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COVID-19 pandemic, vaccination, and academic activities in Dentistry course

Pandemia da COVID-19, vacinação e atividades acadêmicas no curso de Odontologia

Pandemia de COVID-19, vacunación y actividades académicas en el curso de Odontología

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Abstract
This study aimed to assess the incidence of COVID-19 among dental students and their adherence to vaccination. From March 2020 to July 2023, the study was an observational, retrospective, cross-sectional, individualized survey involving students from all academic years of the undergraduate Dentistry course at an educational institution near Rio de Janeiro city, RJ, who willingly agreed to participate in the research. The questionnaire was distributed using Google Forms, with the first page including the Informed Consent Form for participation. Ninety-two questionnaires were completed, with 72.2% of respondents female, 58.7% aged 18-27 years, 64.1% single, and 87% working in clinical practices. Almost half of the participants (42.4%) reported being infected with COVID-19. As for vaccination adherence was notably high, with all participants (100%) receiving the first dose and 97.8% receiving the second dose. Most participants received the Pfizer vaccine for the first and second doses, followed by AstraZeneca. This high level of adherence to vaccination among the students is a testament to their dedication to their profession and the safety of their patients.
Keywords: COVID-19; Incidence; Students, Dental; Vaccination; Health; Teaching.

Resumo
O presente estudo teve por objetivo analisar a incidência de COVID-19 entre acadêmicos de odontologia bem como identificar o nível de adesão à vacinação entre os estudantes. Foi realizado um estudo observacional, retrospectivo, transversal, individualizado, referente ao período de março de 2020 a julho de 2023. Foram incluídos neste estudo, acadêmicos do primeiro ao último período do curso de graduação em Odontologia de uma instituição de ensino localizada em um município da Baixada Fluminense - RJ, que voluntariamente aceitaram participar da pesquisa. O questionário foi aplicado pelo *Google Forms*, em sua primeira página constava o Termo de Consentimento Livre e

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Esclarecido, com a concordância em participar da pesquisa. Foram respondidos 92 questionários, sendo 72,2% sexo feminino, 58,7% possuíam idade entre 18 e 27 anos, 64,1% eram solteiros, 87% atuam nas práticas clínicas. Quase metade dos participantes (42,4%) foram infectados pela COVID-19, quanto à adesão à vacinação foi significativamente alta, com a totalidade (100%) na primeira e 97,8% dos participantes na segunda dose. Houve predominância da Pfizer tanto na primeira quanto segunda dose, seguida pela Astra Zeneca.
Palavras-chave: COVID-19; Incidência; Estudantes de Odontologia; Vacinação; Saúde; Ensino.

Resumen
El presente estudio tuvo por objetivo analizar la incidencia de COVID-19 entre académicos de odontología así como identificar el nivel de adhesión a la vacunación entre los estudiantes. Se realizó un estudio observacional, retrospectivo, transversal, individualizado, referente al período de marzo de 2020 a julio de 2023. Fueron incluidos en este estudio, académicos del primero al octavo período del curso de graduación en Odontología de una institución de enseñanza localizada en un municipio de la Baixada Fluminense - RJ, que voluntariamente aceptaron participar de la investigación. El cuestionario fue aplicado por Google Forms, en su primera página constaba el Término de Consentimiento Libre y Informado y al responder las preguntas, estarían aceptando participar en la encuesta. Fueron respondidos 92 cuestionarios, siendo 72,2% sexo femenino, 58,7% poseían edad entre 18 y 27 años, 64,1% eran solteros, 87% actuaban en las prácticas clínicas. Casi la mitad de los participantes (42,4%) fueron infectados por COVID-19, en cuanto a la adhesión a la vacunación fue significativamente alta, con la totalidad (100%) en la primera y 97,8% de los participantes en la segunda dosis. Hubo predominio de PFIZER tanto en la primera como en la segunda dosis, seguida por la ASTRA ZENECA.
Palabras clave: COVID-19; Incidencia; Estudiantes de Odontología; Vacunación; Salud; Enseñanza.

1. Introduction

The first cases of COVID-19, caused by a new type of coronavirus never seen in humans, occurred on December 31, 2019, in the province of Hubei, China. As the virus spread globally, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic on March 11, 2020 (Brasil, 2020).

In Brazil, the Ministry of Health initiated several measures to reduce the spread of the disease. In the latter part of March, community transmission was officially declared in the country through the publication of Ordinance Nº 454/GM/MS on March 20, 2020 (Brasil, 2020), highlighting the necessity of implementing social distancing measures.

On March 31, 2020, the National Health Surveillance Agency (Anvisa) updated Technical Note No. 4/2020 with guidelines on prevention measures and control measures to be adopted in healthcare services for suspected or confirmed cases of COVID-19 infection (Anvisa, 2020).

The COVID-19 pandemic has overwhelmed health systems globally, resulting in significant losses. Control measures to minimize the spread of the disease, such as transitioning educational institutions and companies to remote activities, are essential. In dental education, this situation persisted until the end of the semester, sparking extensive debate about the resumption of in-person activities (Pereira et al., 2022).

Regarding the nature of dentistry, it was identified as one of the highest risk areas for potential contamination by SARS-CoV-2, which significantly impacted practical measures. As a result, dental care needed to be reorganized and adapted, along with an analysis of individual and collective risk in care production (Brasil, 2020; Brasil, 2021).

