

SEDENTARY BEHAVIOR AMONG MEDICAL STUDENTS: REPERCUSSIONS OF THE CORONAVIRUS PANDEMIC

CONDUTA SEDENTÁRIA ENTRE ESTUDANTES DE MEDICINA: REPERCUSSÕES DA PANDEMIA DO CORONAVÍRUS

SEDENTARISMO EN ESTUDIANTES DE MEDICINA: REPERCUSIONES DE LA PANDEMIA DE CORONAVIRUS

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ABSTRACT

Introduction: In order to face COVID-19, social restriction measures were adopted that influenced the population's living habits, increasing sedentary lifestyle. Considering the high complexity and dedication required by the Medicine course, it becomes relevant to investigate the effect of the pandemic on the practice of physical exercise and sedentary behavior of these students. **Objective:** Identify changes in physical activity and sedentary behavior self-reported by medical students in the city of Salvador, Bahia, before and during the self-confinement imposed by the COVID-19 pandemic. **Methods:** Longitudinal, prospective, quantitative study carried out with regularly enrolled medical students over 18 years of age. A virtual, structured, anonymous, self-completed questionnaire was applied, containing sociodemographic and academic aspects. In addition, the International Physical Activity Questionnaire (IPAQ) was applied in its short version, considering the period before and during the pandemic. Through this, the level of physical activity, sedentary behavior and time spent walking and performing moderate and vigorous activities were measured. **Results:** 268 medical students were included, predominantly women (65.7%), white (50.0%) and mixed race (38.8%), aged 24.2 ± 5.5 years, single (90.7%), attending the clinical cycle (59.0%), in private institutions (78.4%). No statistically significant differences were identified in the level of physical activity and in the time spent with moderate and vigorous activities. However, there was a reduction in walking time ($p < 0.00001$) and an increase in sedentary behavior ($p = 0.001$) during the COVID-19 pandemic, with the greatest impact among women ($p = 0.0009$). **Conclusion:** The repercussions of the COVID-19 pandemic have been shown to increase the sedentary behavior of medical students, especially among women, and to reduce activity time spent with walking. Longitudinal studies are needed to analyze the medium and long-term consequences of this change in the healthy lifestyle habits of medical students. **Level of evidence II; Comparative prospective study.**

Keywords: Longitudinal Studies; COVID-19; Habits; Sedentary Behavior; Students, Medical.

RESUMO

Introdução: Foram adotadas medidas de restrição social para o enfrentamento da COVID-19 que influenciaram nos hábitos de vida da população, aumentando o sedentarismo. Considerando a alta complexidade e a dedicação exigida pelo curso de Medicina, torna-se relevante investigar o efeito da pandemia na prática de exercício físico e conduta sedentária desses estudantes. **Objetivos:** Identificar alterações na atividade física e na conduta sedentária autorrelatadas por acadêmicos de Medicina na cidade de Salvador, Bahia, antes e durante o autoconfinamento imposto pela pandemia de COVID-19. **Métodos:** Estudo longitudinal, prospectivo, quantitativo, realizado com estudantes de Medicina, maiores de 18 anos, regularmente matriculados. Foi aplicado um questionário virtual, estruturado, anônimo, de autopreenchimento, contendo aspectos sociodemográficos e acadêmicos. Além disso, foi aplicado o International Physical Activity Questionnaire (IPAQ), em sua versão curta, considerando o período antes e durante a pandemia. Através deste, foram mensurados nível de atividade física, conduta sedentária e tempo de realização de caminhada, além de atividades moderadas e vigorosas. **Resultados:** Foram incluídos 268 estudantes de Medicina, predominantemente mulheres (65,7%), da raça branca (50,0%) e parda (38,8%), com idade de $24,2 \pm 5,5$ anos, solteiros (90,7%), cursando o ciclo clínico (59,0%), em instituições privadas (78,4%). Não foram identificadas diferenças estatisticamente significantes no nível de atividade física e no tempo despendido com atividades moderadas e vigorosas. Entretanto, houve redução no tempo de caminhada ($p < 0,00001$) e aumento da conduta sedentária ($p = 0,001$) durante a pandemia de COVID-19, sendo o impacto maior entre as mulheres ($p = 0,0009$). **Conclusão:** Foram demonstradas as repercussões da pandemia de COVID-19 no aumento da conduta sedentária dos estudantes de Medicina, principalmente entre as mulheres, além da redução do tempo de atividade despendido com caminhadas. Estudos longitudinais são necessários para analisar as consequências a médio e longo prazo dessa alteração nos hábitos de vida saudáveis de estudantes de Medicina. **Nível de evidência II; Estudo Prospectivo Comparativo.**

