Evaluation of the pandemic and vaccination against COVID-19 in the health of dental academics

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ABSTRACT

This study investigated the prevalence of the coronavirus disease (COVID-19) and vaccination among dental students from public and private institutions, as well as verified the level of influence of the pandemic and vaccination on physical, mental health and academic performance. In this cross-sectional study an online questionnaire using Google Forms® was applied to dental students from a public and a private university on epidemiological data, COVID-19, vaccination and the impact of social distancing on health. The rate of COVID-19 infection in both groups was 36.8% (n=46), and when asked about the period of infection, 82.6% of these (n=38) contracted it before the first dose, but there were no statistically significant differences (χ^2=2.667; p=0.102) between the groups. There was a difference between the groups tested, since 56.3% of the students from G1 were vaccinated with a second dose, compared to 29.6% from G2 (χ^2= 16.554; p= 0.0009). Students were asked about the existence of risks in the dentistry course, and 76.8% considered that there are risks (n=96), with a statistically significant difference (χ^2 = 10.216; p= 0.001). Regarding the vaccine, 64% of the participants think it is safe (n=80), with a statistically significant difference between the groups (χ^2 = 4.374; p= 0.036). Most students contracted COVID-19 before the first dose, were vaccinated with the second dose by AstraZeneca and Pfizer immunizers. The academic performance and the physical and mental health of the students were significantly affected, with the students of advanced periods and those of public universities suffering more negative impacts.

Descriptors: Mass Vaccination. Pandemics. Students, Dental.

1 INTRODUCTION

According to the latest evidence, the main ways of transmission of the SARS-CoV-2 virus are by direct contact with infected people or fomites, by respiratory droplets expelled by an infected person, or by aerosols, which are smaller droplets that contain the virus. and can remain suspended in the air[1]. Health professionals are included in a high-risk group for acquiring this infection, thus justifying the importance of their immunization and inclusion in the priority group of vaccination coverage[1,2].

Among health professionals, there are dental surgeons, who work in the hospital environment, mainly for the diagnosis and treatment of oral manifestations of COVID-19, such as sialadenitis,

anosmia and ageusia[3,4]. These professionals use, in their routine, devices such as high-speed motors, ultrasonic instruments and air/water syringes that generate a large amount of aerosols and contamination of surfaces, predisposing them to contracting COVID-19[5]. The importance of these professionals in the pandemic and their high risk of contamination demonstrate, therefore, the need to vaccinate them, so that they can safely perform dental care.

In the academic sphere, since clinical dental practice involving patients is indispensable and the environment of teaching clinics is a place of contagion, dental students, who provide care to the population, are exposed to the same risks as dental surgeons[6,7]. Thus, it is of great importance that they are vaccinated against COVID-19 so that they have a safe learning environment8. In Brazil, the Ministry of Health has included as a priority in its national vaccination campaign against COVID-19 health students who are undergoing internships in the hospital, primary care and clinical areas[2].

It is worth mentioning that emergency remote teaching is a temporary strategy, since this method cannot replace important practical activities necessary for the teaching-learning process in the health area, with the development of skills, abilities and attitudes essential for the training of health professionals[8].

Still in the academic context, students had to deal with the change in the way of teaching, with theoretical classes through virtual platforms, having to adapt to the hybrid teaching format adopted by institutions, even after the advent of vaccines[9,10]. Consequently, these students were exposed to depression and could be negatively affected by the fear of infection by the virus, of transmitting the disease and losing friends and relatives[11,12]. These negative effects on mental health can have negative repercussions on learning and academic results, especially in the dentistry course[13].

It is believed that most dental students are vaccinated and that the pandemic has negatively affected their physical, mental and academic health.

Thus, the objective of the present study was to investigate the prevalence of COVID-19 and vaccination among dental students from public and private institutions, as well as verifying the level of influence of the pandemic and vaccination on physical, mental health and academic performance.

2 METHODS

Ethical Aspects

The research was carried out after the ethical opinion of approval of the Research Ethics Committee of the State University of Piauí - CEP/UESPI, with CAAE number: 51984721. 3.0000.5209. This research was guided by obedience to all the ethical principles that guide research involving human beings, as provided for in Resolution No. 466/12 (CNS/MS), with the students having read and accepted the Informed Consent Form (ICF). Furthermore, only information collected strictly within the limits of the research objectives was used.