Clinical dental practice involves close contact between professionals and patients. It already has a strict biosafety protocol, with well-structured individual and collective protection measures (Brasil, 2020; Opas, 2020; Anvisa, 2020; Brasil, 2021). Despite this, many dental procedures generate aerosols that can spread beyond the immediate vicinity of the dentist and their team. Studies have shown that the risk of contamination is 100% within a 1-meter radius and 50% at a distance of over 2 meters (Brasil, 2006). Therefore, it is crucial for dental professionals to routinely use individual protection equipment (IPE), including disposable lab coats, gloves, safety glasses, professional masks, and caps. These measures are essential for protecting both the dental team and their patients (Brasil, 2006; Anvisa, 2020; Brasil, 2021).

In the second semester, the dentistry course implemented a hybrid approach. Practical classes were divided into two groups, each attending an online theoretical class or participating in laboratory or clinical practice on alternate weeks. The physical spaces were modified to accommodate 50% capacity, adhering to social distancing guidelines. Before starting these activities, the entire team of professionals and students underwent training to comply with the biosafety standards in response to COVID-19, as outlined by ANVISA (Anvisa, 2020; Brasil, 2021). In addition to the individual protective equipment (IPE) already in use, N95 masks, disposable coats, and face shields were provided to all involved. These stringent biosafety measures were put in place to ensure the safety of both the students and the patients, providing a sense of reassurance in these challenging times.

The return of practical activities during the COVID-19 pandemic in the Dentistry course presented significant challenges due to the need to adhere to new biosafety protocols and the associated risk of contamination, particularly from aerosols generated during dental procedures (Paredes et al., 2021; Batra et al., 2021; Amaral et al., 2021). The absence of a vaccine and limited knowledge about treatment protocols also contributed to uncertainty. Despite these challenges, in response to the decreased severity of COVID-19, in-person activities were permitted for courses that were previously conducted entirely face-to-face. However, this situation led to heightened anxiety, affecting the number of students participating in clinical practice activities in undergraduate courses (Menezes, 2022). It's important to acknowledge the resilience and determination of these students in the face of such challenges, which is truly commendable.

Due to their increased susceptibility to COVID-19, initial vaccine doses were prioritized for students and health professionals. However, global acceptance of the vaccine among dental students was below the desired level, with approximately 22.5% expressing hesitation and 13.9% rejecting COVID-19 vaccines. This vaccine hesitancy was influenced by the socioeconomic context in which dental students live and study, as well as by factors such as social networks, public figures, insufficient knowledge about vaccines, and distrust of governments and the pharmaceutical industry (Riad et al., 2021). With the implementation of widespread vaccination programs, the incidence of COVID-19 decreased, and although new variants occasionally emerged, they were less lethal (Estrada & Nóbrega, 2022). Consequently, this research aimed to assess the occurrence of COVID-19 and vaccination coverage among dental students at a private educational institution during the COVID-19 Pandemic.

2. Methodology

The Research Ethics Committee of UNIG approved this study under the number CAAE: 67118722.8.0000.8044.

2.1 Nature of the research

An observational, retrospective, cross-sectional, individualized study was conducted on undergraduate students in the institution's dentistry department from March 2020 to July 2023.

2.2 Inclusion criteria

Ninety-two academics from the undergraduate Dentistry School at an educational institution on the outskirts of Rio de Janeiro city participated in this study. They willingly agreed to take part in the research. The academics received the Informed Consent Form (ICF) and research questions through the WhatsApp class group. After reading and agreeing to the ICF, each student was directed to answer the research questions.