Descritores: Estudos Longitudinais; COVID-19; Hábitos; Comportamento Sedentário; Estudantes de Medicina.



RESUMEN

Introducción: Frente al COVID-19 se adoptaron medidas de restricción social que influyeron en los hábitos de vida de la población, aumentando el sedentarismo. Considerando la alta complejidad y la dedicación exigida por la carrera de Medicina, se torna relevante investigar el efecto pandémico sobre la práctica de ejercicio físico y la conducta sedentaria de estos estudiantes. Objetivos: Identificar los cambios en la actividad física y en la conducta sedentaria auto-reportados por los estudiantes de Medicina de la ciudad de Salvador, Bahía, Brasil, antes y durante el auto-confinamiento impuesto por la pandemia de COVID-19. Métodos: Estudio longitudinal, prospectivo, cuantitativo, realizado con estudiantes de medicina regularmente matriculados, mayores de 18 años. Foi aplicado um questionário virtual, estruturado, anônimo, autocompletado, contendo aspectos sociodemográficos e acadêmicos. Além disso, foi aplicado o International Physical Activity Questionnaire (IPAQ), em sua versão curta, considerando o período antes e durante a pandemia. A través de éste, se midió el nivel de actividad física, el comportamiento sedentario y el tiempo dedicado a caminar, así como las actividades moderadas y vigorosas. Resultados: Se incluyeron 268 estudiantes de medicina, predominantemente mujeres (65,7%), blancas (50,0%) y morenas (38,8%), de $24,2 \pm 5,5$ años de edad, solteras (90,7%), en el ciclo clínico (59,0%), en instituciones privadas (78,4%). No se identificaron diferencias estadísticamente significativas en el nivel de actividad física y el tiempo dedicado a actividades moderadas y vigorosas. Sin embargo, hubo una reducción en el tiempo de caminata ($p < 0,00001$) y un aumento en la conducta sedentaria ($p = 0,001$) durante la pandemia COVID-19, siendo mayor el impacto entre las mujeres ($p = 0,0009$). Conclusión: Las repercusiones de la pandemia COVID-19 se manifestaron en el aumento de la conducta sedentaria entre los estudiantes de medicina, especialmente entre las mujeres, además de la reducción del tiempo de actividad dedicado a caminar. Son necesarios estudios longitudinales para analizar las consecuencias a medio y largo plazo de este cambio en los hábitos de vida saludables de los estudiantes de medicina. Nivel de evidencia II; Estudio Prospectivo Comparativo.

Descritores: Estudios Longitudinales; COVID-19; Hábitos; Conducta Sedentaria; Estudiantes de Medicina.

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INTRODUCTION

The benefits of regular physical activity practice are widely known and discussed in the national and international literature, being related to people's health and well-being. Such advantages are evident, especially in the quality of life, the immune system, and the cardiovascular and metabolic health of individuals¹⁻³, collaborating both in the prevention and treatment of chronic degenerative diseases^{2,4}. Despite the wide recommendation to include the practice of physical activity in people's routine^{2,5}, there is a low adherence of society to these guidelines, often due to the strenuous daily routine that clashes with health care⁶.

