

## THE IMPACT OF THE COVID-19 PANDEMIC ON PHYSICAL ACTIVITY AMONG DENTAL STUDENTS

### UTICAJ PANDEMIJE COVID-19 NA FIZIČKU AKTIVNOST STUDENATA STOMATOLOGIJE

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#### Abstract

**Introduction:** The pandemic of COVID-19 and epidemiological recommendations adopted to prevent the spread of infection, can significantly impact on physical and mental health of all group population. Although dental students are not a vulnerable group, due to the inability to complete development of their clinical skills during their education they were particularly affected by the pandemic. In reducing the stress caused by the pandemic, physical activity can play a significant role.

**Aim:** The aim of the study was to measure the impact of COVID-19 on physical activity among dental students.

**Material and methods:** The online research was conducted between 1 to 26 December 2020, during the winter semester of the 2020/21 school year at the School of Dental Medicine, University of Belgrade. The study includes 379 dental students (305 female and 74 male) with an average age  $21.6 \pm 2.6$  years. As a research instrument, a demographic questionnaire which contains a question about gender, age, year of studies, material status, place of residence, smoking status and alcohol consumption, anthropometric data (weight, height and waist circumference) and International Physical Activity Questionnaire (IPAQ) were used.

**Results:** There is a statistically significant reduction of physical activity, on all levels, during the pandemic ( $p < 0.05$ ). Students spend 2 hours more sedentary than before the pandemic. The number of students with high physical activity decreased, while the number of those with moderate and low physical activity increased. The total MET is lower during the pandemic than before ( $p < 0.05$ ). There is a statistically significant difference in the frequency and intensity of physical activity expressed in MET between the genders before and during the pandemic ( $p < 0.05$ ).

**Conclusion:** During the pandemic, the physical activity of dental students is significantly reduced, particularly in female students. It is necessary to take preventive measures so that an excessively sedentary lifestyle would not compromise the students' health.

#### Keywords:

COVID-19,  
pandemic,  
physical activity,  
international physical  
activity questionnaire  
(IPAQ),  
dental students

## Sažetak

**Uvod:** Pandemija COVID-19 i epidemiološke preporuke, usvojene u cilju sprečavanja širenja infekcije, mogu značajno uticati na fizičko i mentalno zdravlje svih populacionih grupa. Iako studenti stomatologije ne predstavljaju posebno vulnerabilnu grupu, zbog nemogućnosti da ostvare potpuni razvoj svojih kliničkih vještina tokom školovanja posebno su pogođeni pandemijom. Fizička aktivnost može imati značajnu ulogu u smanjenju stresa uzrokovanog pandemijom.

**Cilj:** Cilj studije je bio da se proceni uticaj pandemije COVID-19 na fizičku aktivnost studenata stomatologije.

**Materijal i metode:** Istraživanje je sprovedeno putem interneta od 1. do 26. decembra 2020. godine, tokom zimskog semestra školske 2020/21. godine na Stomatološkom fakultetu Univerziteta u Beogradu. Istraživanjem je obuhvaćeno 379 studenata stomatologije (305 ženskog i 74 muškog pola) prosečne starosti  $21,6 \pm 2,6$  godina. Kao instrument istraživanja korišćeni su demografski upitnik koji sadrži pitanja o polu, starosti, godini studija, materijalnom stanju, mestu stanovanja, pušačkom statusu i konzumiranju alkohola, antropometrijski podaci (težina, visina i obim struka), kao i Međunarodni upitnik o fizičkoj aktivnosti (engl. *International Physical Activity Questionnaire* - IPAQ).

**Rezultati:** Postoji statistički značajno smanjenje svih nivoa fizičke aktivnosti tokom pandemije ( $p < 0,05$ ). Studenti provode dva sata više u sedećem položaju nego pre pandemije. Smanjen je broj studenata sa visokom fizičkom aktivnošću, dok je povećan broj onih sa umerenom i niskom aktivnošću. Ukupni metabolički ekvivalent (MET) je niži tokom pandemije nego ranije ( $p < 0,05$ ). Postoji statistički značajna razlika u učestalosti i intenzitetu fizičke aktivnosti izražene u MET između polova pre i tokom pandemije ( $p < 0,05$ ).

**Zaključak:** Tokom pandemije fizička aktivnost studenata stomatologije je značajno smanjena, posebno kod studenata ženskog pola. Neophodno je preduzeti preventivne mere kako sedentaran način života ne bi ugrozio zdravlje studenata.

