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ORIGINAL ARTICLE

COVID-19 effects on medical education and student's life habits

Efeitos da COVID-19 no ensino médico e hábitos de vida dos estudantes

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ABSTRACT

Introduction: The COVID-19 pandemic, which began in 2019, led to social isolation measures that impacted education globally, including in Brazil. Universities closed and classes were suspended, resulting in the adoption of emergency education practices. This caused a transition from in-person teaching to the virtual environment, bringing additional challenges to medical education. **Objective:** To assess the profile of medical students at a university in southern Santa Catarina, Brazil, regarding lifestyle and aspirations in the program in the face of the new pedagogical proposal in a pandemic scenario. **Methods:** Cross-sectional study with students who started medical school in 2021 on the two campuses of the University of Southern Santa Catarina. Data were collected via a questionnaire on the Google Forms® platform, from November 2021 to February 2022. **Results:** Of the 87 participants, 51.7% were admitted through the National High School Exam (ENEM) and 21.8% had prior academic training. During the COVID-19 pandemic, 78.2% of students perceived psychological changes, such as depression and anxiety, and 57.2% noticed weight gain associated with changes in lifestyle habits. Regarding the teaching methodology, 66.7% partially adapted to Problem-Based Learning (PBL), and 33.3% believed this method was better than the traditional one. **Conclusion:** The new teaching method (PBL) implemented during the COVID-19 pandemic in remote classes brought about some barriers to students in their learning process, as well as changes in lifestyle and psychological factors. It is concluded that the COVID-19 pandemic impacted students' lives in different ways, as well as having affected medical education.

Keywords: COVID-19 pandemic; Medical students; Problem-based learning.

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RESUMO

Introdução: A pandemia de COVID-19, iniciada em 2019, levou a medidas de isolamento social que impactaram a educação globalmente, incluindo o Brasil. Universidades fecharam e as aulas foram suspensas, resultando na adoção de práticas emergenciais de educação. Isso provocou uma transição do ensino presencial para o ambiente virtual, trazendo desafios adicionais para o ensino médico. **Objetivo:** Avaliar o perfil dos estudantes de medicina de uma universidade do sul de Santa Catarina quanto ao estilo de vida e aspirações no curso diante da nova proposta pedagógica em um cenário pandêmico. **Métodos**: Estudo transversal com alunos ingressantes em 2021 no curso de Medicina nos dois *campi* da Universidade do Sul de Santa Catarina. Os dados foram coletados via questionário em ambiente virtual Google Forms®, de novembro de 2021 a fevereiro de 2022. **Resultados:** Do total de 87 participantes, 51,7% ingressaram pelo Exame Nacional do Ensino Médio (ENEM) e 21,8% possuíam alguma formação acadêmica anterior. Durante a pandemia da COVID-19, 78,2% dos alunos perceberam mudanças psicológicas, como depressão e ansiedade, e 57,2% perceberam aumento do peso corporal associado às mudanças nos hábitos de vida. No que diz respeito à metodologia de ensino, 66,7% adaptaram-se parcialmente ao Ensino Baseado em Problema (PBL), e 33,3% acreditaram ser este método melhor do que o tradicional. **Conclusão:** O novo método de ensino (PBL) implantado durante a pandemia da COVID-19 em aulas remotas trouxe algumas barreiras aos estudantes em seu processo de aprendizagem, além de mudanças no estilo de vida e fatores psicológicos. Conclui-se que a pandemia de COVID-19 impactou de diferentes modos a vida dos estudantes, assim como o ensino médico.

Palavras-chave: Pandemia por COVID-19; Estudantes de medicina; Aprendizagem baseada em problema.