With the pandemic of COVID-19, declared at the end of 2020 by the World Health Organization (WHO)⁷, strict social restriction measures were adopted, which were fundamental to protect public health and reduce the infection rate¹. However, these measures have directly influenced the lifestyle habits of the population^{1,8}. Associated with this, the interdiction of spaces destined for the practice of shared physical activity may have contributed to the accentuation of sedentarism and a significant reduction in the practice of exercise^{3,4}.

In addition to the impact on the economy, health, and professional and family relationships^{1,9}, the pandemic of COVID-19 has greatly interfered in the field of education by imposing the adoption of remote education more broadly in all educational spheres¹⁰. Facing this global health crisis, a profound transformation in medical education¹⁰ is perceived, with interference in the courses' offer and workload. Facing the difficulties arising from social isolation, the flexibility of the study routine could stimulate home exercises, either from previous knowledge, or through sessions with online monitoring^{9,11}. The adherence to these activities would allow the maintenance of the benefits that physical activity promotes to health^{6,12}, which go beyond the coronavirus pandemic, being able to promote permanent behavioral changes, encouraging a more active lifestyle¹³.

Considering these circumstances, this study proposes to identify changes in physical activity and sedentary behavior self-reported by medical students in the city of Salvador, Bahia, Brazil, before and during the self-confinement imposed by the pandemic of COVID-19.

MATERIALS AND METHODS

This is a quantitative sectional study, with a descriptive and analytical approach, carried out with medical students in the city of Salvador, Bahia. The study included students over 18 years of age, who were regularly enrolled and who agreed to participate by signing the Informed Consent Form. Questionnaires with inconsistent answers were excluded.

To calculate the sample size, we considered a total population of 7,140 medical students in the territorial area of interest, which was estimated based on the vacancies made available by the Ministry of Education when each course was authorized and on how long they have existed¹⁴. For a 95% reliability and 5% margin of error, a minimum sample size of 238 students was established.

The students were invited to participate in the survey using the snowball method, a non-probability sampling technique. As a collection instrument, a virtual form was used, built on the Google Forms platform, and disseminated over the internet, by WhatsApp and Instagram social network, between October and December 2020. A standardized questionnaire, designed specifically for this research, was used, containing thirteen multiple-choice questions about sociodemographic and academic aspects. In addition, the International Physical Activity Questionnaire (IPAQ) in its short version was used, whose reliability and validity have already been documented^{15,16}.

Structurally composed of seven open questions, IPAQ allows us to estimate the time spent in sedentary behavior (sitting position) and the time spent per week in different intensities of physical activity (walking and moderate and vigorous physical effort). In order to verify whether there was a change in the physical activity routine, the participants were asked to fill out the questionnaire considering their aurore late on the period before and during the pandemic, allowing the paired analysis of the sedentary behavior adopted.

The score expressed as metabolic equivalent minutes per week (MET-min/week) was used as a general indicator of physical activity, giving separate scores for walking, moderately intense and vigorously intense activities¹⁶. In this sense, the physical activity level of the participants

was categorized as (i) high, when they performed vigorous-intensity activity on at least three days and accumulated at least 1,500 MET-minutes/week; or seven or more days of any combination of walking and moderate- or vigorous-intensity activities, reaching a minimum of 3,000 MET-minutes/week; (ii) moderate, when they performed three or more days of vigorous activity for at least 20 minutes/day; or five or more days of moderate-intensity activity or walking for at least 30 minutes/day; or five or more days of any combination of walking and moderate- or vigorous-intensity activity, reaching at least 600 MET-minutes/week; (iii) low, when they did not meet the previous criteria.

In addition, sedentary behavior was determined by the time the student remained seated per day. Considering that the mortality rate is higher when the sedentary behavior is equal to or greater than 8 hours/day^{13,17}, this metric was used to define individuals who adopt a high sedentary behavior. Those with time less than 8 hours/day were considered as individuals who adopt low sedentary conduct.

Data analysis was performed using the statistical software IBM SPSS, version 26.0. Categorical variables were presented as absolute (n) and relative (%) frequencies, while numerical variables of symmetrical distribution were presented as arithmetic means (MA) and standard deviations (SD), and those of asymmetrical distribution as medians (MD) and interquartile ranges (CI). The comparison between the results obtained before and during the pandemic was performed using the Mann Whitney and Chi-square tests. The level of statistical significance was set at 0.05 or 5%.

