UNIVERSIDADE FERNANDO PESSOA

INFECTION AND ADHERENCE TO COVID 19 VACCINATION IN DENTISTS AND HEALTHCARE PROFESSIONALS

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Dissertação de Mestrado

Mestrado Integrado em Medicina Dentária

Mariana de Fátima Duarte Pereira

Orientador:

Professora Doutora Patrícia Manarte Monteiro

Co-Orientador:

Professora Doutora Liliana Alexandra Pascoal Teixeira

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Aos que me acompanharam nesta jornada. Aos que perdi, aos que estão desde o início, que vieram a meio ou só agora no fim.
Que tenham sempre a certeza de que tudo é possível e de que com dedicação, suor, trabalho e apoio dos que vos rodeiam não há nada que não consigam alcançar.
Nada é impossível.
Impossível não é um termo científico;
Impossível significa apenas que ainda não foi encontrada a solução.

"O valor das coisas não está no tempo que elas duram, mas na intensidade com que acontecem. Por isso, existem momentos inesquecíveis, coisas inexplicáveis e pessoas incomparáveis"
-Fernando Pessoa

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À Universidade Fernando Pessoa, instituição que considerei casa durante estes últimos 5 anos e onde tive a oportunidade de crescer tanto intelectualmente como pessoalmente.

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A todos os amigos e colegas que fizeram parte do meu percurso académico graças ao Curso de Medicina Dentária, Praxe, Associação Académica, Núcleo de Estudantes de Medicina Dentária e Associação Nacional de Estudantes de Medicina Dentária. Foi um prazer partilhar estes 5 anos com vocês. Vou levar-vos, para sempre, no meu coração.

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Resumo

Introdução: A doença COVID-19 causada pela infeção do coronavírus SARS-CoV-2 gera sintomas graves semelhantes a infeção respiratória aguda. A vacinação constituiu um dos meios de intervenção para redução do risco da doença. **Objetivo**: Este estudo visou avaliar as taxas de infeção e de vacinação da COVID-19, e a relação com as horas de contacto do ensino prático clínico na FCS-UFP e/ou da atividade profissional de medicina dentária dos docentes/médicos dentistas do MIMD-UFP durante 1 ano. Pretendeu também complementar a análise com uma revisão da literatura. **Materiais e métodos**: Estudo piloto, observacional, prospetivo, aprovado pela Comissão de Ética da UFP (FCS/PI-172/21; 9 de junho de 2021). Questionário autoadministrado online em Julho de 2021, atualizado em dezembro 2021 e junho de 2022, a todos (N=62) os profissionais docentes/médicos dentistas do curso mestrado integrado Medicina Dentária-UFP. Foram incluídos os profissionais que aceitaram participar e preencheram a totalidade do inquérito (julho 2021) quanto a questões demográficas, história de infeção por SARS-Cov-2, dados sobre vacinação COVID-19 e horas de contacto ensino clínico/prática clínica de medicina dentária. Foi efetuada a análise descritiva e inferencial relativa ao efeito das variáveis recolhidas sendo considerado significativo para valor de $P < 0,05$. Efetuou-se revisão complementar da literatura, seguindo a abordagem PICO e PRISMA. A estratégia de pesquisa englobou cinco termos *MeSH* principais. Foram incluídos artigos de revisão sistemática e/ou meta-analise contemplando inquéritos sobre história de infeção por SARS-Cov-2 e/ou vacinação, aplicados em profissionais de saúde, publicados entre 2020 e 2023 e escritos em inglês. **Resultados:** Quarenta e sete professores/médicos dentistas participaram (75,8 % da população), sendo 32 (68,1%) mulheres e 15 (31,9 %) homens com média etária de 42,38 anos (26 a 65 anos); A taxa de infeção por SARS-CoV-2 foi de 8,5% em julho 2021, acresceu 2,1% em Dezembro e foi de 40,4% em junho 2022. A taxa de vacinação da amostra variou de 91,5% em julho 2021, para 93,6% em Junho 2022. Os indivíduos não vacinados eram mulheres com uma média de idades de 45,8±13,7 anos. A atividade profissional/ensino clínico não mostrou relação significativa com o diagnóstico de infeção por SARS-CoV-2 no período prévio à vacinação (até julho de 2021) nem após 1 ano da primeira vacinação (junho de 2022). Nos 6 artigos incluídos neste estudo, verificou-se uma diminuição das taxas de infeção por COVID-19 após a introdução das vacinas. A taxas de vacinação variaram de 51% a 65,65% entre a população de profissionais de saúde estudadas. As taxas de vacinação foram mais elevadas em estudantes (81,1%) e em médicos dentistas (60,5%). Os estudos utilizaram vários métodos de recolha de dados: consultas, questionários online, por e-mail, telefone, mensagem, entrevista pessoal ou autoadministrados. **Conclusões:** Nesta população a maioria das infeções por SARS-CoV-2 ocorreu entre dezembro de 2021 e junho de 2022; a maioria dos indivíduos já estava vacinado em Julho 2021. As horas de contacto profissional não influenciou significativamente as taxas de infeção nem de vacinação nesta população. A literatura refere que embora a vacinação tenha sido bem aceite pelas populações em estudo, as principais razões para a não adesão à vacinação se deveu a preocupação com os potenciais efeitos secundários.

Palavras-Chave: COVID-19, SARS-CoV-2 infeção, Vacinas, Profissionais de Saúde, Prevalência, Epidemiologia, Incidência.

Abstract

Introduction: The COVID-19 disease caused by the SARS-CoV-2 coronavirus infection generates severe symptoms similar to acute respiratory infection. Vaccination has been one of the means of intervention to reduce the risk of the disease. **Objective:** This study aimed to evaluate the infection and vaccination rates of COVID-19, and the relationship with the contact hours of clinical practical teaching at FCS-UFP and / or the professional activity of dentistry of the teachers / dentists of MIMD-UFP for 1 year. It was also intended to complement the analysis with a literature review. **Materials and methods:** Pilot, observational, prospective study, approved by the UFP Ethics Committee (FCS/PI-172/21; June 9, 2021). Questionnaire self-administered online in July-2021, updated in December-2021 and June-2022, to all (N=62) teaching professionals / dentists of the UFP-Dentistry integrated master's training. Professionals who agreed to take part and completed the entire survey (July 2021) were included, as regards to, demographic questions, history of SARS-Cov-2 infection, data on COVID-19 vaccination and contact hours of dentistry teaching/clinical practice. A descriptive and inferential analysis was carried out on the effect of the variables collected, with a value of $P < 0.05$ considered as significant. A complementary literature review was carried out using the PICO and PRISMA approaches. The search strategy included five main *MeSH* terms. Only systematic reviews and/or meta-analysis articles were included, covering surveys on the history of SARS-Cov-2 infection and/or vaccination, applied to healthcare professionals, published between 2020 and 2023 years and written in English. **Results:** Forty-seven dental teachers/doctors took part (75.8% of the population), 32 (68.1%) women and 15 (31.9%) men with an average age of 42.38 years (26 to 65 years); the SARS-CoV-2 infection rate was 8.5% in July 2021, increased by 2.1% in December and was 40.4% in June 2022. The vaccination rate of the sample varied from 91.5% in July 2021 to 93.6% in June 2022. The unvaccinated individuals were women with an average age of 45.8±13.7 years. Professional dentistry activity/clinical teaching showed no significant relationship with the diagnosis of SARS-CoV-2 infection in the period prior to vaccination (until July 2021) or 1 year after the first vaccination (June 2022). In the 6 articles included in this study, there was a decrease in COVID-19 infection rates after the introduction of the vaccines. Vaccination rates ranged from 51% to 65.65% among the population of healthcare workers studied. Vaccination rates were highest among students (81.1%) and dentists (60.5%). The studies used various data collection methods: consultations, online questionnaires, by email, telephone, message, personal interview or self-administered. **Conclusions:** In this population, most SARS-CoV-2 infections occurred between December 2021 and June 2022; most individuals were already vaccinated in July 2021. Hours of professional contact did not significantly influence infection or vaccination rates in this population. The literature states that although vaccination was well accepted by the study populations, the main reasons for non-adherence to vaccination were due to concerns about potential side effects.

Keywords: COVID-19, SARS-CoV-2 infection, Vaccines, Healthcare professionals, Prevalence, Epidemiology, Incidence.

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List of acronyms and abbreviations

COVID 19 Corona virus disease

SARS-CoV-2 Severe acute respiratory syndrome coronavirus 2

PCR Polymerase chain reaction

VOI Variants of interest

VOC Variants of concern

WHO World Health Organization

EUL Emergency Use Listings Procedure

UFP Universidade Fernando Pessoa/University Fernando Pessoa

FCS-UFP/FHS Faculdade de Ciências da Saúde /Faculty of Health Sciences

MIMD-UFP Mestrado Integrado em Medicina Dentária/Dentistry Master Degree-UFP

CPMD-UFP Clínicas Pedagógicas de Medicina Dentária

P.M.M. Patrícia Manarte Monteiro

IBM® International Business Machines Corporation

SPSS® Statistical Package for the Social Sciences

PRISMA Preferred Reporting Items for Systematic Reviews and Meta-Analyses

MeSH Medical Subject Headings

HCWs Healthcare Workers

SNS Serviço Nacional de Saúde

BMI Body Mass Index

1. Introduction

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2 virus, has presented an unprecedented and unparalleled global challenge, profoundly affecting all sectors of society and healthcare systems worldwide. As of July 2020, there have been about 4 million active cases and around 582,000 deaths (Yüce et al., 2021); and, until October 2023, there have been over 690 million COVID-19 infections worldwide, and 6,75 million people have died from the virus (Senevirathne et al., 2024).