### Ključne reči:

COVID-19, pandemija, fizička aktivnost, *International physical activity questionnaire* (IPAQ), studenti stomatologije

## Introduction

The Coronavirus Disease 2019 (COVID-19) was defined by the World Health Organization (WHO) in March 2020 as an extreme health, economic and social emergency and it was declared a global pandemic (1). According to the data from the European Center for Disease Prevention and Control, within the first two years of the COVID-19 pandemic, more than 450 million cases were reported worldwide (2). A lot of evidence suggests that this type of event has a tremendous impact on people's physical and mental health (3,4).

The first confirmed case of COVID-19 in Serbia was reported on 6 March 2020, and the first COVID-19-related death in the country was announced on 2 February. From March to May 2020 in order to prevent the spread of infection pandemic in Serbia the lockdown has been implemented (5). During the lockdown, all activities at universities in Serbia were blocked, and student dormitories were closed (6). After the beginning of the next semester, from October 2020 students attended to all classes online while shops, theaters, gyms and other facilities worked at reduced intensity. Social distancing and spending time mostly at home have evidently altered the lifestyle and quality of life of university students (7).

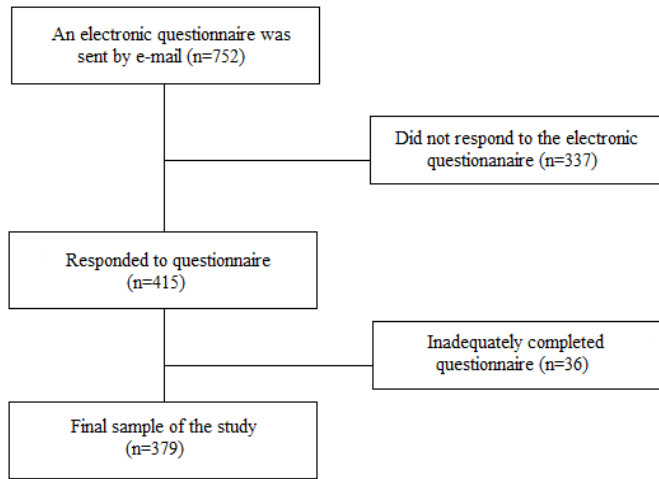
Considering the significant impact on physical and mental health, physical activity has been highly recommended during COVID-19 (8). It is reported that physical activity during pandemic plays an important role in reducing stress in student population (9).

Dental students were especially affected by the COVID-19 outbreak due to difficulty in academic performance and acquiring clinical skills (10). It is not clear how changes in the academic and daily life during the pandemic affecting on the physical activity of dental student population. Therefore, the main goal of this research is to gain insight into impact of COVID-19 on physical activity among dental students.

## Materials and methods

The online study was conducted between 1 to 26 December 2020, during the winter semester of the 2020/21 school year at the School of Dental Medicine, University of Belgrade. During the research period, because epidemiological situation caused by the COVID-19 pandemic, all classes were conducted online. The survey was created by using the Google Forms and the invitation to the study was sent to students by email. Initially, the invitation was sent to 752 active email addresses and the final sample consisted of 379 dental students (**figure 1**).

As a research instrument, demographic, anthropometric and physical activity questionnaire was used. A demographic questionnaire contained information about gender, age, year of studies, material status, place of residence, smoking status and alcohol consumption. Anthropometric data: weight, height (to calculate Body mass index - BMI) and waist circumference were measured and recorded by the subjects, according to the given instruction.



**Figure 1.** A flowchart of the recruitment process.

To assess the frequency, duration and intensity of physical activity a Short Form of International Physical Activity Questionnaire (IPAQ) for adults was used (11). This standardized questionnaire estimates time spent on a certain type (vigorous, moderate, and walking) physical activity over the past 7 days. The scoring was done on the basis of the Guidelines for Data Processing and Analysis of the IPAQ and the results were expressed in the value of metabolic equivalent (METs), which is defined as the amount of oxygen consumed while sitting at rest (12, 13). The weekly physical activity level was calculated as a quotient: minutes of activity/day, days per week, and recommended coefficients (8.0 MET for vigorous, 4.0 MET for moderate, and 3.3 MET for walking physical activity). The sum of all activity expressed in minutes per week represents the total MET. Based on the obtained results, physical activity is divided into three categories high, moderate and low. High physical activities are defined as vigorous-intensity activity  $\geq 3$  days and accumulating at least 1500 MET-minutes/week or  $\geq 7$  days of any combination of physical activities accumulating at least 3000 MET-minutes/week. For moderate physical activity, one of the following criteria must be met:  $\geq 3$  days of vigorous activity  $\geq 20$  minutes per day; or  $\geq 5$  days of moderate-intensity activity and/or walking  $\geq 30$  minutes per day; or  $\geq 5$  days of any combination of physical activities achieving a  $\geq 600$  MET-minutes/week. Low physical activity is considered when there is no physical activity or the criteria of moderate and high activity are not fulfilled (12).