The Research Ethics Committee of the Catholic University of Salvador (UCSal) approved the research project, according to Resolution 466/12 of the National Research Ethics Council (CAAE 36977420.5.0000.5628).

RESULTS

Of the 275 questionnaires answered, seven were excluded due to inadequate completion of information. Thus, the final sample was composed of 268 medical students, predominantly female (65.7%), white (50.0%) and brown (38.8%), with mean age of 24.2 ± 5.5 years, single (90.7%), living with their families (75.4%), studying only (90.7%), not financially independent (91.8%) and without children (92.5%). When analyzing the academic aspects, it was observed that most of the students included were in the clinical cycle (59.0%), in private institutions (78.4%). (Table 1)

When comparing the level of physical activity of medical students before and during the pandemic, no statistically significant differences were identified. However, when analyzing the different activities performed, we observed a reduction in the time spent walking during the pandemic (p<0.00001). No significant differences were shown in the time spent on moderate and vigorous activities. Furthermore, a statistically significant increase in the number of students who adopted a sedentary behavior (p=0.001) during the pandemic of COVID-19 was evidenced. (Table 2)

When stratifying the sample considering gender, an increase in sedentary behavior during the COVID-19 pandemic was observed among both males and females. However, this difference was statistically significant only among women (p=0.0009). (Figure 1)

DISCUSSION

The present study investigated the repercussions of self-confinement during the pandemic of COVID-19 on the practice of physical activity and the adoption of sedentary behavior by medical students in the city of Salvador, Bahia.

The sample was composed mostly of white and brown female students enrolled in private institutions. The sociodemographic profile found corroborates the national demographic census of medical

students¹⁸ and the educational profile of the city of Salvador, Bahia, which has 67% of private institutions, being responsible for 85% of the medical school vacancies¹⁴.

It is important to emphasize that the predominance of females in medical school has been described by other studies¹⁸ and may be associated with the sociocultural changes experienced in the last decades, with an

Table 1. Sociodemographic characteristics of medical students participating in the study.

Characteristics	Sample (N=268)
Age, AV±SD (years)	24.2 ± 5.5
Sex, n (%)	
Female	176 (65.7)
Male	92 (34.3)
Race, n (%)	
White	134 (50.0)
Brown	104 (38.8)
Black	26 (9.7)
Yellow	3 (1.1)
Indigenous	1 (0.4)
Marital status, n (%)	
Single	243 (90.7)
Married	24 (9.0)
Divorced	1 (0.4)
Widow(er)	-
Lives with, n (%)	
Friends / Acquaintances	21 (7.8)
Family Members	202 (75.4)
Alone	45 (16.8)
Has children, n (%)	20 (7.5)
Activities performed, n (%)	
Just study	243 (90.7)
Study and work simultaneously	25 (9.3)
Has financial independence, n (%)	22 (8.2)
Nature of HEI, n (%)	
Private	210 (78.4)
Public	58 (21.6)
Academic Cycles, n (%)	
Basic	92 (34.3)
Clinical	158 (59.0)
Internship	18 (6.7)

n: absolute number; %: percentage; AV: Average; SD: standard deviation; HEI: Higher Education Institution.

Table 2. Analysis of physical activity levels and sedentary behavior of medical students before and during the COVID-19 pandemic.

Variables	Medical Students (n=268)		
	Before	During	p-value
Level of physical activity - IPAQ, n (%)			
High	101 (37.7)	96 (35.8)	0.631 [†]
Moderate	101 (37.7)	97 (36.2)	
Low	66 (24.6)	75 (28.0)	
Walk, MD±IIQ (min/week)	60 (0.0-150.0)	40.0 (0.0-120.0)	<0.00001*
Moderate Activity, AV±IQR (min/week)	120 (20.0-240.0)	120 (30.0-240.0)	0.568*
Vigorous Activity, AV±IQR (min/week)	128 (15.0-270.0)	120 (0.0-270.0)	0.568*
Sedentary behavior, n (%)			
Low (<8 hours/day)	156 (58.2)	118 (44.0)	0.001 [†]
High (≥8 hours/day)	112 (41.8)	150 (56.0)	

IPAQ: International Physical Activity Questionnaire; AV: Average; IQR: Interquartile range (25th and 75th percentile); min/week: minutes per week; [†]Chi-square test; * Mann-Whitney test.