In November 2002, the Chinese province of Guangdong recognized SARS (Severe Acute Respiratory Syndrome) for the first time. By 2003, it had spread to 30 countries and infected 79,000 people, with a death rate of 9.5%. From Himalayan palm civets discovered in a cattle market in Guangdong, China, SARS-CoV was identified and isolated. The zoonotic source of SARS was also found in humans employed at the same market, as well as in ferret badgers and racoon dogs. Therefore, these market animals served as intermediate hosts, increasing the virus' ability to spread to people (Umakanthan et al., 2020).

SARS-CoV-2 is one of several viruses in the species of SARS-related CoV, according to taxonomy. On the other hand, the disease spectrum, mechanisms of transmission, and diagnostic techniques of SARS-CoV and SARS-CoV-2 differ. Within a short period of time following the news on a cluster of respiratory infections in Wuhan, Central China, the sickness (COVID-19) quickly spread throughout the world, affecting millions of people and destroying the social, educational, and economic sectors, as well as the public healthcare systems(Senevirathne et al. 2024; Umakanthan et al., 2020; Yuan et al., 2023).

The changes that took place in the genome during each replication is what caused SARS-CoV-2 to change over time. The SARS-CoV-2 variants were classified as either variants of interest (VOI) or variants of concern (VOC) due to factors such as immune escape, disease severity, increased risk of transmissibility, decreased efficacy of current social measures, and accessibility to vaccines and therapeutics (Bhardwaj et al., 2023).

Four SARS-CoV-2 strains that have surfaced since late 2020 were first classified as VOC by the World Health Organization (WHO). The emerging mutations from SARS-CoV-2 variants were the B.1.1.7, the B.1.351, the P.1, and the B.1.617.2, with the corresponding

WHO classifications as, the Alpha, the Beta, the Gamma, and the Delta variants. WHO released a second variation as a VOC at the end of the year 2021, the Omicron, corresponding to the B.1.1.529 mutant variant (Mistry et al., 2022; Dhama et al., 2023).

Owing to the pressing need for safe and effective vaccinations on a worldwide scale, the WHO begun approving the Emergency Use Listings (EUL) protocol through emergency use validation (Zhou et al., 2022). Based on the strong results from phase 1-3 clinical studies, the four main COVID-19 vaccines—BNT162b2 (Pfizer–BioNTech), ChAdOx1 nCoV-19 (AstraZeneca), mRNA-1273 (Moderna), and Janssen (Johnson & Johnson)—received early regulatory authorization (Senevirathne et al., 2024).

Among the most impacted groups and frontline warriors are healthcare professionals and dentists, whose practices have been subjected to the unprecedented challenges and risks—due to their continuous exposure—and drastically reshaped in response to the health crisis that came associated with the virus (Luo et al., 2021).

Several studies were conducted all over the world, regarding the infection (Durbin et al., 2023; Nishida et al., 2021; Saccomanno et al., 2022) and vaccination (Kelekar et al., 2021; Nabaggala et al., 2022; Maltezou et al., 2022; Mascarenhas et al., 2021; Schmidt et al., 2023; Theodorea et al., 2021) rates in the population of healthcare workers, providers, such as dental students and dentists.

As an example, a cross sectional study conducted in Iran, through a formulary questionnaire handed out to health professionals, demonstrated a rate of infection of 5.62% (273 out of 4854 cases) among healthcare workers, with a mean age of 35 years and a dominance of female cases (146 cases: 53.5%) (Sabetian et al., 2021). Other countries like Ethiopia, China, and Africa, also implemented questionnaires and inquiries to assess the infection and vaccination among healthcare workers (Ackah et al., 2022; Shui et al., 2022).

In Portugal, as well as in many other countries and parts of the world, these professionals have undergone abrupt and significant changes in their work routines, requiring rapid adaptation to address the new demands and ensure the safety of patients and medical staff.

As the pandemic progressed, understanding the interplay between COVID-19 infection rates and vaccination coverage among these professionals became imperative not only for safeguarding their health and well-being but also for ensuring the resilience of healthcare systems.

This pilot longitudinal study aimed to evaluate, via a self-administered survey, the SARS-CoV-2 infection rates and COVID-19 vaccination rates, and the relation of contact hours of clinical teaching at FHS-UFP and/or professional dental care activity, in a population, both Dentistry Master Teachers and Dental Care professionals over 1 year (2021-2022). It also aimed to complement this study with a review of literature in this topic.

By synthesizing empirical data, epidemiological insights, and qualitative analyses—like meta-analyses and systematic reviews—this work seeks to provide a comprehensive understanding of the dynamic relationship between COVID-19, vaccination status, and infection rates by inquiries applied among the healthcare community.

2. Materials and methods

2.1. – Type of study, ethics committee, location, and methodology

This descriptive, observational, and prospective study was approved prior to its implementation by the UFP Ethics Committee (FCS/PI-172/21; June 9, 2021).

An epidemiological study was conducted using an online self-administered survey (Google form; ANNEX A) that was applied in July 2021. A short on-going self-administered questionnaire was also applied in December 2021 and June 2022, in order to update data on infection by SARS-Cov-2 and on adherence to COVID-19 vaccination of the healthcare population thus scrutinized.

This research aimed to carry out a descriptive survey of the history of SARS CoV-2 and/or COVID-19 infection, gather data on the COVID-19 vaccine and hours of professional contact within the scope of UFP Dentistry Master clinical teaching or Dental Care professional activity in the UFP population of both, dentist-teachers, in order to answer the following question:

What is the occupational health status regarding the history of SARS CoV-2 infection, COVID-19 vaccine data and clinical contact hours in the context of teaching and professional activity of UFP Dentistry Master's Degree teachers?

To answer this question, the research team implemented an epidemiological self-administered survey—in July 2021—regarding the health condition of the population on study, pertaining to SARS CoV-2 infection and COVID-19 vaccination adherence, and carried it out in collaboration with the Occupational Health and Risk Service of the University Fernando Pessoa. The epidemiological survey was conducted during the years 2021-2022.

The population (N=62) involved all both teachers/dentists of the UFP Dentistry Integrated Master's Degree (MIMD-UFP) invited to participate in this epidemiologic research. Collected data and outcomes of this survey were provided by the principal investigator (P.M.M) and the research team to the author of this work, solely for this analysis and in order to be described in the present document.

2.1.1. Inclusion and Exclusion Criteria

The inclusion criteria admitted all dentists teaching at the UFP Dentistry Integrated Master's Degree (MIMD-UFP), whether vaccinated against COVID-19 or not, who freely agreed to take part in the study by completing the entire survey.

Conversely, the exclusion criteria precluded all dentists teaching at UFP Dentistry Integrated Master's Degree (MIMD-UFP) that did not agree to participate in the study or that did not complete the entire survey.

The study did not involve any risks for the participants. An informative email was sent to all MIMD dentists (content described in ANNEX A), which contained all the information about accessing the survey and whether or not they agreed to take part.

2.1.2. Confidentiality of data and research

Participation was completely voluntary and free of charge. Identity and personal data were not disclosed in accordance with the current data protection legislation. To this end, the personal data collected for the trial was coded and pseudonymized. The description of the terms of confidentiality of data and research was fully disclosed in the applied informed consent (ANNEX A) of this research.

2.1.3. Reliable and scientifically recognized alternative acts/interventions, and risk of non-monitoring.

The survey was developed taking into account clinical criteria and questions about SARS-CoV-2 and/or COVID-19 infection, as well as vaccination data, and developing complementary questions according to the objective defined for the descriptive survey of occupational health conditions. When applying the survey, no references were found in the literature regarding validated surveys for SARS-CoV-2 applicable to the academic community, dentistry master degree teachers and dentists, concomitantly.

2.1.4. Statistical analysis

The data resulting from this epidemiological research study (questionnaire) was transferred to a spreadsheet in the Microsoft Office Excel® software program, and

statistical analysis was carried out using IBM® SPSS® Statistics vs. 28.0—considering a significance level of 0.05 in all statistical inference situations.

The aim was to carry out a descriptive and inferential analysis of the effect of the variables collected in the survey. The quantitative and qualitative variables were described using the mean and standard deviation, median and respective quartiles, as well as the minimum and maximum values. Inference was carried out using appropriate techniques, chosen after checking the assumptions of parametric techniques. If the parametric technique could not be used, then a non-parametric test was carried out to determine differences between study groups—meaning the population median. The statistical tests carried out used a significance level of 0.05 (α=0.05).

Nominal categorical variables were described using counts and percentages and ordinal variables that used the median of observations, when appropriate. Prevalence measures were presented in percentages and with the respective 95% confidence interval, calculated using the Wald method or the exact method—depending on the applicability of the expressions to each situation. The bivariate description of qualitative variables was carried out using contingency tables, with the counts and percentages presented.

In most situations, the distribution of the quantitative variable was not normal and, given the high degree of asymmetry in the observed distributions, the comparison of measures of central tendency was carried out using non-parametric tests on the median of the observations (Kruskal-Wallis test for more than 2 groups, and/or Mann Whitney U test for 2 independent groups).

2.2 – Complementary Review

A descriptive review was conducted to further complement the conducted study, selecting publications in *PubMed and Google Scholar* on SARS-Cov-2 infection rates and disease prevalence, as well as on vaccination rates in dental students, dentists, or healthcare professionals. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method was applied for included meta-analyses and systematic reviews of studies that applied inquiries on the history of infection and vaccination in healthcare workers—such as dentists—between 2020 and 2023.

2.2.1. Search Strategy

The search strategy was performed with *MeSH* words previously selected, pertinent to the study, with filters of the search database—including free full texts and abstracts (**Table 1**). The *MeSH* words used were ((COVID-19 Vaccines) [Mesh] OR (COVID-19)[Mesh] OR (SARS-CoV-2)[Mesh] OR (Post-Acute COVID-19 Syndrome)[Mesh] OR (SARS-CoV-2 variants));(Prevalence)[Mesh], (Health Personnel)[Mesh] OR (Healthcare workers) OR (Heath Care professionals, ((Incidence)[Mesh] OR (Epidemiology)[Mesh]).