Students filled out the same questionnaire twice. Once for the present time, during the pandemic and once retrospectively for the period before the pandemic. The survey was completed within 15 min. Participation was anonymous and voluntary. All students provided written informed consent to participate in this study. The study was approved by the Ethical Committee of the School of Dental Medicine, University of Belgrade (No. 36/4) and conducted in accordance with the Declaration of Helsinki.

Software package SPSS ver. 20 was used for the analyses (SPSS Inc, Chicago, USA). Kolmogorov-Smirnov and Shapiro-Wilk tests were used to test the normality of

data distribution. The Wilcoxon signed-rank test was used to compare physical activity before and during the pandemic, while in relation to gender, the Mann-Whitney test was used. Statistical significance was set at  $p < 0.05$ .

## Results

### Characteristics of Participants

The sample consisted of 379 students, female ( $n = 305$ , 80.5%) and male ( $n = 74$ , 19.5%) with an average age of  $21.6 \pm 2.6$  years. The majority of students rate their financial situation as good and live mostly with their parents. The majority of students have a normal diet and have a waist circumference that indicates a low risk of metabolic

**Table 1.** Demographic characteristics of the study sample ( $n = 379$ ).

Demographic Variables	n	%
Gender		
Men	74	19.5
Women	305	80.5
Year of study (Grade year)		
First	82	21.6
Second	92	24.3
Third	84	22.2
Fourth	40	10.6
Fifth	41	10.8
Sixth	40	10.6
Material status		
Very bad	0	0
Bad	10	2.6
Medium	73	19.3
Good	226	59.6
Very good	70	18.5
Place of residence		
With parents	168	44.3
In university dormitories	43	11.3
In rented apartments	107	28.2
In own apartment	61	16.1
Smoking		
Yes	64	16.9
No	315	83.1
Alcohol consuming		
Yes	41	10.8
No	151	39.8
Sometimes	187	49.4
Body mass index		
< 18.5 (underweight)	26	6.9
18.5 - 24.9 (normal)	306	80.7
25 - 29.9 (overweight)	41	10.8
$\geq 30$ (obese)	6	1.6
Waist circumference		
Low risk (< 94 cm for men, < 80 cm for women)	348	91.8
High risk (94 - 102 cm for men, 80 - 88 cm for women)	20	5.3
Very high risk (> 102 cm for men, > 88 cm for women)	11	2.9

diseases. Every fifth student is a smoker and every second consumes alcohol. Characteristics of the total sample (n = 379) are shown in **table 1**.

There is a statistically significant reduction in physical activity, on all levels, during the pandemic (**table 2**). Before the pandemic, dental students spent about 4.5 hours a day sitting, while during the pandemic and online classes it was 6.5 hours a day.

**Table 2.** Different types of physical activity before and during the pandemic in MET (n = 379).

Physical activity	Before pandemic	During pandemic	p value
	Median (Min - Max)	Median (Min - Max)	
Vigorous intensity	960 (0 - 8 640)	480 (0 - 11 520)	< 0.001
Moderate intensity	480 (0 - 5 040)	240 (0 - 5 040)	< 0.001
Walking	1 386 (99 - 4 158)	1 188 (99 - 3 465)	< 0.001
Total MET	3 150 (99 - 14 376)	2 346 (99 - 12 354)	< 0.001

p value -Wilcoxon's signed rank test; Total MET- minutes of physical activity a week

**Table 3.** Incidence of physical activity level in regards to gender (n = 379).

Activity level	Female n (%)		Male n (%)	
	Before pandemic	During pandemic	Before pandemic	During pandemic
High	157 (51.5%)	99 (32.5%)	50 (67.6%)	42 (56.8%)
Moderate	132 (43.3%)	175 (57.4%)	21 (28.4%)	26 (35.1%)
Low	16 (5.2%)	31 (10.1%)	3 (4%)	6 (8.1%)

Based on a minimum total physical activity, students can be classified in high, moderate and low physical activity level. The number of students with high physical activity decreased, while the number of those

with moderate and low physical activity increased in both genders. Before the pandemic, the highest percentage of students of both genders were in the category of high level of physical activity, while during the pandemic, the highest percentage of female students belonged to the moderate category of physical activity (**table 3**).