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Introduction

In the first half of 2020, the social history of the planet was shaken by the outbreak of a new coronavirus, which, elevated to the status of a pandemic, triggered social isolation measures that affected education in at least 200 countries[1]. This was also the case in Brazil, where schools and universities were closed, face-to-face classes suspended, and many institutions adopted what can be called emergency education practices[2]. The Ministry of Education (MEC) created the Emergency Operational Committee, which temporarily eased distance education (EaD) as one of its first actions, guiding the actions of states, municipalities, and educational institutions, while respecting the autonomy of those involved[3].

The widespread transmission of the coronavirus in a short period also highlighted the need for health professionals, especially doctors, to develop cognitive skills involving problem-solving, decision-making, and refined clinical judgment. However, finding the best approach to train these professionals to respond collaboratively and in a multidisciplinary way to public health emergencies has been considered a "largely unresolved need." Medical education was also affected by the interruption of in-person classes, as well as lectures and congresses, in addition to restrictions on clinical care and exams, making it necessary to implement new learning structures[4,5].

Many medical schools have been seeking to develop self-regulated learning (SRL) skills, with problem-based learning (PBL) being a preferred teaching methodology and curricular approach to improve these skills. In this methodology, the student becomes the protagonist of their own learning, solving problems collaboratively, reflecting on their experiences, and engaging in self-directed questioning[6]. A recent systematic review suggested that teaching in the virtual environment and in-person teaching are equivalent in terms of exam results measuring learning[7].

The COVID-19 pandemic brought a unique opportunity to evaluate the importance of virtual learning platforms in medical education, accelerating, in a way, their dissemination in medical schools across the country.

In recent years, changes in the pedagogical formats of medical courses have included adopting new teaching methodologies and changes in admission methods, following technical recommendations from local and national executive committees, such as the National High School Exam (ENEM). During the pandemic, due to the suspension of in-person activities, the selection process at the university in this study was adapted to a virtual format, giving greater weight to the essay. In this context, it is assumed that the student profile may have changed, enabling more universal access to the selection process.

Additionally, the pandemic brought changes to people's routines, such as reduced levels of physical activity and alterations in eating habits, with an increase in behaviors that are harmful to health[8]. There were also significant psychological impacts due to the measures adopted to control the pandemic, which followed technical recommendations based on state and national guidelines supported by the scientific evidence available at the time, overburdening mental health because of physical and social isolation. These effects have already been observed among university students[9,10].

This study aimed to evaluate the lifestyle of first-year medical students, whose teaching method was based on PBL, amid the pandemic. It highlights the organization of students' routines regarding social restrictions, remote teaching, and new pedagogical proposals. Thus, the study sought to identify the profile of first-year medical students in the PBL method implemented at UNISUL, in the context of the COVID-19 pandemic.

Methods

This observational cross-sectional study was conducted with incoming medical students at the University of Southern Santa Catarina - UNISUL, on the Tubarão and Pedra Branca campuses, in 2021. The selection of students took place through the National High School Exam (ENEM), through which the Problem-Based Learning (PBL) teaching methodology was also adopted. The project was submitted to the UNISUL Research Ethics Committee, receiving approval under CAAE n. 51301821.9.0000.5369.

The study population corresponded to a census of the 216 students enrolled in that academic year. Exclusion criteria were established for participants under 18 years old, those who interrupted the course, dropouts, or those already involved in the research project (n=3). Data collection took place between November 2021 and February 2022, concluding before the full return of in-person classes to avoid interference in the assessment environment.

Data were obtained through a semi-structured, self-administered questionnaire distributed online via the Google Forms® platform. The instrument, composed of 29 questions (including objective and open-ended questions), covered four main domains: lifestyle and health status; organization of studies and academic aspirations; impact of the COVID-19 pandemic on students' routines; and expectations regarding the PBL methodology. The questionnaire items were selected based on literature review and the study's objectives, and the Informed Consent Form (ICF) was presented at the beginning, with mandatory completion for continuation. The full questionnaire is available as supplementary material.