Table 1 – Search strategy used in electronic databases, PubMed, and Google Scholar.

Search Field	***MeSH* and keywords from tree structures of the search strategy**
Search field 1	COVID 19 Vaccines" OR "SARS-CoV-2 vaccines; "Post-Acute COVID-19 Syndrome" OR SARS-CoV-2 variants"
	AND
Search field 2	("Healthcare workers" OR "Health Personnel Knowledge" OR" "Dentists" OR "Dental Care Professionals")
	AND
Search field 3	("Prevalence " OR "Incidence " OR " Epidemiology ")

2.2.2. Inclusion criteria, exclusion criteria and study eligibility

For this work, only full-text articles of systematic reviews and/or meta-analyses that applied surveys-inquiries among healthcare professionals, dental students, or dentists, available in English language, in *PubMed and Google Scholar*, and published from 2020 to 2023, were included.

Other studies methodologies such us, in vitro studies, animal studies, cohort studies, randomized clinical trials, field studies, case reports or longitudinal studies, or incomplete articles were excluded.

After the initial search, a thorough selection of the articles found was made, thus eliminating duplicates and articles not relevant to this thesis—a process carried out in contemplation of the title and abstract of each one. For data eligibility, a full reading of each article was performed to further select those of a systematic and meta-analytical nature, as well as those describing the infection and/or vaccination rates among healthcare/dentists via inquiry-based data (self-administered, or by interview).

3. Results

3.1. – Longitudinal Survey Results

For data collection purposes, a survey consisting of a self-administered questionnaire, was made available via Google Forms in July 2021.

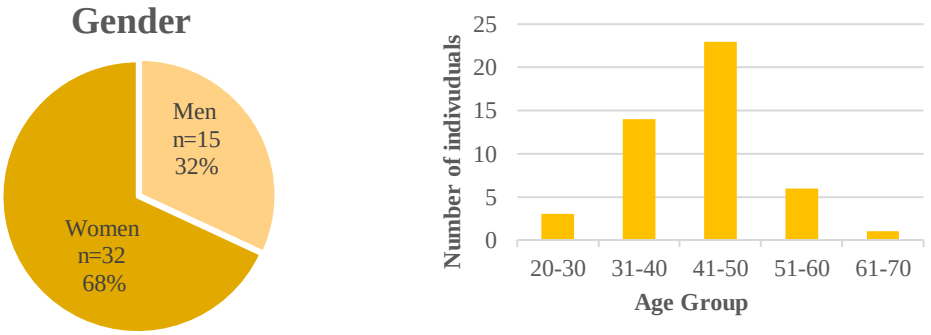
The population consisted of 62 both dentists-academic teachers at the Master's Degree in Dentistry of University Fernando Pessoa, during the 2020-21 academic year. Nine dentists/academic teachers did not answer the self-administered survey and were excluded. Of the remaining 53, who responded to the survey, only 47 met the inclusion criteria—thus answering the entire survey and freely consented to participate in the study. This constituted the sample of 47 participants, 75.8% of the total study population.

A short on-going self-administered questionnaire was also applied in December 2021 and June 2022, in order to update the data pertaining to SARS-Cov-2 infection condition and the adherence to COVID-19 vaccination of the mentioned 47 healthcare participants.

3.1.1. Sociodemographic characterization

Of the 47 participants, 32 (68.1%) were female and 15 (31.9%) were male (**Figure 1**). The average age was 42.38 years—ranging from a minimum of 26 to a maximum of 65 years—and did not differ significantly by gender (Student's t-test, $p>0.05$).

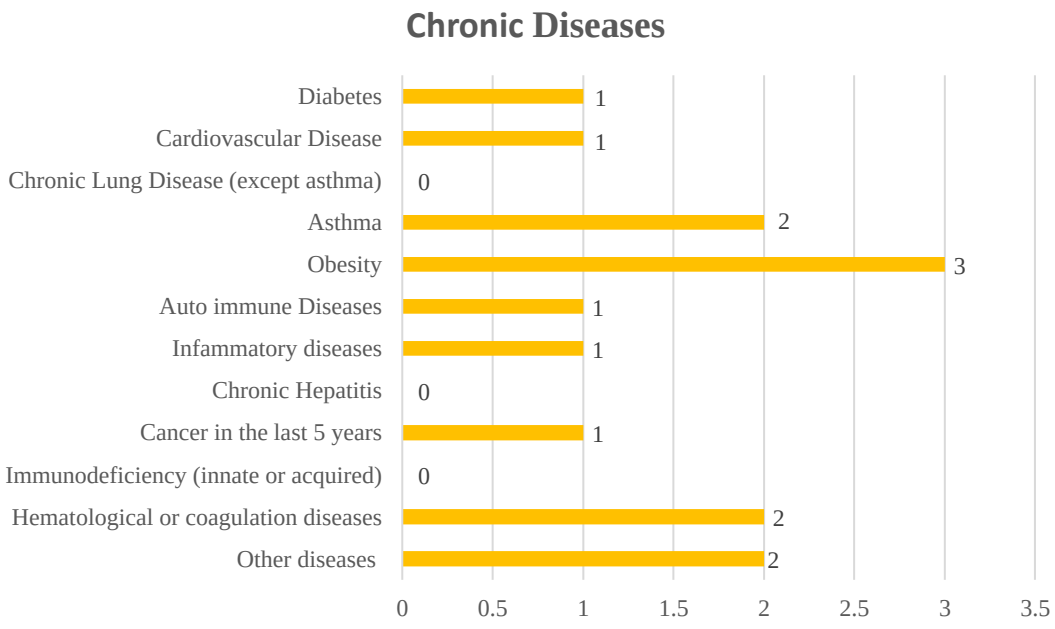
Figure 1 – Distribution of the sample (n=47) by gender and age group.



3.1.1.1. - General state of health

Figure 2 shows the absolute frequency of chronic diseases in the study sample. Around 2.1% (n=1) of the individuals reported diabetes, with the same frequency for cardiovascular disease (excluding hypertension). There were no records of individuals (n=0) with chronic respiratory or liver diseases, or any primary or acquired immunodeficiency. Around 4.3% (n=2) reported having asthma, and 6.4% (n=3) a body mass index BMI≥30 kg/m2. Around 2.1% reported having an autoimmune disease (n=1), and 2.1% had had an oncological disease in the last 5 years (n=1). Around 4.3% of individuals had a hematological disease, or other diseases not specified in the survey (n=2).

Figure 2 – Absolute frequency of chronic pathologies in the sample (n=47).

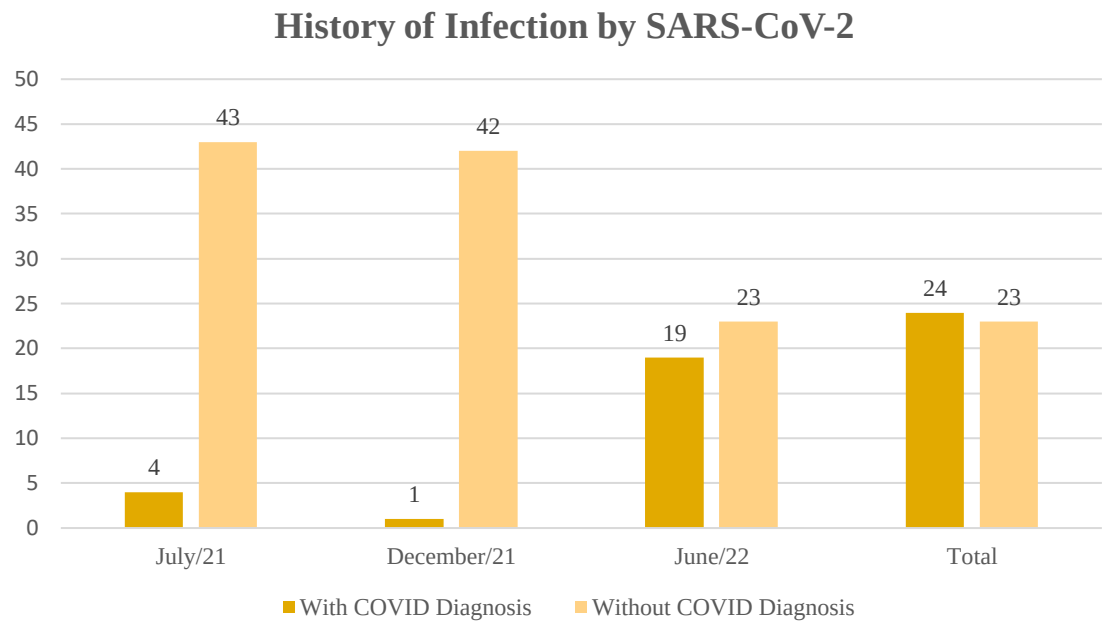


3.1.1.2 - History of SARS-CoV-2 infection

In order to monitor the history of SARS-CoV-2 infection throughout the period of this investigation, each participant (n=47) self-filled out data update forms in July 2021, December 2021 and in and June 2022. Around 8.5% (n=4) of the individuals reported a previous diagnosis of COVID-19 (relative to the date the survey was implemented —July 2021). In December 2021, only 2.1% (n=1) tested positive for COVID-19. The majority of SARS-CoV-2 infections occurred between December 2021 and June 2022, with 40.4%

(n= 19) of individuals reporting having been diagnosed with SARS-CoV-2 infection or COVID-19 disease (**Figure 3**).

Figure 3 – Absolute and relative frequency of individuals diagnosed with SARS-CoV-2 or COVID 19 infection, in the time period (July 2021 to June 2022).