Population Study

This was a study carried out at a public university, State University of Piauí (UESPI) and a private university, Mauritius of Nassau University Center (UNINASSAU), from December 2021 to January 2022, in the city of Parnaíba/PI. The sample size calculation was based on the target population: young people over 18 years of age, enrolled in the dentistry course at both universities, totaling 280 students, 90 at UNINASSAU and 190 at UESPI. Thus, the required sample size was 138 participants. The sample was non-probabilistic, intentional, with the minimum number of participants considered sufficient, considering the proposed analyses, the sampling error of 5%, in

addition to a 90% confidence level, indicating that the probability of the error made by the research was not exceeded 5%[14].

Eligibility Criteria

Inclusion criteria were young people over 18 years of age who were studying a bachelor's degree in dentistry at any time. While in the exclusion criterion were students outside the established age group.

Calibration

Two researchers sent by email the link to access the questionnaire prepared by Google Forms® to 10 professors of the dentistry course from the two universities involved in the research to calibrate the researchers regarding their ability to carry out online research and to compute the data obtained, as well as to determine of intra-examiner and inter-examiner agreement. Kappa values were 0.84 for inter-examiner agreement (between the two examiners), 0.85 and 0.87 for intra-examiner agreement.

Pilot Study

Before data collection, a pilot study was carried out with 10 dentistry students, minors from UESPI, who were attending the first period and did not participate in the research, to evaluate the method and verify if there would be any need to make changes in the methodology initially. proposal. As a result, there was no need to change the methodology.

Data Collect

UESPI students participated in group 1 (G1) and UNINASSAU students, in group 2 (G2). An email with an invitation to participate and a link to access the survey was sent to the students' personal email address twice a week for 15 days, in an attempt to get more participants, with a questionnaire link being sent via a messaging application to all classes in the case of non-response by email. Students were invited to answer an online questionnaire developed in Google Forms® (Google LLC, Mountain View, CA, USA), consisting of two pages. The first with epidemiological data and the second with data on COVID-19, vaccination and the repercussion of social distancing on student health (figure 1), based on the questionnaire previously validated by other authors and adapted to this research[15].

Which university do you study? ( ) Public ( ) Private
Age: ( ) Between 18 and 20 years old ( ) Between 21 and 25 years old ( ) Over 25 years old
Monthly Family Income: ( ) Up to 3 minimum wages ( ) More than 3 minimum wages
Period currently studying:( )1st ( )2nd ( )3rd ( )4th ( )5th ( )6th ( )7th ( )8th ( )9th ( )10th
Do you act clinically? ( ) Yes ( ) No
Vaccination: ( ) Not vaccinated ( ) Single dose ( ) 1st dose, waiting for 2nd dose ( ) 2nd dose
Which type of vaccine? ( ) Coronavac ( ) Astrazeneca ( ) Pfizer ( ) Johnson – single dose
Have you had Covid-19? ( ) Yes ( ) No
If yes, it was: ( ) before taking the first dose; ( ) in the interval between the first and second dose; ( ) after completing the vaccine cycle
What symptoms did you have when you had Covid-19? _____
Do you adopt preventive measures (mask, social distance, gel alcohol) against COVID-19? ( ) Yes ( ) No
Do you believe that the dentistry course brings risks regarding covid-19? ( ) Yes ( ) No
Does the vaccine make you safe when you have Covid-19? ( ) Yes ( ) No
Did the pandemic negatively affect your physical health? ( ) Yes ( ) No
Has the pandemic negatively affected your mental health? ( ) Yes ( ) No
Did the pandemic negatively affect your academic performance? ( ) Yes ( ) No

Figure 1. Questionnaire applied to students

The results were stored in the Excel Windows 2016 Microsoft® (Redmond, WA, USA) database in graphs and tables. With BioEstat (Instituto Mamirauá, Belém, PA, Brazil), in its version 5, it was possible to perform descriptive statistics, with averages, percentages and frequencies, association analyzes from the chi-square, all with the level of significance measured by the p value >0.05. Graphs were assembled in sequence with Origin 2016 (OriginLab, Northampton, MA, USA) to compare results.

3 RESULTS

Despite having been contacted by email and messaging application for 150 students, a higher number than stipulated by the sample calculation, a total of 132 students responded to the questionnaire, 73 from G1 and 59 from G2. Of this total, 7 students were excluded from the study because they were underage, leaving a sample of 125 participants, 71 in G1 and 54 in G2, a value below the sample calculation. Regarding both groups, 52% were female (n=65) and 48% were male (n=60) and most of them had a monthly family income of up to 3 minimum wages (56.8%). There was a statistically significant difference (χ^2=33.637; p < 0.0001) in the age item between the groups tested, with 90.4% between 18 and 25 years of age (n=113) as illustrated in figure 2, with 77.6% students from the 1st to the 3rd year of the course (n=97) and 22.4% from the fourth to the fifth year of the course (n=28). There were statistically significant differences between the groups tested (χ^2=65.818; p <0.0001).