Data analysis was performed using Jamovi software version 2.2.5 (2021). Quantitative variables were described using measures of central tendency and data dispersion, as mean ± standard deviation or median and interquartile range, according to the normality of the data, indicated by the Shapiro-Wilk test. Qualitative variables were described as absolute (n) and relative (%) frequencies.

Results

Of the 216 students invited, 87 responded (response rate of 40%). Of these, 77% were women, with an average age of 24 ± 8 years (Table 1).

Regarding weight, 26.4% were overweight (BMI ≥ 25), with 57.5% perceiving weight gain, and 70.1% reporting eating deregulation, including increased consumption of sweets (21.5%), ultra-processed foods (17.1%), and increased general appetite (21%).

A portion (44.8%) reported previous COVID-19 infection. Among these, 64.7% stated they fully adhered to preventive measures (mask, hygiene, 70% alcohol, distancing), while 35.5% reported partial adherence.

More than half (51.7%) were admitted through ENEM in 2019, 12.6% in 2018, and 8% in 2009. Regarding prior education, 21.8% already had a degree, with the most cited courses being pharmacy (26.3%), law and nursing (both 15.8%). Among graduates, 47.4% completed their degree over 10 years ago. Half of the working students reported they would need to quit their job with the full return of classes, although 62.7% were still employed at the time of the research. The main financial support came from parents, followed by scholarships, own income, and support from partners.

During this period, 75% perceived changes in healthy lifestyle habits. Alcohol consumption was reported by 87.4%, with 16.1% indicating increased consumption. Regarding hobbies (physical activities, meditation, music/dance), 71.4% reduced or stopped their practices: 62.5% reduced, and 8.9% stopped completely.

Most students partially adapted to the PBL method (66.7%), with only 19.5% fully adapted. Regarding comparisons between PBL and traditional teaching, 33.3% considered PBL superior, 27.6% considered it inferior, and 34.5% did not express an opinion. The main motivation for studying Medicine was "being useful to people" (32.4%). Regarding specialty choice, 67.8% had not yet decided, while the rest mainly chose pediatrics (14.3%), neurology (10.7%), and gynecology/obstetrics (10.7%). Table 2 provides details on study hours, class formats, and specialty choices.

Table 1. Habits and lifestyle changes of students entering medical school, 2021 (n=87).

		N	%
Alcohol consumption	yes	76	87.4
Frequency of alcohol consumption	1 to 2 days a week	28	32.2
	3 to 4 days a week	10	11.5
	Less than 1 day a month	13	14.9
	Less than 1 day a week	25	28.7
	Never	11	12.6
Change in alcohol consumption during the pandemic	Started	3	3.4
	Increased	14	16.1
	Decreased	14	16.1
	No change	44	50.6
	Stopped drinking	2	2.3
Smoker	Yes	8	9.2
Smoking duration	Less than 1 year	3	37.5
	1 to 2 years	2	25.0
	3 to 5 years	2	25.0
	10 to 15 years	1	12.5
Change in smoking during the pandemic	Started	1	12.5
	Increased	3	37.5
	Not change	1	12.5
	Reduced	3	37.5
Pandemic impacted student's life	yes	39	44.8
	Partially	42	48.3
	No	6	6.9
Psychological changes during the pandemic	Yes	68	78.2
	No	19	21.8
Psychological support during the pandemic	Yes	20	29.4
	No	48	70.6
Maintaining a healthy routine	Yes	9	13.2
	Partially	42	61.8
	No	17	25.0
Care during the pandemic	Yes	44	64.7
	Partially	24	35.3
Having *hobbies*/habits	Yes	56	82.4
	No	12	17.6
Type of *hobby*/habit*	Relaxation/meditation	16	18.8
	Music and/or dance	20	23.5
	Extra course	6	7.1
	Physical activity/sports	43	50.6
Change in *hobby*/habit during the pandemic	Quit	5	8.9
	Reduced	35	62.5
	No	16	28.6

continue...