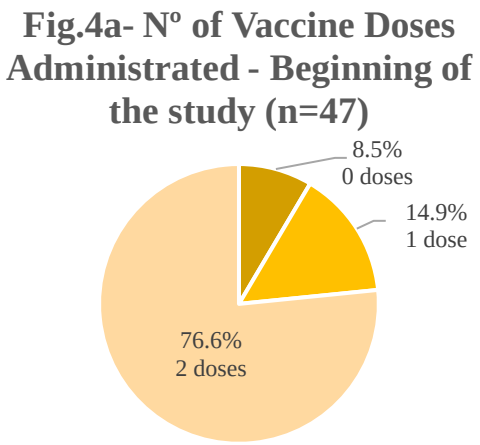


3.1.1.3 – COVID-19 Vaccination

For the purpose of monitoring vaccination history and doses of SARS-CoV-2 vaccine throughout the period of this investigation, each participant (n=47) filled out update forms in July 2021, December 2021, and June 2022. **Figure 4** shows the absolute and relative frequency of individuals and their SARS-CoV-2 vaccine doses received up to July 2021 (**Figure 4a**) and June 2022 (**Figure 4b**).

By July 2021, 8.5% (n=4) of the individuals were unvaccinated, 14.9% (n=7) had one dose of the vaccine, and 76.6% (n=36) already had two doses of the SARS-CoV-2 vaccine (**Figure 4a**). All of the unvaccinated (n=4) were female, with an average age of 45.8±13.7 years. In June 2022 (**Figure 4b**), only 6.4% (n=3) of the individuals were unvaccinated, 19.1% (n=9) had received 2 doses of the vaccine, and 74.5% (n=35) had received 3 doses of the SARS-CoV-2 vaccine.

Figure 4 – Absolute and relative frequency (n and %) of individuals un-vaccinated and vaccinated with one, two and three doses of the vaccine against SARS-CoV-2, July 2021, (4a) until June 2022 (4b).



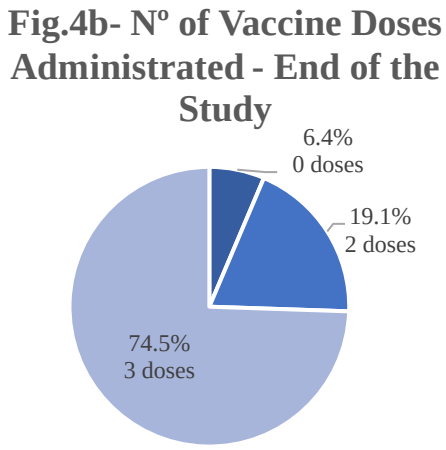
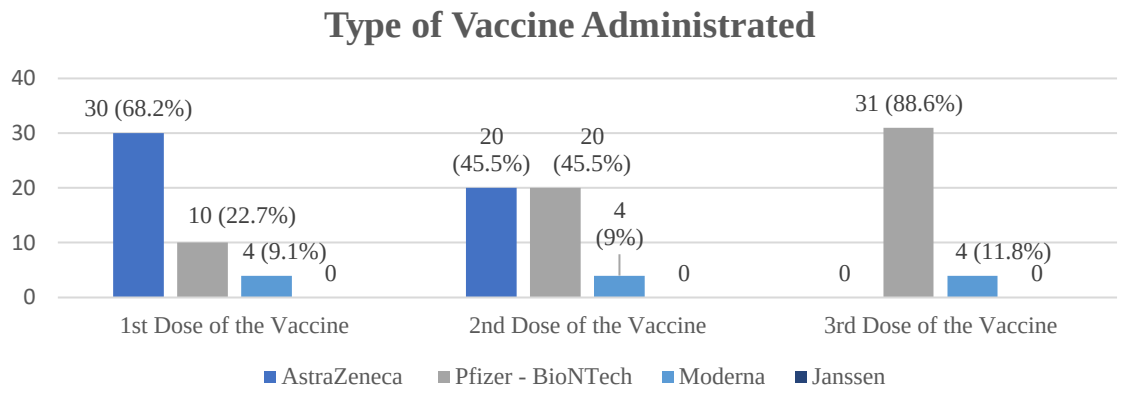


Figure 5 shows the frequency of vaccine doses (by manufacturer) administered from July 2021 until the end of the study (June 2022). As their 1st dose, 68.2% (n=30) of the subjects received the vaccine from AstraZeneca®, 22.7% (n=10) received the vaccine from Pfizer-BioNTech®, and 9.1% (n=4) were given the vaccine from the Moderna® manufacturer. Around 45.5% (n=20) of the individuals received their second dose of the vaccine from AstraZeneca®, 45.5% from Pfizer - BioNTech® (n=20), and 9% (n=4) received their second dose from Moderna®. No individual was given the Janssen-Johnson vaccine&Jonhson®. About 88.6% (n=31) were given the Pfizer-BioNTech® vaccine as their third dose of vaccination, and 11.7% (n=4) were given the Moderna® vaccine.

Figure 5 – Absolute and relative frequency (n, %) to the type (manufacturer's designation) of vaccines against SARS-CoV-2, in vaccinated individuals (n=44) and different doses administered.

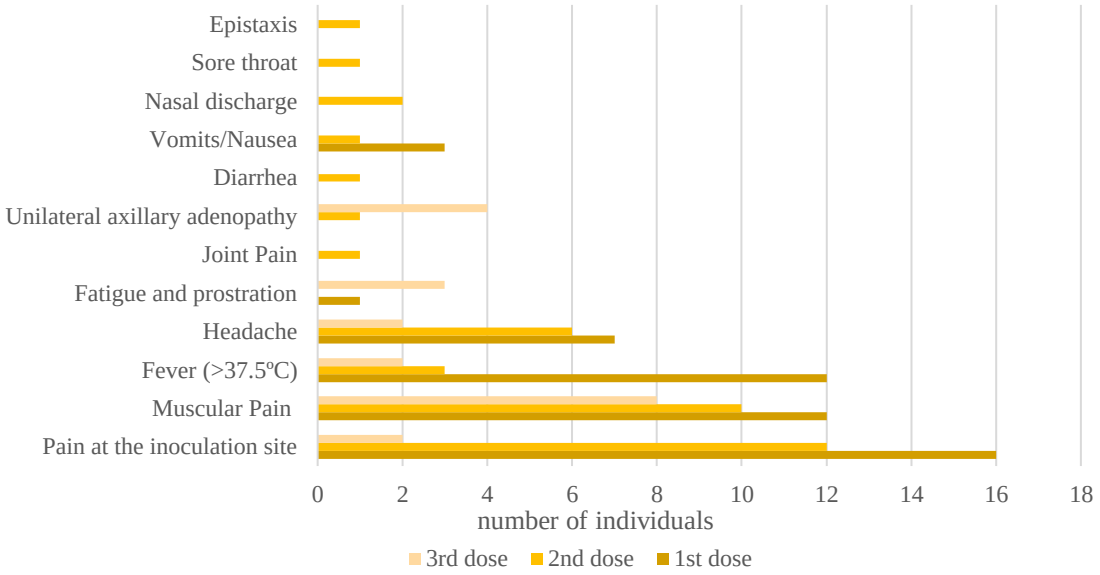


3.1.1.4- Post-vaccination adverse effects

In order to monitor the history of adverse effects following vaccination against SARS-CoV-2 throughout the period of this investigation, each participant (n=44) filled in several data update forms—July 2021, December 2021, and June 2022.

The adverse effects of the 1st and 2nd dose were accounted for in a total sample of 44 individuals, with 24 (54.5%) reporting that they had symptoms after the 1st dose of the vaccine and 21 individuals (47.7%) after the 2nd dose of vaccine. The 3rd dose was only administered to 35 individuals; around 15 of the latter (42.9%) reported having post-vaccination symptoms. The absolute frequency of the main symptoms described by the individuals after receiving the 1st, 2nd and 3rd doses of vaccines are shown in **Figure 6**. It is clear that in the 1st and 2nd doses the symptoms most often described by the individuals were those of pain at the inoculation site, generalized muscle pain, fever, and headache. With the 3rd dose, the symptoms most often described by individuals pertained to muscle pain and unilateral axillary adenopathy.

Figure 6 – Absolute frequency (n) of the most described symptoms after administration of the 1st, 2nd (n=44) and 3rd dose (n=35) of vaccines against SARS-CoV-2.



3.1.1.5 - Professional clinical and teaching activities

During the first period of confinement, the Portuguese national authorities ordered the suspension of dental medicine, stomatology, and dentistry activities—with the exception of situations that were proven to be urgent and unavoidable. When asked about the clinical activity carried out during this period (March to May 2020), around 63.8% (n=30) reported working as a dentist (**Figure 7**). From June 2020 to June 2021, 93.6% (n=44) of respondents reported that simultaneously worked both as a dentist and as a clinical teacher of the Dentistry Master Training (**Figure 8**). The cumulative frequency of working hours per week, in terms of simultaneous clinical and academic activity, was superior to 40 hours/week for 36% (n=17) of respondents and between 25 and 40 hours/week for 32% (n=15) of respondents (**Figure 9**). Two respondents (26%) reported working less than 25 hours/week and 3 (6%) did not work at all during the reference period.

Figure 7 – Frequency (n, %) of participants who carried out clinical activity as dentists between March 2020 and May 2020.