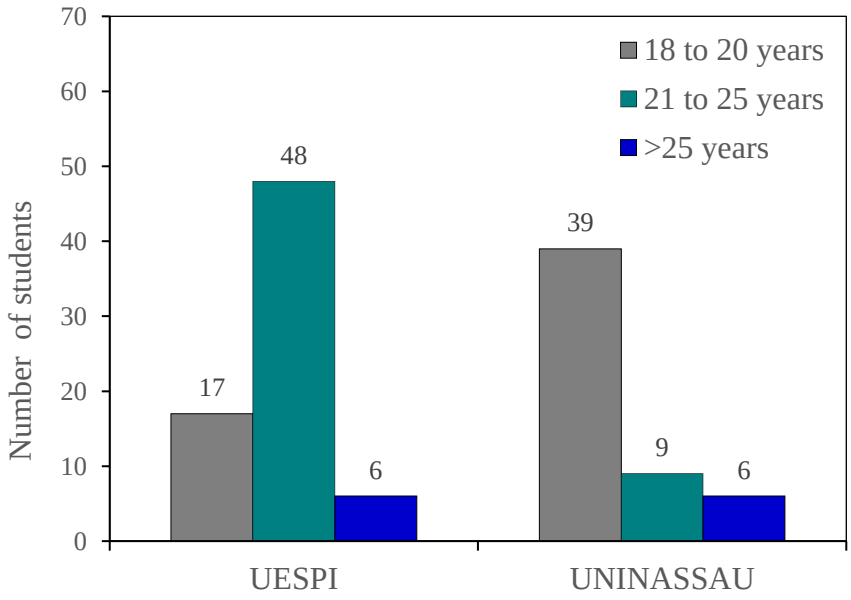

Figure 2. Distribution of ages among the groups participating in the research

The G1 group was more frequent and most of the students from G1 attended the ninth period and from G2, the second period. Regarding clinical activity, the majority of respondents still had no activities (56.8%). In addition, there was a significant difference between the groups (χ^2=20.193; p<0.001), and, among those who worked clinically, those in the G1 group were in

greater number. Socioeconomic data and academic status were recorded in table 1.

Table 1. Distribution of socioeconomic data and students' academic status

Variables		**G1**	**G2**	**Total**	**χ^2 *p*-value**
Age	18-20 years	17	39	56	33.637
	21-25 years	48	9	57	0.0001**
	>25 years	6	6	12	
Gender	Female	37	28	64	0.001
	Male	34	26	61	0.879
Monthly family income	Up to 3 minimum wages	39	32	71	0.234
	Greater than 3 minimum wages	32	22	54	0.763
Period studied	1st period	9	0	9	65.818 0.0001**
	2nd period	11	42	53	
	3rd period	4	0	4	
	4th period	9	1	10	
	5th period	6	1	7	
	6th period	5	9	14	
	7th period	5	1	6	
	8th period	3	0	3	
	9th period	12	0	12	
	10th period	7	0	7	
Clinical activity	Yes	43	11	54	20.193
	No	28	43	71	0.001*

G1: UESPI students; G2: UNINASSAU students; χ^2: Chi-square test; ***:** significance at 0.001%; **: significance at 0.0001%

Regarding vaccination status, 8% of the students were not vaccinated (n=10), 43.2% took the first dose (n=54), 44.8% took the second dose (n=56) and 4% took single dose (n=5). There was a difference between the groups tested, since 56.3% of the students from G1 were vaccinated with a second dose, compared to only 29.6% from G2 (χ^2=16.554; p=0.0009). There was a difference regarding the type of vaccine (χ^2=10.733; p=0.013), with AstraZeneca (Cambridge, UK) and Pfizer (New York, NY, USA) being the most used (table 2). The COVID-19 infection rate in both groups was 36.8% (n=46), and when asked about the period of infection, 82.6% of these (n=38) contracted it before the first dose, however, there were no statistically significant differences (χ^2=2.667; p=0.102) between the groups. In this case, the G test was also applied (with G value of 2.780 and p=0.095), not showing any statistically significant difference.

When asked about the symptoms presented when infected with COVID-19, the most prevalent were fever (73.91%), tiredness (69.56%) and headache (65.21%), with no statistically significant difference (χ^2=4.613; p=0.867) between the groups, with both presenting similar symptoms.

