prescription tranquilizers remained strongly associated with suicidal behavior (OR 1.53 [1.03-2.29]. The use of tranquilizers and alcoholic beverages to deal with anxiety, stress, and sleep difficulties are well known and correlate with the strong associations between SI and mental health factors found in the study (Table 3).

The strong association between tobacco use and SI among respondents was surprising. Tobacco consumption has dropped exponentially in Brazil in the last 30 years, one can think that university students who maintain the habit of smoking are those who are less concerned with physical health, or less committed to healthy lifestyle habits, or even those who smoke as a way to deal with anxiety. Daily tobacco use was associated with a history of suicide attempts among university students in Taiwan[66].

Substance consumption can be seen as both a reason for interventions aimed at promoting health and well-being, and as a signal in the search for actions that reach students at risk of suicidal behavior.

Study limitations

The respondents were invited in the classroom, on normal days of the academic calendar. We can infer that some of the more depressed students, with a greater degree of mental suffering, and probably at greater risk for suicide, do not attend classes assiduously, or are less willing to participate. These students may have been excluded from this research, minimizing the prevalence of this behavior in the studied group.

The prevalence of suicidal behavior among university students is quite varied in the literature, and difficult to compare. This is probably due to the use of different instruments and questions with different types of questioning, specification of severity and duration of symptoms to assess the presence of thoughts of death, SI, suicide planning and past attempts.

As this is a cross-sectional study, it is not possible to assert causal relationships between the prevalence of thoughts, planning and previous SA with other sociodemographic factors, habits and behavior, and health characteristics. Future bivariate and multivariate analyses between these factors are necessary to deepen the understanding of suicidal behavior among future physicians.

CONCLUSIONS

Suicidal thoughts, suicide planning and attempts are common among medical students (27%, 8% and 3.9%). Simple questions can identify a serious problem that is amenable to prevention and several interventions. All stages of the medical

course are at risk for suicidal behavior. Bullying, presence of a mental disorder, seeking mental health care at the university, use of non-prescription tranquilizers, low socioeconomic status, living alone, religion (atheist, agnostic or spiritualist) and degree of religiousness are the factors that, together, better explain the chance of suicidal behavior. Medical schools should be aware of the practice of bullying within the institution and of students who are more socially isolated, or who have been bullied. Factors associated with mental suffering in the academic environment (exhausting workload, lack of spaces for culture and leisure, lack of ties within the community) must be identified and modified. Educational actions on mental health problems are encouraged during undergraduate school, for all agents involved in the university community (students, teachers, supervisors and coordination); in addition to expanding specialized psychological and psychiatric support services for students.

AUTHORS' CONTRIBUTION

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