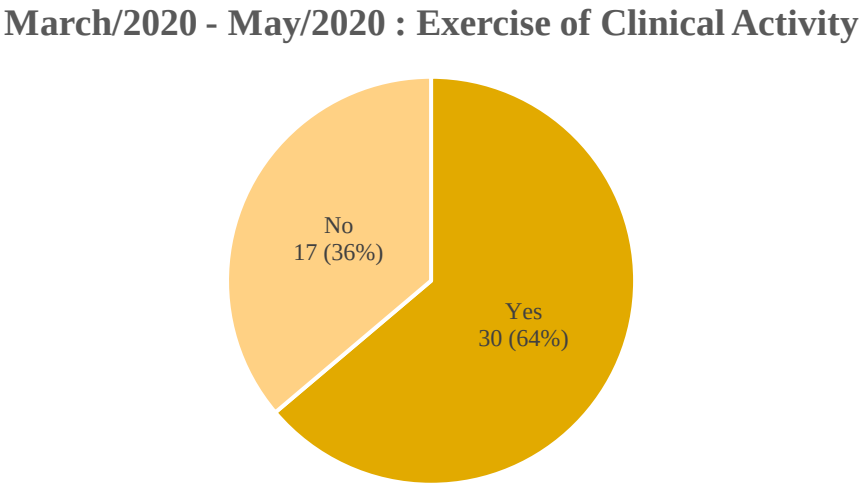


Figure 8 – Frequency (n, %) of participants who carried out simultaneous clinical teaching activity at MIMD and clinical activity as dentists between June/2020 and June/2021.

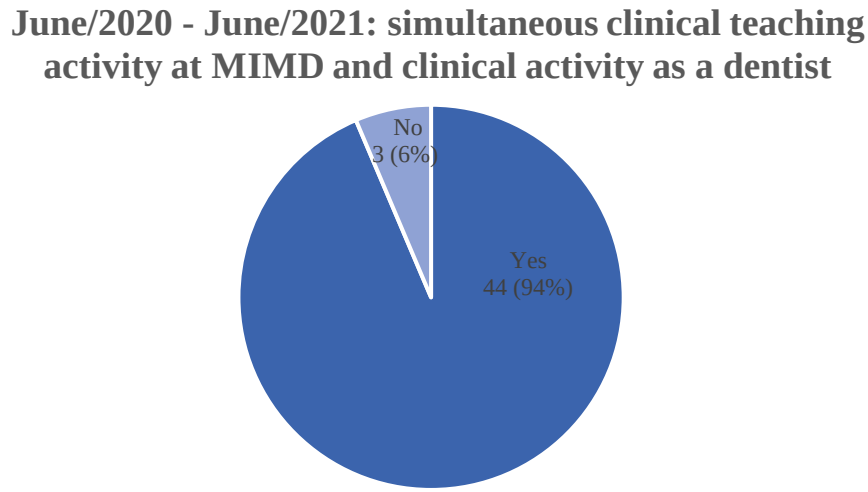
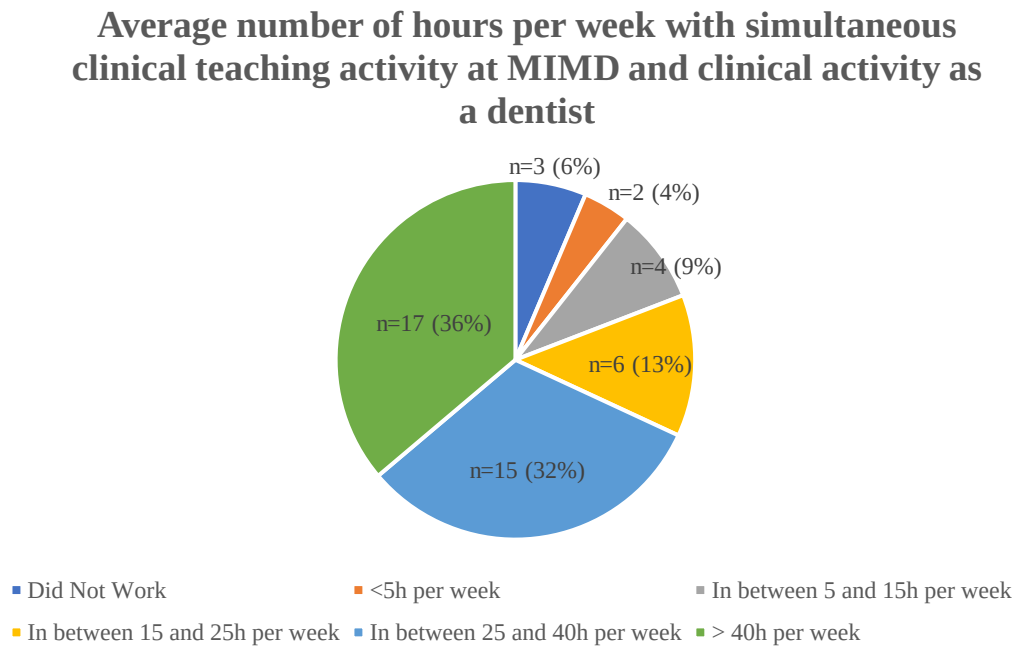


Figure 9 – Cumulative frequency (n, %) of hours per week performed in teaching, clinical teaching, MIMD and clinical activity as a dentist (n; %).



3.1.2. Inferential statistical analysis

3.1.2.1- Relation between sociodemographic factors, general health status, professional activity, and past/present history of SARS infection-Cov2.

Table 2 shows the analyses of the relation between demographic variables, general health status, professional activity, and past/present history of SARS-CoV-2 infection. No significant associations were found between demographic variables—namely gender, age, and SARS-CoV-2 infection. The existence of chronic pathologies was also not found to be related to the diagnosis of COVID-19 disease ($p<0.05$). Professional practice, in terms of teaching/clinical teaching activities at the Dentistry Master Training and/or professional activity as a dentist, did not show a significant relationship with the diagnosis of SARS-CoV-2 infection, in the period prior to vaccination (until July 2021) or in the time after the end of the study—1 year after (June 2022).

Table 2 – Inferential analysis between demographic variables, general health status, professional activity of respondents and history of SARS-CoV-2 infection, prior to the study (until July 2021) and in the final phase of the study (until June 2022).

Demographic variables, general health, and professional activity		**History previous diagnosis* SARS-CoV-2 infection (until July 2021)**		p	**Diagnosis of SARS CoV-2 infection (until June 2022)**		p
		Yes	**No**		**Yes**	**No**	
		n=4	**n=43**		**n=23**	**n=24**	
Gender	Female	2 (50%)	30 (69.8%)	0.583[1]	18 (78.3%)	14 (58.3%)	0.143[3]
	Male	2 (50%)	13 (30.2%)		5 (21.7%)	10 (41.7%)	
Age(years)	Average (DP)	41 (10.4)	42.5 (8.7)	0.985[2]	42.3 (8.9)	42.5 (8.6)	
	Median (IQR)	42.5 (30.8-49.8)	42 (38-47)		41 (38-49)	43 (36.3-46)	0.926[2]
	Min-Max	27-52	26-65		29-59	27-65	
Diabetes	Yes	0 (0%)	1 (2.3%)	1.000[1]	0 (0%)	1 (4.2%)	1.000[1]
	No	4 (100%)	42 (97.7%)		23 (100%)	23 (95.8%)	
Cardiovascular Disease (excludes hypertension)	Yes	0 (0%)	1 (2.3%)	1.000[1]	0 (0%)	1 (4.2%)	1.000[1]
	No	4 (100%)	42 (97.7%)		23 (100%)	23 (95.8%)	
Chronic lung disease (excludes asthma)	Yes	0 (0%)	0 (0%)	n.a.			n.a
	No	4 (100%)	43 (100%)		23 (100%)	24 (100%)	
Asthma	Yes	0 (0%)	2 (4.7%)	1.000[1]	0 (0%)	2 (8.3%)	0.489[1]
	No	4 (100%)	41 (95.3%)		23 (100%)	22 (91.7%)	
Obesity (BMI≥30 kg/m2)	Yes	0 (0%)	3 (7%)	1.000[1]	1 (4.3%)	2 (8.3%)	1.000[1]
	No	4 (100%)	40 (93%)		22 (95.7%)	22 (91.7%)	
Auto immune disease (ex. rheumatoid arthritis, lupus)	Yes	1 (25%)	0 (0%)	0.085[1]	0 (0%)	1 (4.2%)	1.000[1]
	No	3 (75%)	43 (100%)		23 (100%)	23 (95.8%)	
Inflammatory Disease	Yes	0 (0%)	1 (2.3%)	1.000[1]	0 (0%)	1 (4.2%)	1.000[1]
	No	4 (100%)	42 (97.7%)		23 (100%)	23 (95.8%)	
Chronic Liver Disease	Yes	0 (0%)	0 (0%)	n.a.			n.a
	No	4 (100%)	43 (100%)		23 (100%)	24 (100%)	
Cancer (in the last 5 years)	Yes	0 (0%)	1 (2.3%)	1.000[1]	0 (0%)	1 (4.2%)	1.000[1]
	No	4 (100%)	42 (97.7%)		23 (100%)	23 (95.8%)	
Immunodeficiency (primary or acquired)	Yes	0 (0%)	0 (0%)	n.a.			n.a
	No	4 (100%)	43 (100%)		23 (100%)	24 (100%)	
Hematological or Coagulation disease	Yes	0 (0%)	2 (4.7%)	1.000[1]	2 (8.7%)	0 (0%)	0.234[1]
	No	4 (100%)	41 (95.3%)		21 (91.3%)	24 (100%)	
Other Chronical Diseases	Yes	0 (0%)	2 (4.7%)	1.000[1]	0 (0%)	2 (8.3%)	0.489[1]
	No	4 (100%)	41 (95.3%)		23 (100%)	22 (91.7%)	
March/2020-May/2020 practiced MD clinical activity	Yes	2 (50%)	28 (65.1%)	0.613[1]			
	No	2 (50%)	15 (34.9%)				
June/2020-June/2021 carried out Clinical Teaching activities at MIMD and MD activity	Yes	3 (75%)	41 (95.3%)	0.239[1]			
	No	1 (25%)	2 (4.7%)				

Statistical test applied: 1 – Fisher. T.; 2–Mann-Whitney. T: * reported by individuals and diagnosed by self-test until July 2021; n.a – not applicable

Statistical test applied: 1 – T. Fisher; 2–T. t-student; 3-Chi-Square T.

n.a – not applicable

3.1.2.2 - Relation between sociodemographic factors, general health status, professional activity, and number of doses of SARS-CoV-2 vaccine administered.