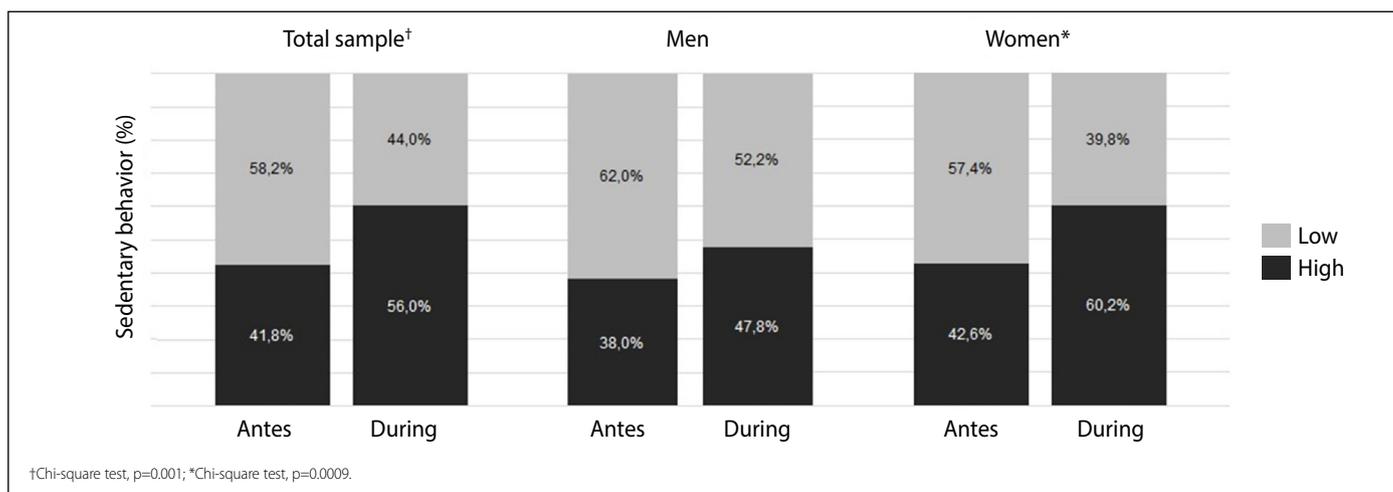


Figure 1. Analysis of sedentary behavior among medical students before and during the Covid-19 pandemic, considering the total sample and stratification by sex.

accentuation of female empowerment, which has been transposing the patriarchal structural models that are so prevalent and rooted in society²⁷.

The medical course is highly complex and imposes on students countless responsibilities and full-time dedication^{10,19}. This stereotype imbricated to the course often leads to the abstention of physical activity from the list of priorities of these students. Besides, immersed in this academic universe, students end up compromising their quality of life, giving up leisure time, nights of sleep, and healthy eating, which are indispensable factors for their physical and mental health^{20,21}.

Within this scope, the present study showed an increase in sedentary behavior among medical students during the pandemic of COVID-19, with a reduction in the time spent walking. The study by Luciano et al.²¹ validates these findings, pointing out a reduction in walking time and an increase in sedentary lifestyle among 773 Italian medical students. No other studies were found in the literature addressing the repercussions of social isolation on physical activity practice and sedentary behavior among medical students.