... continued Table 1

		N	%
Changes in eating habits during the pandemic	Yes	61	70.1
	No	26	29.9
Type of change in eating habits during the pandemic*	Increased appetite	45	21.0
	Reduced appetite	9	4.2
	Increase in ready-made and frozen foods	30	14.0
	Increase in sweets	46	21.5
	Increase in fruits and vegetables	8	3.7
	Increase in proteins and meats	4	1.9
	Increase in fast food/snacks	37	17.1
	Increase in water consumption	22	10.4
	Reduction in water consumption	13	6.2
Weight Change During the pandemic	Increased	50	57.5
	Did not change	19	21.8
	Decreased	18	20.7

Caption: * More than one option was selected.

Table 2. Study and teaching methodology of students entering medical school, 2021 (n=87).

		N	%
Frequency of extracurricular activities	1 to 4 hours	28	32.2
	4 to 8 hours	31	35.6
	8 to 12 hours	19	21.8
	More than 12 hours	9	10.3
Motivation to study medicine*	Family influence	20	8.3
	Financial return	38	15.8
	Being useful to people	78	32.4
	Childhood fantasy	19	7.9
	Scientific curiosity	22	9.1
	Talent/vocation	37	15.4
	Works in the health sector	26	10.8
	Social status	1	0.4
Adapting to the PBL method When comparing PBL with traditional teaching, do you think:	Yes	17	19.5
	Partially	58	66.7
	No	12	13.8
Academic activities during the pandemic	Better	29	33.3
	Same	4	4.6
	Worse	24	27.6
	No Opinion	30	34.5
What did you think of online classes during the pandemic	Online	28	32.2
	Hybrid	59	67.8

continue...

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		N	%
Adapting to the PBL method When comparing PBL with traditional teaching, do you think:	Demotivated	28	32.2
	Made it difficult to enroll in college	3	3.4
	Made it easier to enroll in college	53	60.9
	Others	3	3.4
Academic activities during the pandemic	Yes	28	32.2
	No	59	67.8

Caption: * More than one option was selected.

Discussion

This study sought to provide a comprehensive profile of medical students who started in 2021, considering demographic, socioeconomic, lifestyle aspects, pandemic impacts, and adaptation to the PBL method. The findings reveal significant changes in various areas, offering valuable insights into the reality of medical students in the post-pandemic scenario.

An increase in alcohol consumption was observed, supported by data from PAHO indicating a pattern of "heavy episodic drinking" more frequent among young people with higher incomes during the pandemic. Moreover, 37.5% of students reported starting or increasing smoking, aligned with evidence linking tobacco use to severe forms of COVID-19 and hospitalization — British studies show up to an 80% increased risk. These changes suggest that the pandemic context may have accentuated risky behaviors, requiring integrated interventions for student health[11]. Smoking is a risk factor for COVID-19 progression in hospitalized patients, with smokers having twice the risk of progressing to severe forms compared to never-smokers[12].

The female predominance (77%) and higher average age (24 years) reflect a shift in the profile of incoming students, consistent with previous studies on the feminization and increased maturity in entering the course. However, the high rate of working students (49%), many of whom considered quitting their jobs with the return of in-person classes, markedly differs from pre-pandemic investigations, which recorded only about 5% employment. This indicates potential financial impact and more complex life transitions for current students[13-15].

The reduction in hobbies and weight gain reveal that the pandemic harmed mechanisms for balancing personal and academic life, highlighting the need for institutional strategies to promote students' holistic health. The perception of psychological changes in 78% of the group, with only 29% seeking specialized help, reinforces the urgency of accessible and proactive psychological support services within universities. Emotional changes have great potential to persist into medical residency, a period already characterized by intense stress and high risk of burnout. This scenario compromises not only the well-being of future doctors but also technical learning and patient safety[22].