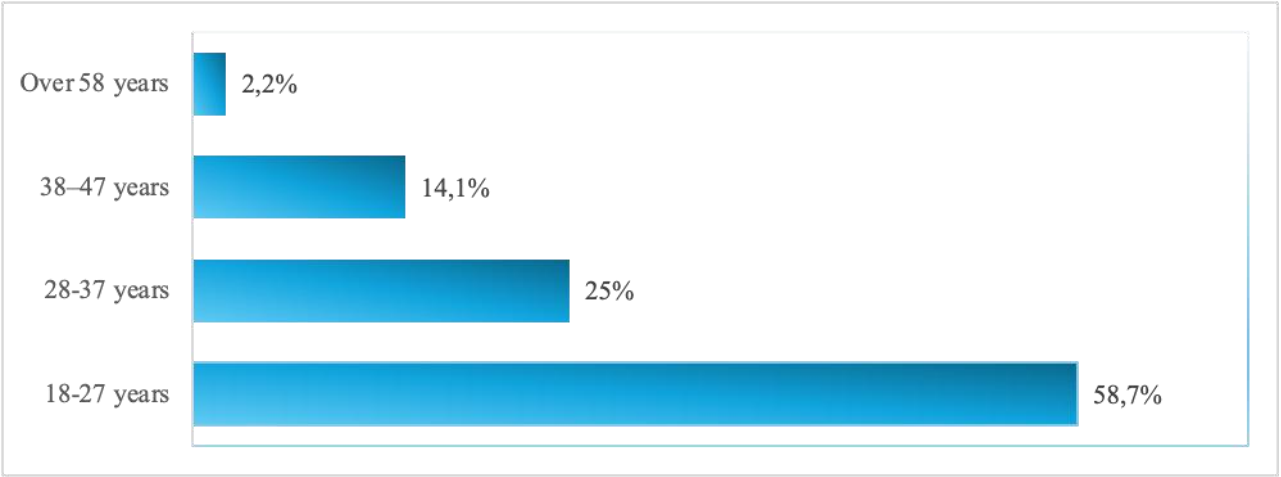
2.3 Data analysis

Data analysis was done using an electronic survey created in the Google Forms app. The survey contained questions about the research subject, including gender, age, marital status, years of study at dental school, number of vaccine doses, vaccination timeline, type of vaccine received, experience with COVID-19, clinical and laboratory practices at the institution, and any professional activities outside of the course. The collected information was entered into a Microsoft Excel spreadsheet for analysis, with the variables being described in terms of percentages.

3. Results

Ninety-two surveys were answered; 72.2% were female, and 100% took some dose of the vaccine. 34.8% were working in addition to the dentistry course. The age group of the sample was between 18 and 57 years, and 58.7% comprised the age group of 18 to 27 years, as described in Figure 1.

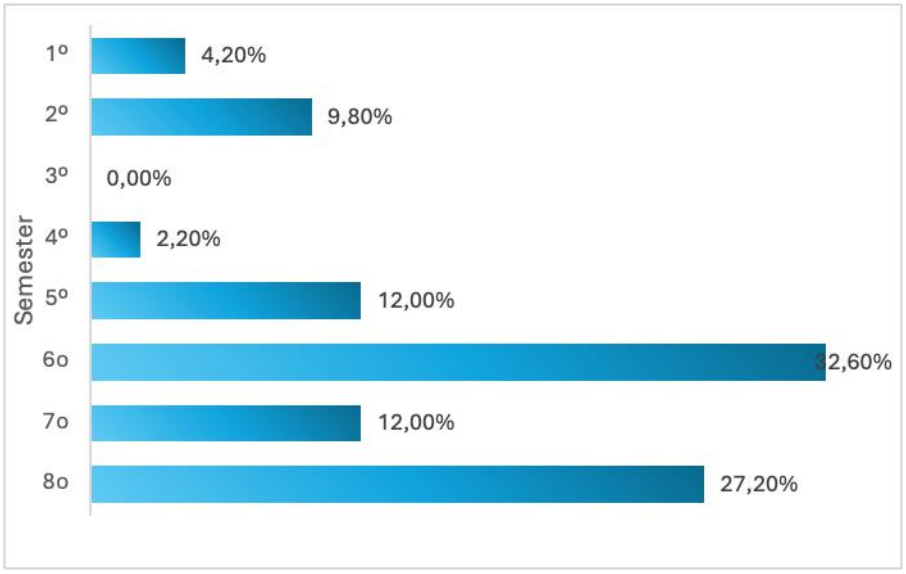
Figure 1 – Distribution of 92 dental students according to age group.



Source: Authors.

Regarding an area of expertise, 87% of students are involved in clinical practices, corresponding to the fourth to the eighth period, as indicated in Figure 2.

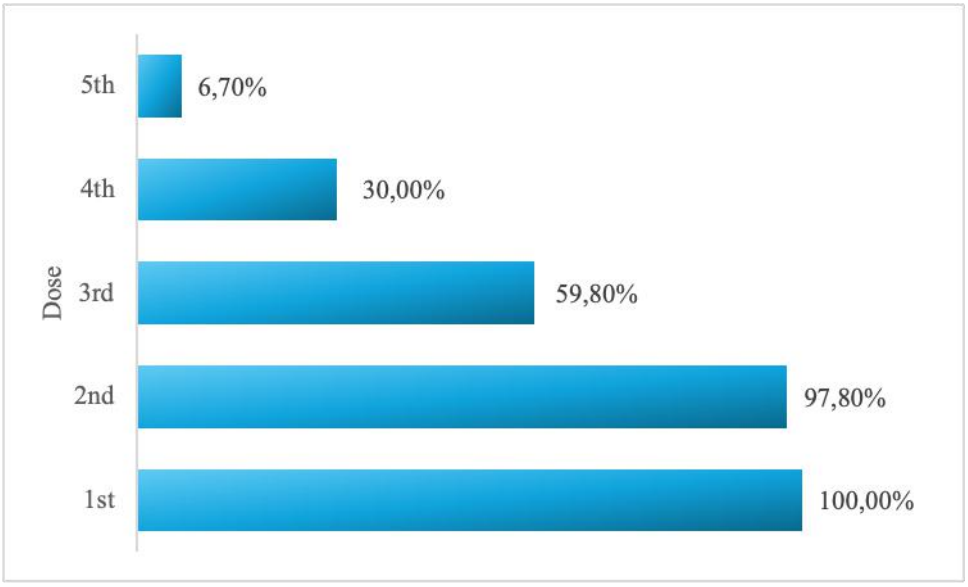
Figure 2 - Distribution of dentistry students according to school semester.



Source: Authors.