Table 2. Distribution of epidemiological data on COVID-19 and vaccination

Variables		G1	G2	Total	χ^2 *p*-value
Vaccination status against COVID-19	Not vaccinated	1	9	10	16.554 0.0009**
	1st dose	26	28	54	
	2nd dose	40	16	56	
	Single dose	4	1	5	
Type of vaccine	AstraZeneca	38	12	50	10.733 0.013*
	Coronavac	7	9	16	
	Pfizer	21	23	44	
	Janssen	5	1	6	
Have you ever had COVID-19	Yes	21	25	46	3.687 0.055
	No	50	29	79	
When had Covid-19	Before the 1st dose	14	24	38	2.667 0.102
	Between 1st and 2nd dose	4	1	5	
	After 2nd dose	3	0	0	
Symptoms presented	Headache	17	13	30	4.613 0.867
	Fever	13	21	34	
	Nausea	5	9	14	
	Diarrhea	5	6	11	
	Shortness of breathe	3	6	9	
	Tiredness	11	21	32	
	Loss of smell/taste	12	13	25	
	Dry cough	6	8	14	
	Weakness	13	17	30	
	Dizziness	1	2	3	

G1: UESPI students; G2: UNINASSAU students; χ^2: Chi-square test; ***:** significance at 0.001%; **: significance at 0.0001%

It was found that 99.2% of the participants stated that they adopt preventive measures, with no difference (χ^2=1.325: p= 0.249) between the groups. Students were asked about the existence of risks of getting sick from COVID-19 in the dentistry course, and 76.8% considered that there are risks (n=96), with a statistically significant difference (χ^2=10.216; p= 0.001). Regarding the vaccine, 64% of the participants think it is safe (n=80), with a statistically significant difference between the groups (χ^2=4.374; p= 0.036). The cited data can be seen in table 3.

When asked about the impact of the pandemic on health and academic performance, 55.2% responded that their physical health was compromised, with a statistically significant difference (χ^2= 6.111 and p= 0.013) and 79.2% responded that their mental health was affected, with a statistically significant difference (χ^2 = 6.584 and p= 0.010). In addition, 82.4% (n=103) responded that their academic performance was impaired, with a statistically significant difference (χ^2= 9.487 and p= 0.021) (table 4).

Table 3. Distribution of data regarding preventive measures, risks of getting sick in the course and safety of the vaccine

Variables		G1	%	G2	%	Total	χ^2 *p*-value
Adopt preventive measures	Yes	71	100	53	98.1	124	1.325
	No	0	-	1	1.9	1	0.249
Do you think there are risks in the course	Yes	62	87.3	34	62.9	96	10.216
	No	9	12.7	20	37.1	29	0.001**
Vaccine brings security	Yes	51	71.8	29	53.7	80	4.374
	No	20	28.2	25	46.3	45	0.036*

G1: UESPI students; G2: UNINASSAU students; χ^2: Chi-square test; ***:** significance at 0.001%; **: significance at 0.05%

Table 4. Distribution of data regarding health and academic performance.

Variables		G1	%	G2	%	Total	χ^2 *p*-value
Compromised physical health	Yes	46	64,7	23	42,5	69	6.111
	No	25	35,3	31	57,5	56	0.013*
Affected mental health	Yes	62	87,3	37	68,5	99	6.584
	No	9	12,7	17	31,5	26	0.010**
Impaired academic performance	Yes	65	91,5	38	70,3	103	9.487
	No	6	8,5	16	29,7	22	0.021*

G1: UESPI students; G2: UNINASSAU students; χ^2: Chi-square test; ***:** significance at 0.05%; **: significance at 0.01%;

4 DISCUSSION

Observing the socioeconomic data, there was a prevalence of females, which corroborates the studies[16,17] that emphasized the feminization of the dentistry course compared to previous years. In addition, it is assumed that the greater participation of this gender in this research is due to the fact that they interact more frequently on social networks, a fact reinforced by another author[17] when stating that women are more available to participate in research that use online questionnaires. Regarding monthly family income, it was observed that most undergraduates have an income of up to 3 minimum wages, probably because the predominant group in this research is from public universities. A similar fact was observed by other researchers[12,18] when they concluded that most university students in the public network are low-income.

There was also a difference in age between the groups, which may be due to the fact that in G2, the most prevalent period in the research was the second, consisting of younger people, which was expected, since most university students begin their academic life, close to adulthood[19]. Such findings in the research justified the fact that most respondents are not yet working in clinical activities, corroborating some studies[20,21] that highlighted that the first two years of the dentistry course are not focused on clinical practice.

The most used vaccines were AstraZeneca® and Pfizer® due to being the most acquired in the period in which the age group of these young people was contemplated with the vaccination. In addition, a study[21] showed that these immunizers were the most acquired in Brazil for vaccination of its population.