The vaccination rate in this study's sample was of 91.5% (n=43) by July 2021 and of 93.6% (n=44) by June 2022 (**Table 3**). There was no significant relation between age, gender, the presence of chronic pathologies, or clinical activity/clinical teaching according to the number of vaccine doses or the lack of vaccination.

Table 3 – Inferential analysis between demographic factors, demographic variables, general health status, professional activity of respondents and number of doses of vaccine against SARS-CoV-2 (until July 2021) and comparative analysis of demographic variables, general health status, with the total number of doses of vaccine against SARS-CoV-2 (until June 2022).

Demographic variables, general health, and professional activity		**Number of doses of the Vaccine (until July 2021)**			**p**	**Number of doses of the vaccine (until June 2022)**		**p**
		0	**1***	**2**		**0**	**02/mar**	
		n=4	**n=7**	**n=36**		**n=3**	**n=44**	
Gender	Female	4 (100%)	3 (42.9%)	25 (69.4%)	0.138[1]	3 (100%)	29 (65.9%)	0.220[3]
	Male	0 (0%)	4 (57.1%)	11 (30.6%)		0 (0%)	15 (34.1%)	
Age (years)	Average (DP)	45.8 (13.7)	39 (9.4)	42.7 (8)	0.705[2]	50.3 (12.4)	41.8 (8.3)	0.102[2]
	Median (IQR)	46.5 (33-57.8)	42 (31-47)	42 (39.3-46)		57 (36-57)	42 (38.3-46)	
	Min-Max	32-58	27-52	26-65		36-58	26-65	
Diabetes	Yes	0 (0%)	0 (0%)	1 (2.8%)	0.855[1]	0 (0%)	1 (2.3%)	1.000[1]
	No	4 (100%)	7 (100%)	35 (97.2%)		3 (100%)	43 (97.7%)	
Cardiovascular Disease (excludes hypertension)	Yes	0 (0%)	1 (14.3%)	0 (0%)	0.054[1]	0 (0%)	1 (2.3%)	1.000[1]
	No	4 (100%)	6 (85.7%)	36 (100%)		3 (100%)	43 (97.7%)	
Chronic lung disease (excludes asthma)	Yes	0 (0%)	0 (0%)	0 (0%)	n.a.			n.a
	No	4 (100%)	7 (100%)	36 (100%)		3 (100%)	44 (100%)	
Asthma	Yes	0 (0%)	1 (14.3%)	1 (2.8%)	0.350[1]	0 (0%)	2 (4.5%)	1.000[1]
	No	4 (100%)	6 (85.7%)	35 (97.2%)		3 (100%)	42 (95.5%)	
Obesity (BMI≥30 kg/m2)	Yes	0 (0%)	0 (0%)	3 (8.3%)	0.613[1]	0 (0%)	3 (6.8%)	1.000[1]
	No	4 (100%)	7 (100%)	33 (91.7%)		3 (100%)	41 (93.2%)	
Auto immune disease (ex. rheumatoid arthritis, lupus)	Yes	0 (0%)	1 (14.3%)	0 (0%)	0.054[1]	0 (0%)	1 (2.3%)	1.000[1]
	No	4 (100%)	6 (85.7%)	36 (100%)		3 (100%)	43 (97.7%)	
Inflammatory Disease	Yes	0 (0%)	0 (0%)	1 (2.8%)	0.855[1]	0 (0%)	1 (2.3%)	1.000[1]
	No	4 (100%)	7 (100%)	35 (97.2%)		3 (100%)	43 (97.7%)	
Chronicl Liver Disease	Yes	0 (0%)	0 (0%)	0 (0%)	n.a.			n.a
	No	4 (100%)	7 (100%)	36 (100%)		3 (100%)	44 (100%)	
Cancer (in the last 5 years)	Yes	0 (0%)	0 (0%)	1 (2.8%)	0.855[1]	0 (0%)	1 (2.3%)	1.000[1]
	No	4 (100%)	7 (100%)	35 (97.2%)		3 (100%)	43 (97.7%)	
Immunodeficiency (primary or acquired)	Yes	0 (0%)	0 (0%)	0 (0%)	n.a.			n.a
	No	4 (100%)	7 (100%)	36 (100%)		3 (100%)	44 (100%)	
Hematologial or Coagulation Disease	Yes	0 (0%)	0 (0%)	2 (5.6%)	0.727[1]	0 (0%)	2 (4.5%)	1.000[1]
	No	4 (100%)	7 (100%)	34 (94.4%)		3 (100%)	42 (95.5%)	
Other Chronical Disease	Yes	0 (0%)	0 (0%)	2 (5.6%)	0.727[1]	0 (0%)	2 (4.5%)	1.000[1]
	No	4 (100%)	7 (100%)	34 (94.4%)		3 (100%)	42 (95.5%)	
March/2020-May/2020 practiced clinical MD	Yes	3 (75%)	5 (71.4%)	22 (61.1%)	0.776[1]			
	No	1 (25%)	2 (28.6%)	14 (38.9%)				
June/2020-June/2021 carried out Clinical Teaching activities at MIMD and MD activity	Yes	4 (100%)	6 (85.7%)	34 (94.4%)	0.593[1]			
	No	0 (0%)	1 (14.3%)	2 (5.6%)				

Statistical test applied: 1 – T. Qui2; 2–T. Kruskal-Wallis; * Includes individuals previously diagnosed with SARS-CoV-2/COVID 19 infection and indicated for administration of only one dose of vaccine until July 2021; n.a – not applicable

Statistical test applied: 1 – T. Fisher; 2–T. t-student; 3 – Chi-Square. T; n.a – not applicable

3.2. – Complementary Review Results

A descriptive review was performed to further complement the conducted study, selecting publications in *PubMed and Google Scholar* on SARS-Cov-2 infection rates and disease prevalence, as well as on vaccination rates in dentists or healthcare professionals. A total of 132 were found initially (**Figure 10**), through screening. Seventy articles were duplicates, 33 were excluded by the title and abstract analysis and reading, and 16 were removed for not meeting the PRISMA quality checklist domains (**Table 4**). Of the remaining 13 articles, only 6 contained data that supported the eligibility and inclusion criteria. The exclusion criteria comprehended duplicates, irrelevant articles, articles that were not systematic reviews or meta-analyses, or unavailability of full text.

Figure 10 – PRISMA 2020 flowdiagram (PRISMA 2020).

Source: https://www.prisma-statement.org/prisma-2020-flow-diagram.

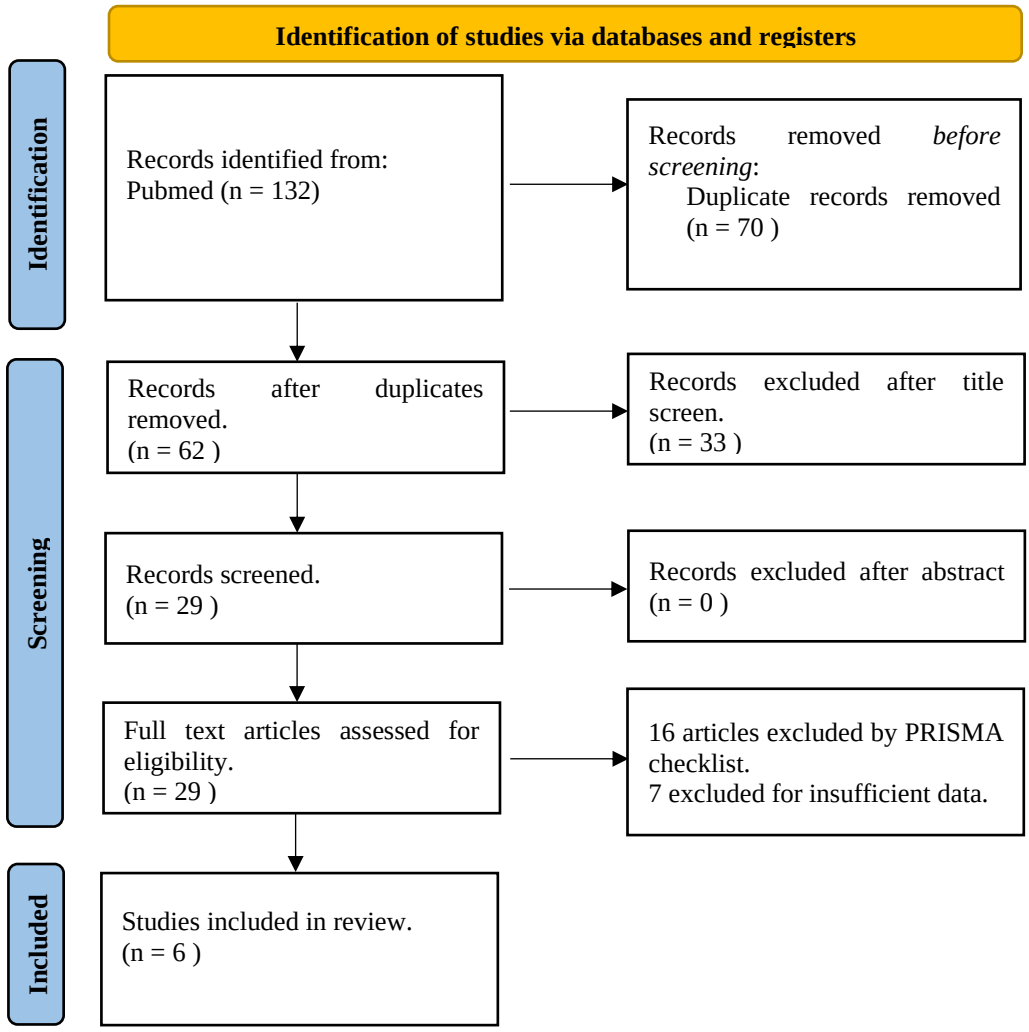


Table 4 – Prisma Checklist quality assessment of the selected publications (PRISMA 2020).