There was adherence to vaccination, mainly at the beginning of the pandemic, from the first to the fifth dose (multipurpose). It was observed that while the number of vaccines increased, the same was not the case, with a decreasing number of vaccinated people over time (Figure 3).

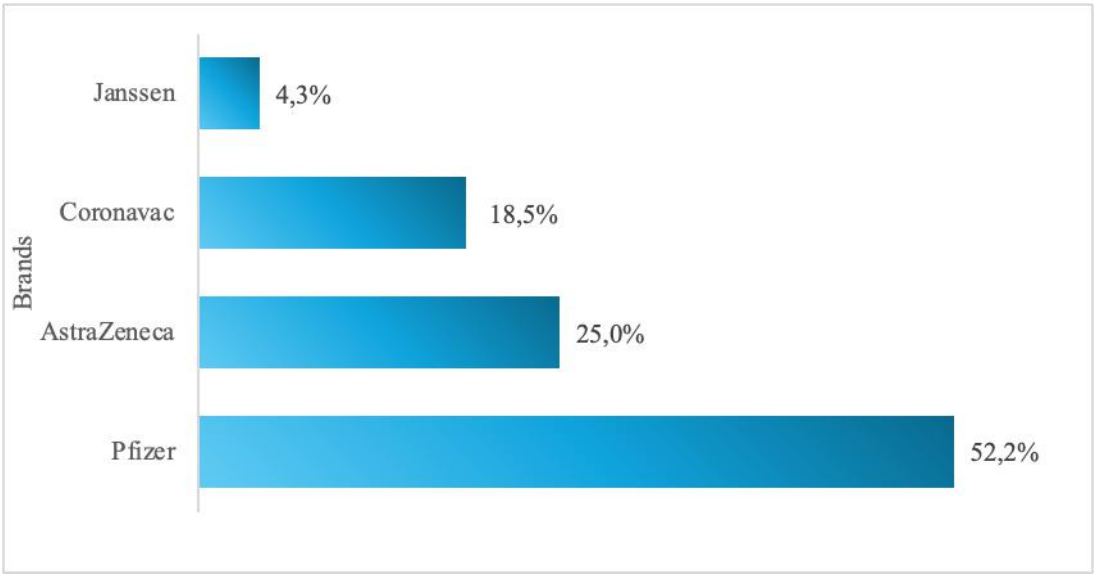
Figure 3 - Adherence to vaccination according to doses.



Source: Authors.

According to Figures 4 to 8, Pfizer was the most widely used vaccine in all doses, with a total of 5 vaccine doses administered.

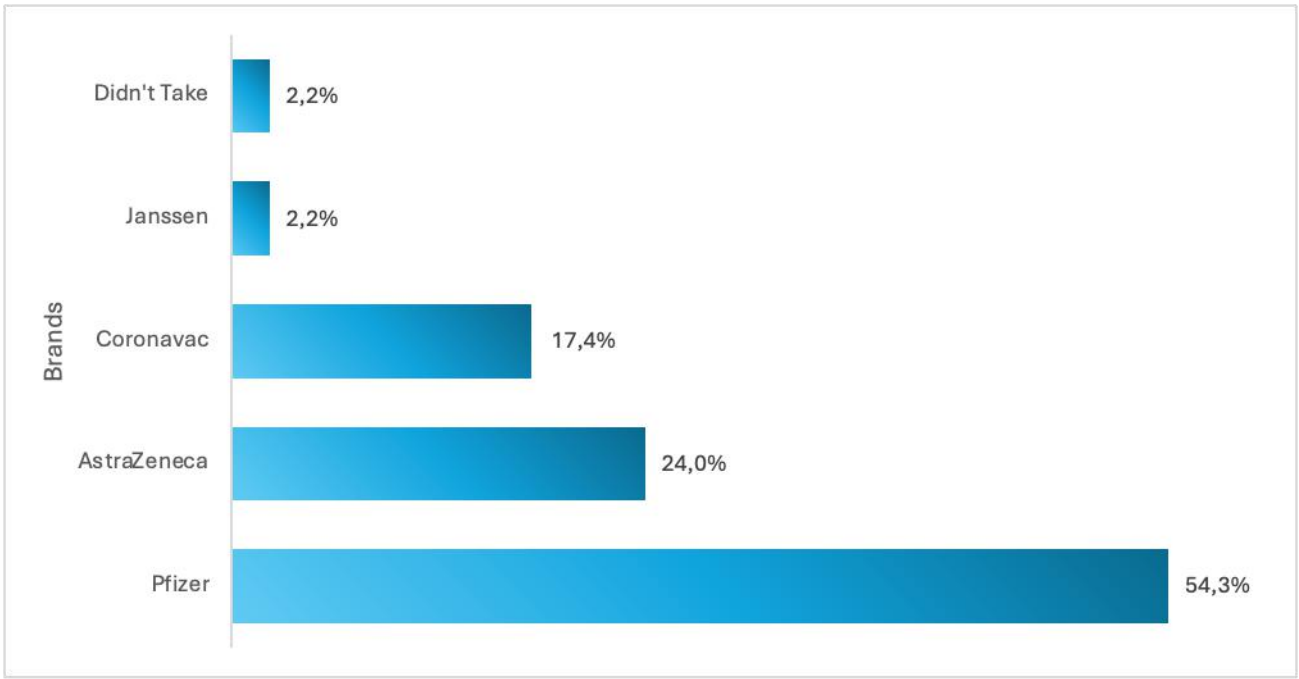
Figure 4 - Vaccine brands most administered on the first dose.