This survey found that the majority of

respondents who contracted COVID-19 were infected before the first dose, suggesting that vaccination is an important protective mechanism. This fact was reinforced by other authors[22-24] when demonstrating the effectiveness of vaccines in their research. Regarding symptoms, both groups had similar symptoms, with fever being the most prevalent, especially tiredness, weakness, headache and loss of smell and taste. Other studies[25,26] also found that fever was the most prevalent symptom.

Regarding prevention measures, most respondents from both groups stated that they adopt preventive measures, corroborating the study[27] that found that most students are adept at such measures, including in the social environment. Other studies[28-30] showed that most higher education students in different countries changed their routine during the pandemic and adopted preventive measures such as the use of masks and social distancing.

In this research, 76.8% of the participants considered that there are risks in the dentistry course, but 37.03% of the G2 students stated that there were no risks in the course. This is probably due to the fact that most of the interviewees in G2 are from the 2nd period, with little knowledge of the risks of dental activity and are not in clinical activity, therefore being less exposed to risks than those in more advanced periods. This fact was reinforced by other authors[31,32] who reported that during academic periods students have more notions of biosafety and the importance of using personal protective equipment (PPE).

Regarding the variable safety with the vaccine, only 64% feel safe, showing an alarming number of students in the health area questioning the effectiveness of vaccines. This fact is responsible for the drop in vaccination coverage rates. This may be because according to some studies[33,34], negative advertising has been increasingly frequent and persuasive, with false and distorted information, questioning the safety and efficacy of vaccines.

Regarding the impacts on physical and mental health and academic performance, it was observed that most students had mainly their mental health and academic performance affected, corroborating other researches[35,36] by showing that dentistry students had their mental health affected with levels high levels of stress, anxiety and various deleterious effects, as well as delays in graduation, compromised study routine and reduced learning.

However, in this study, G2 students were less affected compared to G1 students, probably related to the fact that most G2 students are at the beginning of the course, without anxiety for the end of graduation. This fact was explained by other authors[35] when they found that the fact that academics are in advanced periods of the course, do not adapt to distance learning or worry about the delay in graduation may contribute to the development of mental disorder[37]. This fact was recently reinforced by some authors when they emphasized that the COVID-19 pandemic led to an increase in anxiety, depression and stress, in addition to greater concerns about learning and biosafety in dental students who were attending their last year[38].

5 CONCLUSIONS

Most students contracted COVID-19 before the first dose, were vaccinated with the second dose by AstraZeneca® and Pfizer® immunizers. The academic performance and the physical and mental health of the students were significantly affected, with the students of advanced periods and those of public universities suffering more negative impacts.

RESUMO

Influência da pandemia da COVID-19 e vacinação na saúde física, mental e no desempenho acadêmico de estudantes de odontologia

Este estudo investigou a prevalência da COVID-19 e vacinação entre estudantes de odontologia de

instituições públicas e privadas, bem como verificar o nível de influência da pandemia e da vacinação na saúde física, mental e no desempenho acadêmico. Em um estudo transversal, foi aplicado um questionário online utilizando o Google Forms® a estudantes de odontologia de uma universidade pública e privada sobre dados epidemiológicos, COVID-19, vacinação e o impacto do distanciamento social na saúde. A taxa de infecção por COVID-19 em ambos os grupos foi de 36,8% (n=46), e quando questionados sobre o período de infecção, 82,6% destes (n=38) contraíram antes da primeira dose, mas não houve significância estatística diferenças (χ^2=2,667; p=0,102) entre os grupos. Houve diferença entre os grupos testados, pois 56,3% dos escolares do G1 foram vacinados com uma segunda dose, comparado a 29,6% do G2 (χ^2= 16,554; p= 0,0009). Os alunos foram questionados sobre a existência de riscos no curso de odontologia, e 76,8% consideraram que existem riscos (n=96), com diferença estatisticamente significativa (χ^2 = 10,216; p= 0,001). Em relação à vacina, 64% dos participantes a consideram segura (n=80), com diferença estatisticamente significativa entre os grupos (χ^2 = 4,374; p= 0,036). A maioria dos alunos contraiu COVID-19 antes da primeira dose, foram vacinados com a segunda dose pelos imunizadores AstraZeneca® e Pfizer®. O desempenho acadêmico e a saúde física e mental dos alunos foram significativamente afetados, com os alunos de períodos avançados e os de universidades públicas sofrendo mais impactos negativos.

Descritores: Vacinação em massa. Pandemias. Estudantes, Odontologia.

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