The total MET was lower in both female and male students during the pandemic. There is a statistically significant difference in the frequency and intensity of physical activity expressed in MET between the males and females before and during the pandemic (**table 4**).

## Discussion

The research has shown that COVID-19 and epidemiological recommendations adopted to prevent the spread of infection, such as self-isolation, lockdown and social distancing can lead to a deterioration in the quality of life of all population groups (7,14). Although young adults are the least exposed to COVID-19 (15), they are the most vulnerable group with regard to the impact of mental health (16). Previous experiences have shown the positive effect of physical activity on mental health and general well-being in youth. The importance of practicing physical activities is reflected in their overall positive effects on the life of a person from a psychological, physiological and sociological point of view. Considering the physiological aspect of improving health through physical activities, these primarily represent an effective way of preventing and treating various diseases and help in maintaining and improving health (17).

Earlier research reports that one in four adults and more than three-quarters of adolescents do not meet the WHO recommendations for physical activity (18,19). According to the new recommendations by WHO Global Action Plan on Physical Activity 2018-2030, adults (age 18-65 years) should do at least 150-300 min of moderate-intensity aerobic physical activity, or at least 75-150 min of vigorous-intensity aerobic physical exercises for substantial health benefits (20).

Since the beginning of the current pandemic, various data can be found in the literature. In response to

**Table 4.** Physical activity in MET regards to gender (n = 379).

Activity level	Before pandemic			During pandemic		
	Female	Male	P	Female	Male	P
	Median (Min - Max)	Median (Min - Max)		Median (Min - Max)	Median (Min - Max)	
High	960 (0 - 8 640)	2 040 (0 - 6 720)	< 0.001	480 (0 - 11 520)	1 440 (0 - 10 080)	< 0.001
Moderate	480 (0 - 5 040)	720 (0 - 3 360)	0.110	240 (0 - 5 040)	480 (0 - 3 600)	0.078
Low	1 386 (99 - 4 158)	1 386 (99 - 4 158)	0.732	1 188 (99 - 3 465)	1 188 (99 - 3 465)	0.445
Total MET	3 036 (99 - 14 376)	4 141 (396 - 12 852)	0.004	2 205 (99 - 12 057)	3 390 (99 - 12 354)	< 0.001

p value - Mann-Whitney U test; Total MET minutes of physical activity a week.

COVID-19 in some population groups, physical activity decreased while in others increased (3, 21-25).

The study on the Turkish student population showed that the percentage of physically active students decreased almost three times during the pandemic (9). The physical activity of dental students decreased during the COVID-19 pandemic compared to the period before the pandemic (3, 22). The aforementioned studies are in agreement with the results of this study.

Data analysis on physical activity before the pandemic shows dental students spend about 4.5 hours a day sitting, similar to the National Health survey (26). During the pandemic weekly sitting time was two hours more than before, which is consistent with the study among university students in Spain (27). According to WHO Global Action Plan on Physical Activity 2018 - 2030, to help reduce the detrimental effects of high levels of sedentary behavior on health, the population including students should aim to do more than the recommended levels of moderate-to-vigorous physical activity (20). This study and others point to significant reduction of the exercise of vigorous and moderate physical activity (27).

The Total MET from the students before the pandemic (3 150) was similar to the study among students from the University of Novi Sad (3 718) which is, according to guidelines, a high level of physical activity (28). During the pandemic and online classes, there was a significant decrease in Total minutes of physical activity per week (2 346) which puts them in the category of moderate physical activity.

Previous research among the Serbian student population has reported that male students have more intense physical activity than female students (28, 29). In this study, the difference in physical activity between the genders becomes very pronounced during the pandemic, which others also confirm (27).

There are some limitations in this study that should be acknowledged. First, the study was carried out in a single university center. Also, the study retrospectively recorded data on physical activity before the pandemic. To the best of our knowledge, this is the first investigation of physical activity particularly in dental students in Serbian population during the pandemic. There is a need to continue research about the impact of the reduction of physical activity during the COVID-19 pandemic on the mental health of dental students.

## Conclusion

During the pandemic, students' physical activity has been significantly reduced, particularly among female dental students. It is necessary to take preventive measures so that an excessively sedentary lifestyle would not compromise the health of students.

## Literature

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