Source: Authors.

The primary series cycle (WHO, 2024) is complete when the second dose of the COVID-19 vaccine is administered, but only 2.2% were able to receive it. On the other hand, Jansen was the vaccine used the least (2.2%), and Pfizer was the most used (54.3%) (Figure 5).

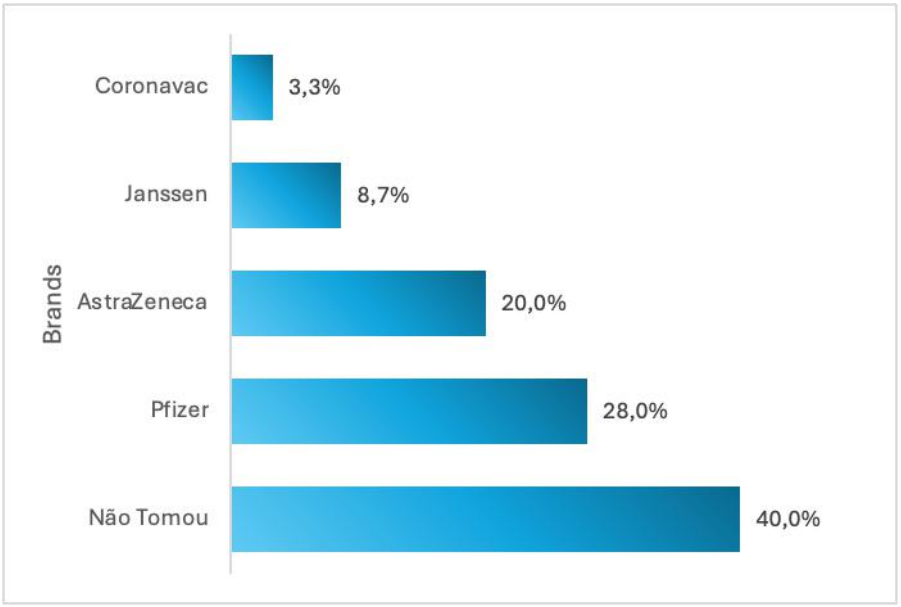
Figure 5 - Vaccines received in the 2nd dose.



Source: Authors.

According to Figure 6, adherence to the third dose, which is considered the first booster dose (WHO, 2024), was lower, with 40.2% of respondents not receiving this dose.

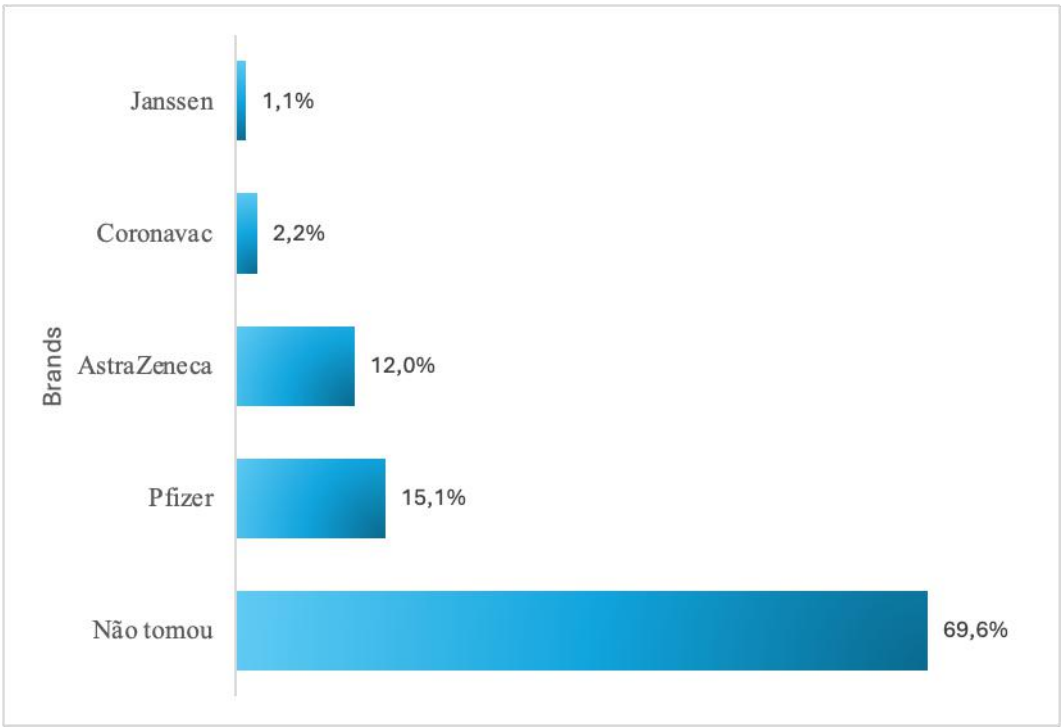
Figure 6 – Ranking of vaccines administered in the 3rd dose.



Source: Authors.