Partial adaptation to PBL, reported by 66.7%, and the large proportion of undecided students when comparing it to the traditional method (34.5%) indicate initial insecurity toward the methodology. This may relate to the fact that many do not yet have clear comparative parameters, which is common in recent implementations of active methodologies. Evidence showing that PBL requires greater autonomy and extracurricular resources supports the understanding that institutional support and faculty and tutor training can accelerate adaptation[17,18].

Although the findings are relevant, the low response rate (40%) and possible sampling bias, especially on one campus, limit the study's representativeness. Additionally, data collection was interrupted with the return to hybrid classes, preventing additional responses and comparative analyses between remote and in-person phases.

The results point to the need for institutional actions focused on student well-being, including health promotion programs, structured psychological support, and training for effective PBL use. Strategies such as academic tutoring, self-care workshops, and integration activities between students and faculty can promote pedagogical and emotional adaptation.

The pandemic also highlighted the limitations of remote education, which can take various forms, such as online classes, correspondence courses, television broadcasts, or videoconferences. This situation encourages reflection on methodologies that better articulate remotely taught content with theory. Therefore, in times of crisis, such as the temporary suspension of in-person classes, it becomes essential to reflect on methodologies that predispose more efficient learning outcomes. Active methodologies, particularly PBL, seem to contribute to the training of doctors and other health professionals[19-21].

Conclusions

The study revealed that the pandemic significantly affected students' lifestyle habits, mental health, academic adaptation, and socioeconomic situation, with changes such as increased alcohol consumption, deregulated eating, and signs of psychological distress. The predominance of women, higher average age, and prior experience reflect a new profile of incoming students, who are more mature but

also more vulnerable to social and financial pressures. The high rate of working students and economic dependence on parents indicate the need for institutional attention.

Partial adaptation to the PBL method suggests that its remote implementation required more autonomy and organization, without adequate support. This highlights the importance of improving teaching structures, training faculty, and effectively integrating PBL. In summary, the pandemic revealed weaknesses in the training path of future doctors, making it essential to adopt welcoming policies, psychological support, and pedagogical adaptation in institutions.

The study points to the need for structured welcoming programs, such as mentoring, continuous psychological support, and hybrid integration of PBL, and reinforces the importance of addressing the emotional and human dimension of Medicine. Future studies should evaluate the impact of remote learning and PBL, focusing on pedagogical and scientific evolution, also considering the relationship between schools and students to strengthen technical, communicative, and emotional skills.

Finally, following the tripod of art, science, and humanity — the pillars of Medicine — requires further studies on the impact of remote learning and PBL, as well as interdisciplinary plans that strengthen technical, communicative, and emotional skills.

Authors' Contributions

We describe contributions to the papers using the taxonomy (CRediT) provided above: *Conceptualization, Investigation, Methodology, Visualization & Writing – review & editing*: HM Heidemann; MS de Oliveira; M Oenning. *Project administration, Supervision & Writing – original draft*: BPM Iser.