Outside the context of COVID-19, Figueiredo et al.⁶ demonstrated that the time devoted to physical activity is reduced during the six years of medical school. Castro Júnior et al.²² reported high rates of sedentarism among medical students in Fortaleza/CE, especially among students from private institutions. Raddi et al.², when analyzing the behavior of medical students over a decade, also showed a worsening in the levels of physical activity, however, without changes in the accumulation of sitting time. In agreement with these authors, in a recent meta-analysis, Castro et al.¹² demonstrated that medical students have a high risk of sedentary behavior, as well as low levels of physical activity. These studies reinforce that the pandemic of COVID-19 had a deleterious effect on the accumulation of sitting time, an alteration demonstrated in the present study and not evidenced by the pre-pandemic studies, a factor that increases sedentary behavior among medical students.

This behavior has been observed in various population profiles and not only among students. Botero et al.²³, when analyzing Brazilian adults, also demonstrated a decreased level of physical activity and increased sedentary behavior during the pandemic of COVID-19. This was reinforced by Malta et al.²⁴ when they demonstrated a worsening of lifestyles and an increase in health risk behaviors among Brazilian adults.

Another important point is that sedentary behavior trends differ between men and women²⁵. Therefore, we carried out a subgroup analysis stratifying the studied sample considering gender. An increase in sedentary behavior during the COVID-19 pandemic was demonstrated among both men and women, with a statistically significant difference only in women. Similar data were described by Castro Júnior et al.²² when they demonstrated that female medical students had a greater

tendency to be physically inactive/sedentary than males in the same situation, especially in the age range between 19 and 32 years²².

When analyzing the pandemic context, it was expected that the restrictive measures implemented in the fight against COVID-19 would interfere with the practice of physical activity²⁶, considering the determination to close gyms and sporting spaces for group activities⁸. However, the present study did not show differences in moderate and vigorous activities among medical students.

Regarding walking time, the increased use of screens, an escape valve for many people during the pandemic²⁷, can contribute to its reduction and to an increase in sedentarism. Associated with this, in the case of medical students, the compulsory migration to remote education¹⁰ reduced the need to commute to the educational institutions, academic practice fields, outpatient clinics and hospitals, also inferring in the walking time and increase in sedentary behavior.

Although these behaviors reflect social isolation and confinement, their deleterious effects can be minimized with the adoption of home-based activities^{3,21}. Several types of exercise can be performed without disrespecting the restrictions implemented, and they can even be aided by the use of digital tools to offer physical exercises taught by professionals in the area^{9,28,29}. In addition, it is possible to adopt strategies that minimize sedentary behavior, such as, for example, interspersing sitting time with pauses/interruptions to stand up for at least 5 minutes²⁹.

It is important to point out that physical inactivity and a sedentary lifestyle are considered serious public health problems, and can also be considered a pandemic, since they are responsible for more than 3 million deaths/year worldwide³. It is known that a sedentary lifestyle negatively impacts cardiovascular health, well-being, and the immune and metabolic status of individuals³⁰. Thus, this change in the behavior of medical students offers a greater risk to life. Therefore, it is imperative to find ways to encourage regular physical activity in the academic environment, either by building sports areas in or near the educational institutions, or by establishing agreements and partnerships with sports facilities/academies or by encouraging student athletics and integrative events among students. Thus, the biopsychosocial homeostasis of the students is promoted, thus converging with the construction of a healthier society²⁴.

Regarding the potential limitations of this study, we can point out the sample size and the temporal characteristic of the methodological design used, reducing the ability to generalize the results with statistical accuracy. Moreover, the information about the practice of physical activity before the pandemic was collected when the pandemic was already underway, which may be influenced by memory bias. However, these factors do not invalidate the critical analysis of the results obtained.

CONCLUSION

During the pandemic of COVID-19, there was an increase in sedentary behavior among medical students, especially among women. It is known that social isolation was a necessary measure for controlling the spread of this disease; however, its repercussion in the reduction of healthy life habits can cause deleterious consequences for the physical

and mental well-being of these students in the short, medium, and long term. Therefore, considering the risks and benefits, regular physical activity during the pandemic should be encouraged, while maintaining the necessary sanitary measures for a safe activity.

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