Adherence to the fourth dose, considered the second booster dose, was even lower than that of the third, with 69.6% not taking it. Janssen's participation rate for the fourth dose was also lower, at 1.1%. This information is presented in Figure 7.

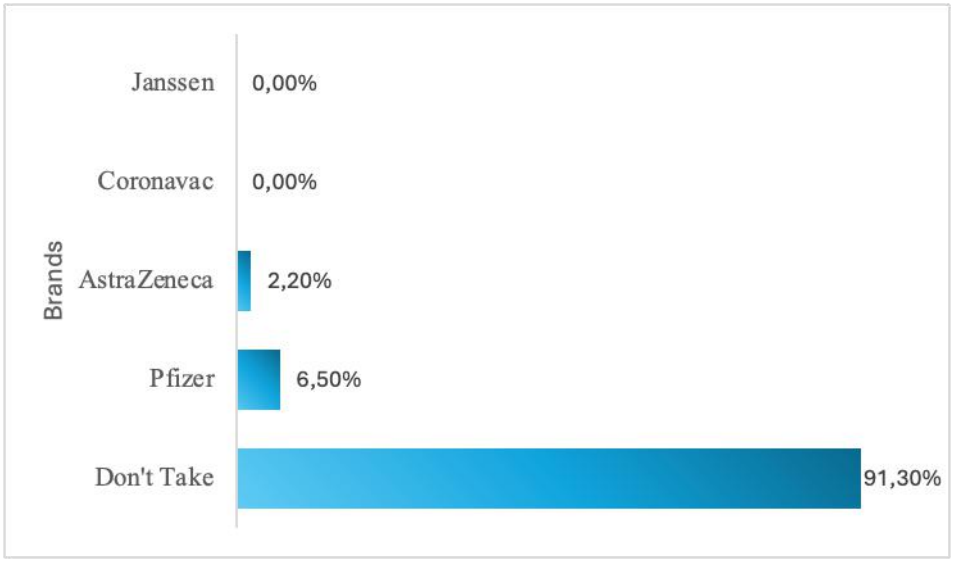
Figure 7 - Vaccines received in the 4th dose.



Source: Authors.

The third booster dose had the lowest adherence, with 91.3% of respondents not getting vaccinated. As shown in Figure 8, no one received the CoronaVac or Janssen vaccines.

Figure 8 - Vaccines received in the 5th dose.

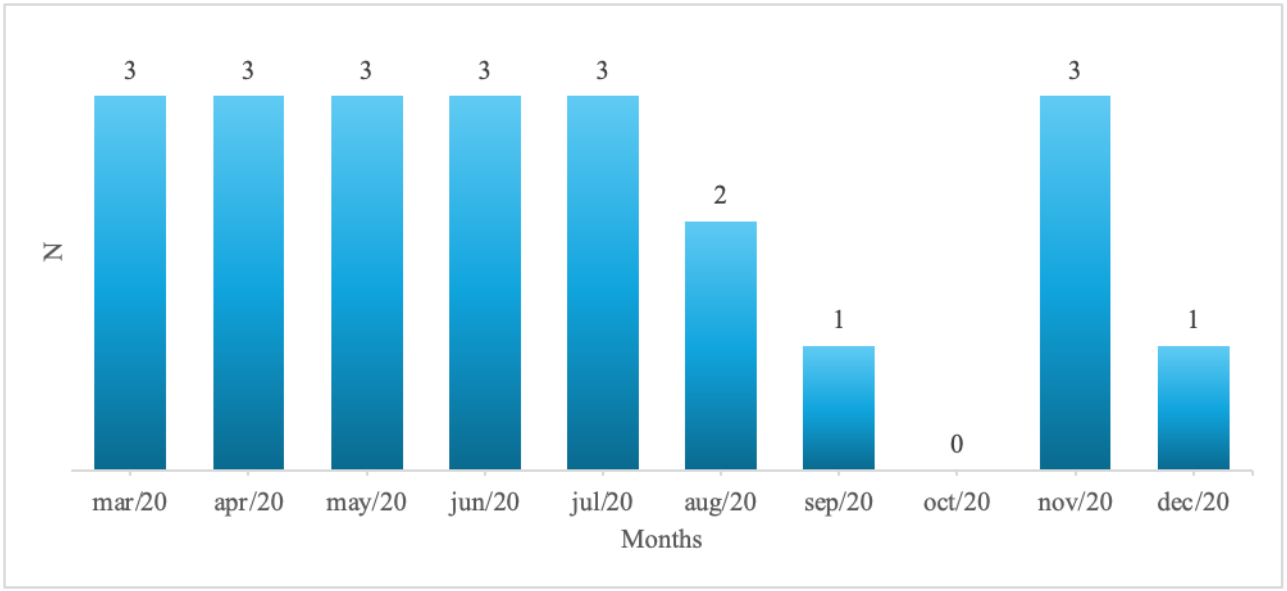


Source: Authors.

In the present study, the person who presented the symptoms and performed the COVID-19 test was considered non-infected and harmful. The infected person tested positive for COVID-19.

In 2020, 16.3% of the sample studied were infected during the isolation period (March to July) or the final tests and the beginning of the vacation (4.34%) at the end of the second semester. Additionally, 24% were infected between the lockdown and the hybrid education system during the school year. It is important to note that no vaccine was developed that year. This information is depicted in Figure 9.