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References

1. Organização das Nações Unidas para a Educação, a Ciência e a Cultura (UNESCO). COVID-19 impacton education. Montr UNESCO Inst Stat [Internet]. 2020; [access in 2022 Aug 01]. Available from: http://uis.unesco.org/sites/default/files/documents/ip66-survey_of_covid19_pandemic_impacts-final_0.pdf.
2. Hodges C, Moore S, Lockee B, Trust T, Bond A. The Difference Between Emergency Learning. Educ Rev. 2020;1-15.
3. Salles GEB, Gandra DM, Nogueira HP, Silva LCP, Cruz MC, Corrêa MG, et al. Mudanças comportamentais e resiliência dos estudantes de Medicina em meio à Pandemia da Covid-19. Brazilian J Heal Rev. 2021;4(2):8451-63.
4. Sandhu P, Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. Med Educ Online. 2020;25(1):20-2.
5. Markenson D, DiMaggio C, Redlener I. Preparing health professions students for terrorism, disaster, and public health emergencies: Core competencies. Acad Med. 2005;80(6):517-26.
6. Demirören M, Turan S, Öztuna D. Medical students' self-efficacy in problem-based learning and its relationship with self-regulated learning. Med Educ Online. 2016;21(1):1-9.
7. Pei L, Wu H. Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. Med Educ Online. 2019;24:1-14.
8. Malta DC, Szwarcwald CL, Barros MBA, Gomes CS, Machado ÍE, de Souza Júnior PRB, et al. A pandemia da COVID-19 e as mudanças no estilo de vida dos brasileiros adultos: um estudo transversal, 2020. Epidemiol Serv Saude. 2020;29(4):1-13.
9. Odriozola-González P, Planchuelo-Gómez Á, Irurtia MJ, García LR. Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. Psychiatry Res. 2020;290:113108.
10. Oliveira WA, Andrade ALM, Souza VLT, Micheli D, Fonseca LMM, Andrade LS, et al. COVID-19 pandemic implications for education and reflections for school psychology. Psicol - Teor e Prática. 2021;23(1):1-26.
11. Queiroga VV, Filgueira EGK, Vasconcelos AM de, Procópio JVV, Gomes FWC, Gomes CHFM, et al. A pandemia da Covid-19 e o aumento do consumo de álcool no Brasil. Res Soc Dev. 2021;10(11).
12. Cardoso TCA, Rotondano Filho AF, Arruda JT. Correlação entre pandemias: Tabagismo e a COVID-19. Res Soc Dev. 2021;10(10).
13. Paes ÂT, Dias BF, Eleutério GN, Paula VP. Profile of medical students in the first group of the Faculdade Israelita de Ciências da Saúde Albert Einstein. Einstein (Sao Paulo). 2018;16(3).
14. Zazula R, Appenzeller S. Perfil psicossocial de ingressantes de Medicina em uma universidade bilíngue e multicultural. Rev bras Orientac Prof. 2019;20(2):17-28.
15. Rego RM do, Marques NA, Monteiro PC, Oliveira CLB, Lins NAA, Caldas CAM. O perfil atual do estudante de Medicina e sua repercussão na vivência do curso. Pará Res Med J. 2018;2(1-4):22-30.
16. Pitanga FJG, Beck CC, Pitanga CPS. Inatividade física, obesidade e COVID-19: perspectivas entre múltiplas pandemias. Rev Bras Atividade Física Saúde. 2020;25:1-4.
17. Becker AS, Busnello CV, Banolas EL, Avila GO, Ely MGB, Gobbo MOS, et al. O impacto na saúde mental de estudantes universitários submetidos ao ensino digital remoto durante o isolamento social decorrente da pandemia de Covid-19: uma revisão sistemática. Rev da AMRIGS. 2021;65:2-11.
18. Silva SM, Rosa AR. The impact of Covid-19 on the students' mental health and the role of teaching institutions to protect and promote their emotional well-being. Praksis. 2021;2:189-206.

19. Rodrigues BB, Cardoso RRJ, Peres CHR, Marques FF. Aprendendo com o Imprevisível: Saúde Mental dos Universitários e Educação Médica na Pandemia de Covid-19. Rev Bras Educ Med. 2020;44(Suppl 1):8-12.

20. Santos KD, Castro S, Valle Junior SR, Rodrigues ES, Almeida PR. Ensino online em tempos de pandemia: a opinião de universitários quanto aos desafios encontrados. Res Soc Dev. 2021;10(10).

21. Bresil CF, Garcia LF. Metodologia Ativas Na Medicina E O Impacto Da Pandemia De Covid 19 No Ensino Médico. An do XII Encontro Nac Produção Científica da UNICESUMAR. 2021.

22. Moreira GF, Morais RBAR, Camurça LT, Teixeira TM, Pinheiro LP, Santana CMC, et al. Impactos na saúde mental da pandemia da COVID-19: revisão de literatura. Med J Eur. 2024;2(4):48-55. DOI: https://doi.org/10.5281/zenodo.13356766.