Source: https://www.prisma-statement.org/prisma-2020-checklist.

		Gholami, et al., 2023	Moltot et al., 2023	Lin et al., 2022	Wake A. D., 2022	Luo et al., 2021	Wang et al., 2021
Title	1	1	1	1	1	1	1
Abstract	2	1	1	1	1	1	1
Introduction							
Rationale	3	1	1	1	1	1	1
Objectives	4	1	1	1	1	1	1
Methods							
Eligibility criteria	5	1	1	1	1	1	1
Information sources	6	1	1	1	1	1	1
Search strategy	7	1	1	1	1	1	1
Selection process	8	1	1	1	1	1	1
Data collection process	9	1	1	1	1	1	1
Data itemns	10(a)	0	1	1	1	0	1
	10(b)	0	1	1	1	1	1
Study and risk of bias assessment		1	1	1	1	1	1
Effect measures		1	1	1	1	1	1
Synthesis methods	13(a)	1	1	1	1	1	1
	13(b)	1	1	1	1	1	1
	13(c)	1	1	1	1	1	1
	13(d)	1	1	1	1	1	1
	13(e)	1	1	1	1	1	1
	13(f)	1	1	1	1	1	1
Reporting bias assessement		1	1	1	1	1	1
Certainty assessement		1	1	1	1	1	1
Results							
Study selection	16(a)	1	1	1	1	1	1
	16(b)	1	1	1	1	1	1
Study characteristics	17	1	1	1	1	1	1
Risk of bias in studies	18	1	1	1	1	1	1
Results of individual studies	19	1	1	1	1	1	1
Results of Syntheses	20(a)	1	1	1	1	1	1
	20(b)	1	1	1	1	1	1
	20(c)	1	1	1	1	1	1
	20(d)	1	1	1	1	1	1
Reporting biases	21	1	1	1	1	1	1
Certainly of evidence	22	1	1	1	1	1	1
Discussion	23(a)	1	1	1	1	1	1
	23(b)	1	1	1	1	1	1
	23(c)	1	1	1	1	1	1
	23(d)	1	1	1	1	1	1
Other Information							
Registration and protocol	24(a)	1	1	1	1	1	1
	24(b)	1	1	1	1	1	1
	24(c)	1	1	1	1	1	1
Support		1	1	1	1	1	1
Competing interests		1	1	1	1	1	1
Avalability of data, code, and other materials		1	1	1	1	1	1

Table 5 describes the main outcomes of the 6 articles included in this review. Main abstracts description of those studies are provided in **Annex B** (**Table 5.1**).

Table 5 – Main outcomes from the included (n=6) systematic reviews and meta-analysis publications (reference, methods, SARS-CoV-2 infection rates, COVID-19 vaccination rates main findings).

Reference	Methods			Results	
	Population	**Sample Size**	**Inquiry**	**Infection**	**Vaccination**
Gholami et al., 2023	Healthcare workers;	n= 980 296 (p1=898 203; p2=82 093);	Serum samples and questionnaire;	p1=6.1% p2=8.1%	59%
Lin et al., 2022	Dental students and dental practitioners;	n=12585;	Self-administered questionnaire or questionnaire;	N.A	dental students= 60.5%; dental practitioners= 81.1%
Luo et al., 2021	Healthcare workers;	n=24952;	6 self-designed questionnaires and 3 questionnaires previously reported in literature(on-line, e-mail, telephone, text message, personal interview and paper-based)	N.A	51%
Moltot et al., 2023	Healthcare workers;	n=5981;	Cross sectional surveys (web based/face to face self-administered questionnaire)	N.A	54.49%
Wake, 2022	Healthcare workers and general population;	n= 119025;	Type of inquiry= cross sectional studies. (yes or no question);	N.A	59.77%
Wang et al., 2021	Healthcare workers and general population;	n= 81173;	Online surveys;	N.A	65.65%

Of the 6 articles included (**Table 5**), all reported to healthcare worker's vaccination rates and acceptability, one article also refers to the infection rates in that same population. All of meta-analyses and systematic reviews included used data collected from questionnaires—such as online, via email, telephone, text message, personal interview, or self-administered. Three of the studies only consider the healthcare workers (Gholami et al., 2023; Luo et al., 2021; Moltot, et al., 2023), 2 of them considered both the healthcare workers population and the general population (Wang et al 2021; Wake, 2022), and one focused mainly on dental students and practitioners (Lin, G. S. S., et al 2022).

According to Gholami and colleagues (2023), during the period one of the study (July to December of 2020 year) the estimated polymerase chain reaction (PCR) positive rate was of 6.1% (95% CI, 4.1-8.8) and, during the period two (January to June 2021 year), the estimated PCR positive among healthcare workers was of 8.1% (95% CI, 4.6–13.8). The vaccination rates among the population were 59.0% (95% CI, 39.4–76.1)(Gholami et al., 2023).

The main outcomes of the Luo and colleagues (2021) study, in a population of healthcare workers, regarding the overall acceptance of the COVID 19 vaccines was of 51% and—depending on several factors such as gender and age, among other conditions. Those authors also stated that healthcare workers have been more exposed to professional information, which may have affected their decision to become vaccinated and more concerned on the efficacy and safety of the COVID-19 vaccine (Luo et al., 2021).

Other healthcare workers of Ethiopia registered a COVID-19 vaccination rate of 54.59% (95% CI: 42.49, 66.69) (Moltot, T. et al 2023).

Two studies compared the healthcare workers and general population vaccination rates (Wang et al., 2021; Wake, 2022) While 59.77% (95%CI [51.56, 67.98], $p = 0.000$) of healthcare workers were vaccinated in one study (Wake, 2022), in the other population studied of the same "individuals" 65.65%. (95%CI: 55.20, 75.38) accepted the COVID-19 vaccine (Wang et al., 2021).

Only one study evaluated the vaccination rates of dental students and of dental care professionals, and revealed that the mean acceptance rates of the COVID-19 vaccine of dental students and professionals was of 60.5% [CI: (56.1, 65.0)] and 81.1% [CI: (72.4, 89.8)], respectively (Lin et al., 2022).

4. Discussion

This observational prospective study applied a survey, in July of 2021 year, that consisted of self-completion questions, made available via Google Forms, to a population of 62 individuals who simultaneously practiced dentistry/teaching clinical in the UFP-Dentistry Master (MIMD) during the 2020-21 academic year. Nine dentists/teachers did not respond to the survey and were excluded. Of the remaining , 47 met the inclusion criteria, fulfilled the entire survey, and freely consented to participate.

The convenience sample of 47 participants corresponded to 75.8% of the total study population. 32 (68.1%) were female and 15 (31.9%) were male. The average age of participants was of 42.38 years—ranging from a minimum of 26 to a maximum of 65 years—and did not differ ($p>0.05$).significantly by gender.

Around 2.1% (n=1) of the individuals reported having diabetes and cardiovascular disease (excluding hypertension); 4.3% (n=2) had asthma and 6.4% (n=3) a body mass index BMI≥30 kg/m2; 2.1% reported having an autoimmune disease (n=1) and 2.1% had had oncological history in the last 5 years (n=1). 4.3% of the individuals had a hematological disease or other diseases not specified in the survey (n=2). There were no records of individuals with chronic respiratory or liver disease, or primary or acquired immunodeficiency.

In order to monitor the conditions of SARS-CoV-2 infection, vaccination against SARS-CoV-2 and adverse effects following vaccination against SARS-CoV-2, each participant (n=47) filled-in a data update form provided throughout the period of this investigation (1st-July 2021, 2nd-December 2021, and 3rd-June 2022).

Around 8.5% (n=4) of participants reported the infection by SARS-CoV-2 until July 2021. In the period between July-2021 and the December-2021, only 2.1% (n=1) of participants obtained a positive diagnosis for COVID 19. The majority of SARS-CoV-2 infections occurred in the period between the (December 2021 and June 2022, with 40.4% (n=19) of the total number of individuals (n=47) reporting had been diagnosed with SARS-CoV-2 infection/COVID 19 disease.

The incidence of the history of SARS-CoV-2 infection records, by age group, over the total study period was of 57.7% in those aged 40-49 years, 45.5% in those aged 30-39 years, 42.9% in those aged 50 years and 33.3% (just one case) in those under 30 years

old. Of the total number of reported cases of history of SARS-CoV-2 infection, 79.2% (n=19) occurred between January and June of 2022 year.

By July 2021, 8.5% (n=4) of the individuals were unvaccinated, 14.9% (n=7) had one dose of vaccine and 76.6% (n=36) had already two doses of the SARS-CoV-2 vaccine. All of the unvaccinated (n=4) were female, with an average age of 45.8±13.7 years. In June 2022, only 6.4% (n=3) of the individuals had not been vaccinated, 19.1% (n=9) had received 2 doses of vaccines and 74.5% (n=35) had received 3 doses of the SARS-CoV-2 vaccine.