Figure 9 - Times that was infected in 2020.

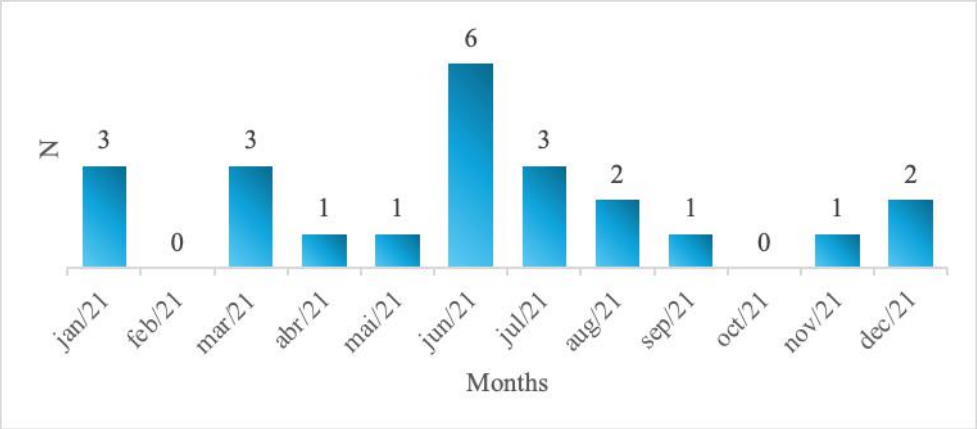


Source: Authors.

Figure 10 illustrates the impact of COVID-19 on students in 2021. At the start of the year, a vaccination campaign was launched, prioritizing the health sector, including students. However, due to an age-based priority system, the youngest

individuals were the last to receive their first vaccination dose. There are peak incidences during the final test periods in June and November and during the vacations in January, July, and December, totaling 16.29%.

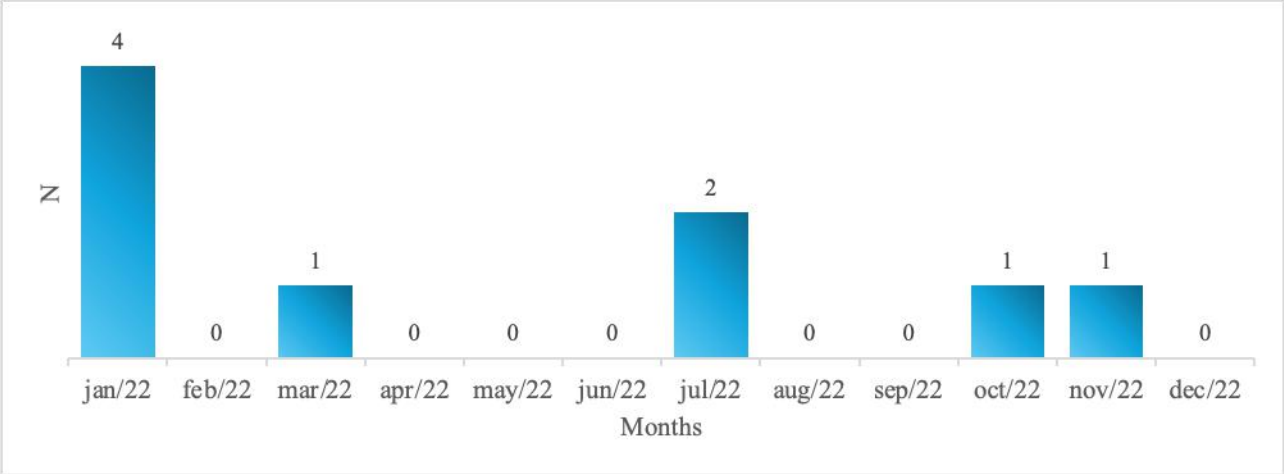
Figure 10 - Times that was infected in 2021.



Source: Authors.

The trend in 2022 was like the previous year, but the number of infections was significantly reduced, as shown in Figure 11.

Figure 11 - Times that was infected in 2022.



Source: Authors.

A single case of contamination was reported in March 2022. However, the affected student only began the Dentistry Course in the second semester. The contaminated students participated in laboratory and clinical activities in October and November, which accounts for 2% of the sample. After 100% of academic activities were resumed, only 9% of students were infected, while 16% reported that they were never infected.

4. Discussion

The COVID-19 pandemic has disrupted daily life globally. Quarantine measures were implemented to contain the virus, leading to significant routine changes. However, despite these efforts, the virus continued to spread. In response, dental

schools in America and Europe, including our own, swiftly transitioned to remote education (Amaral et al., 2021; Costea et al., 2022; Thurzo et al., 2022). In-person classes were replaced by online teaching using various platforms. This period presented many challenges, the biggest being the eventual return to face-to-face classes amidst the ongoing pandemic and the need to ensure maximum biosecurity with zero contagion while a vaccine was being developed.

Thus, returning to theoretical and practical classes in dental schools worldwide followed strict biosafety protocols (Cabrera-Tasayco et al., 2020; Costea et al., 2022; Thurzo et al., 2022). In our case, we adhered to the recommendations set by ANVISA (Brasil, 2021), which were updated approximately once a week. It is important to note that Dentistry involves working close to the upper airways, which are responsible for the transmission of COVID-19 (Brito Aragão et al., 2021).

As mentioned earlier, we faced numerous challenges, such as guiding patients in removing and isolating and training employees and dental students in biosafety standards; this required a significant commitment and dedication from all academic staff. Adapting laboratory and clinical activities required extensive effort. However, with everyone's involvement, we overcame this phase and achieved encouraging results, with a low incidence of contamination during practical activities.

Before the pandemic, dentistry already had a rigorous biosafety protocol due to the risks of contamination from various diseases such as hepatitis and AIDS (Brasil, 2006). It is well-known that effective biosecurity measures before, during, and after dental care can reduce the risk of COVID-19 transmission for dentists and patients, increasing confidence in managing the dental environment (Cabrera-Tasayco et al., 2020). The pandemic has significantly impacted the daily lives of healthcare professionals, especially those at high risk of infection. Despite implementing stricter biosafety protocols, dentists are frequently exposed to aerosols generated during dental procedures, increasing the risk of virus transmission. COVID-19 poses a significant challenge for dental professionals and students working in clinics due to the potential for virus spread during dental procedures (Aragão et al., 2021).

The rate of COVID-19 contamination among dentists was low, with only 0.17% of them being diagnosed with COVID-19, compared to the total infected population in Brazil. Specifically, 2,737 dentists out of 1,603,055 infected individuals in the country were diagnosed with the virus (CFO, 2020). It is important to note that this percentage is significantly lower than that of the general population in Brazil.

A study with Brazilian students found that women were more participatory, making up 80.1% of 833 participants (Brito Aragão et al., 2021). Our study similarly obtained 72.5% female participation, which is in line with the proportion of female Dentistry students worldwide, as indicated by Riad et al. (2021). Concerning age groups, 57.8% of the participants were between 18 and 27 years old, representing most of the sample; this aligns with similar findings in previous studies, which reported that 85.1% of participants fell within the 18 and 25 age range (Brito Aragão et al., 2021) and 98.6% fell within the 20 and 28 age range (Franco et al., 2022).

Vaccines are essential tools for protecting those at most significant risk. They are the last line of defense (Thurzo et al., 2022). At the beginning of the vaccination campaign, all health workers were encouraged to get vaccinated, especially with the first three doses. In our study, the adherence to the first two doses was high, at 100% and 97%, respectively. According to the WHO, these first two doses are considered primary, while the third dose is a booster (WHO, COVID-19 Vaccines, 2024). The vaccine acceptance level observed in our study among dental students was higher than in a previous study, where only 38.8% took both doses (Franco et al., 2022). Our study found that even though the vaccine acceptance level was high among dental students, there was still some hesitation and rejection, with 22.5% hesitating and 13.9% rejecting COVID-19 vaccines. This hesitation was influenced by various factors, including socioeconomic context, social media influence, influence of public figures, and distrust of the pharmaceutical industry (Riad et al., 2021).

Vaccine hesitancy (VH) refers to the "delay in the acceptance or refusal of vaccines, despite the availability of vaccination services," it is an emerging public health challenge fueled by misinformation about the efficacy and safety of vaccines. Since it is an early-stage vaccine, concerns about the side effects are understandable. A study conducted with health professionals from the Czech Republic found that the most common side effect was pain at the injection site (89.8%), followed by fatigue (62.2%), headache (45.6%), muscle pain (37.1%), and chills (33.9%). Vaccine manufacturers reported these effects. The authors conclude that providing accurate information is the best way to reduce the fear of vaccines and emphasize their importance (Riad et al., 2021).

In a study conducted in Brazil, 833 dental students from various states and the Federal District participated in an online survey. The results showed that 3.3% (n=27) of the students tested positive for COVID-19. Among the infected students, 11.11% (n=3) were from the first year, 14.81% (n=4) from the second year, 22.22% (n=6) from the third year, 11.11% (n=3) from the fourth year, and 40.74% (n=11) from the fifth year. In our study, it was observed that 58.7% (n=54) of the participants had been infected with COVID-19. However, 16.3% (n=15) were infected during remote education or before they began studying Dentistry.

When the isolation period was excluded from the sample, 42.4% (n=39) remained, representing the number of infections observed during the hybrid period until the end of social isolation measures. This data showed a lower infection rate compared to Albania, where a contamination level of 43.9% was observed among dental students.

Notably, in 2022, the number of infected individuals was much lower than in previous years. This positive trend can be attributed to factors such as vaccination, which significantly reduced the risk of virus contamination, and the students' full adoption of biosafety practices. It is encouraging to note that the research participants have embraced these practices despite their limited experience, as they were starting dental practice in 2020. The holiday period was identified as having the highest level of contamination.

5. Conclusion

The study found that nearly half of the participants (42.4%) had contracted COVID-19. The results show a high adherence to vaccination, with all participants (100%) receiving the first dose and 97.8% receiving the second dose. Pfizer was the most administered vaccine for the first and second doses, followed by AstraZeneca.

This study was conducted in the academic environment of an institution with undergraduate dentistry with a reduced sample size; new studies are necessary to increase the sample size and verify adherence to another dose of monovalent immunizer XBB applied to priority groups and children.

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