As first dose, 68.2% (n=30) of the individuals received the vaccine from AstraZeneca®, 22.7% (n=10) received the one from Pfizer- BioNTech® and 9.1% (n=4) were given the vaccine from the manufacturer Moderna®. Around 45.5% (n=20) of the individuals received the second dose of the vaccine from AstraZeneca® (n=20), 45.5% from Pfizer - BioNTech® (n=20) and 9% (n=4) received the second dose from Moderna®. No individual was given the Janssen-Johnson vaccine&Jonhson®. Around 88.6% (n=31) were given the Pfizer vaccine-BioNTech® as their third dose of vaccination, and 11.7% (n=4) were given the vaccine from Moderna®.

Around 20 individuals (45.4%) reported no symptoms after the 1st dose of the vaccine and 23 individuals (52.3%) also, no symptoms after the 2nd dose of the vaccine. Of the 35 individuals who received the 3rd dose, 20 (57.1%) reported that they had no post-vaccination symptoms.

During the first period of confinement, the Portuguese national authorities ordered the suspension of professional dental practice, stomatology, and dentistry activities, with the exception of situations that were proven to be urgent and unavoidable. When asked about the clinical activity carried out during this period (March to May 2020), around 63.8% (n=30) registered that worked as a dentist. From June 2020 to June 2021, 93.6% (n=44) of the respondents reported having worked simultaneously as a dentist and as a clinical teacher on the UFP Dentistry master's degree (MIMD) training. The cumulative frequency of working hours per week, in terms of simultaneous clinical and academic activities, was more than 40 hours/week for 36% (n=17) of the respondents and between 25 and 40 hours/week for 32% (n=15) of the respondents. Around 26% (n=12) of respondents reported working less than 25 hours/week and 3 (6%) did not work at all during the reference period.

As for the relation of between sociodemographic factors, general health status, professional activity, and past/present history of SARS-CoV-2 infection, no significant associations were found for demographic variables—namely gender, age, existence of chronic pathologies and SARS-CoV-2 infection. Professional practice, in terms of teaching/clinical teaching activities at MIMD and/or professional activity as a dentist, did not show a significant correlation with the diagnosis of SARS-CoV-2 infection, be it in the period prior to vaccination (until July-2021) or after 1 year—in the final period of the study, in June of 2022 year.

The vaccination rate in this study's was of 91.5% (n=43) by July-2021 and of 93.6% (n=44) by June-2022. The number of vaccine doses and the lack of vaccination was independent ($p>0.05$) of the age, the gender, the existence of chronic pathologies or the clinical activity/clinical teaching of those participants in the study.

At the time of this survey, no references were found in the literature regarding alike validated surveys for SARS-CoV-2 applicable to the academic community, dental students, teachers, or dentists/dentistry professionals. In the last 3 years numerous publications related to SARS-CoV-2 infection and the several parameters of COVID-19 disease were published. The risk factors/predisposing factors to transmission, the essential conditions and diagnostic techniques, and the different preventive and therapeutic ways of approaching the disease, have been the main lines of research, with around 11,000 articles published in indexed journals (Chung et al., 2024).

Health professionals were considered risk and exposure groups, and, for this reason, some observational studies were performed in those populations (Hosseini et al., 2021; Kasztelewicz et al., 2024). Around 1944 studies were found, of which 1167 were narrative reviews and 138 clinical trials mostly related to vaccination and clinical/adverse effects of those therapies. Epidemiological studies were published with information on socio-demographic characteristics and co-morbidities, clinical manifestations of the disease, analytical laboratory indicators for the detection of disease and/or immunity, complications resulting from COVID-19 disease and vaccination against SARS-CoV-2.

Regarding the oral health condition, there has also been an expected interest; and numerous articles have been published on adapting clinical practice to the risks of infection in the clinical environment at the dental office (Melo et al., 2021), creating guidelines and limitation protocols for procedures that generate and spread aerosols, in

the several scientific fields of dentistry (Tsuchiya et al., 2023). However, there is still a lack of research data or published studies on the prevalence of COVID-19 disease or SARS-CoV-2 infection in the professional group of dentists/dental assistants/hygienists and also in those associated with oral health teaching and practices, involving groups of students with practical clinical teaching inherent in their undergraduate curricula in the medical and dental sciences (Durbin et al., 2023; Manzoor et al., 2022).

In the present study, the percentage of participation was representative only of the population studied—professionals with both professional and academic qualifications, i.e., dentists/clinical teachers on the UFP-Dentistry master (MIMD) training—and these data cannot be extrapolated to other populations. However, the importance of applying and monitoring this action in professional populations in the context of the environment, occupational health and education was discussed, since the safety of those professionals, and their both professional competence, was essential for community response, in professional clinical care, as dentists, and especially as teachers in the specific training field of Dentistry, for dental students education and for safety and preventive health conditions during the training of the students, the future dental care professionals.

The methodology applied in this research included a self-administered survey on sociodemographic questions, medical condition, history of SARS-CoV-2 infection and vaccination status. Other studies have applied similar surveys, validating the scope of their application (Dar-Odeh et al., 2022; Jungo et al 202; Pollán et al., 2020; Ribeiro et al., 2022).

The proportion of participants categorized by demographic characteristics was similar to that of other published studies (Bsoul, 2021; Bsoul et al., 2022).

According to several cohort studies, wherein multivariate analyses were carried out, greater disease severity was associated with demographic factors such as older age and male gender. Strong and consistent associations have also been found between obesity, diabetes (Guo et al., 2020; Richardson et al., 2020; Shi et al., 2020) and chronic obstructive pulmonary disease (Ebinger et al., 2020; Wolff et al., 2021; Zhang et al., 2020; Zhang et al., 2021; Zhou et al., 2020).

Studies indicate weak or limited evidence between arterial hypertension, oncological pathologies, smoking habits, kidney disease and the risk of COVID-19 severity (Gao et al., 2021).

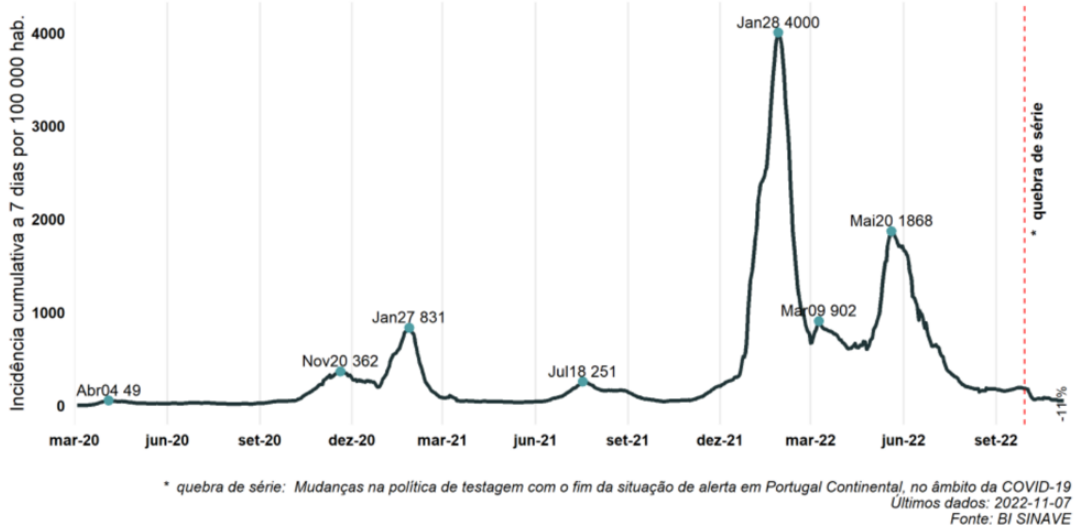
The participants on the present study were mostly female, with an average age of 42.38 years and a low prevalence of comorbidities. The main pathologies described were hematological (n=2), obesity (n=3) and asthma (n=2); but, as the number of individuals with these pathologies was very low, no significant correlations were found for comorbidities and the risk of SARS-CoV-2 infection.

The outcomes regarding the history of SARS-CoV-2 infection in the 47 participants of this research tendency followed the temporal evolution of the COVID-19 disease in Portugal. At the time the data published by the General Directorate of Health on the incidence (**Figure 11**) of new diagnosed cases indicated two prevalence peaks, namely in January 2021 and January 2022 (Direção Geral de Saúde [DGS], 2022).

These data were in line with the data reported in this study, wherein around 8.5% (n=4) of individuals reported a history of SARS-CoV-2 infection or COVID-19 disease in the initial phase of the pandemic—namely from March 2020 to July 2021 (the period before the 1st blood collection carried out for this study). Around 2.1% (n=1) reported a diagnosis of SARS-CoV-2 infection between July 2021 and December 2021. The majority of infections occurred between December 2021 and June 2022 with 40.4% (n= 19) of the total sample reporting had a SARS-CoV-2 infection .

Figure 11– Number of new cases diagnosed in Portugal between March 2020 and September 2022.

Source: https://covid19.min-saude.pt/wp-content/uploads/2022/11/DGS_boletim_20221107.pdf



Some studies reported SARS-Cov-2 infection rates in dental care professionals ranging from 1% to 15% (Campus et al., 2021; Estrich, et al., 2020; Galicia et al., 2021).

In most countries, the activity associated with healthcare was closed for short periods until the scientific community created preventive protocols for clinical action (Melo et al., 2021a, 2021b).

There was no significant relationship between professional and academic activity and the risk of SARS-CoV-2 infection, which may give us the perception that the infection control standards adopted in clinical and academic activity have been respected and appropriated to the inherent occupational risk.

Portugal demonstrated to have one of the highest COVID-19 vaccination rates in the world. As of September 2021, 84% of the 10.3 million people living in the nation were fully immunized. That was the highest rate globally, surpassing that of the United Arab Emirates (80.8%), Singapore (77.3%), and the 27 member nations of the European Union (61.6%) (EURONEWS, 2021).

In 2022, almost 100% of all age groups had received at least a dose of one of the vaccines and a booster dose. In January 2024, there were a total of 1.890.126 vaccines administrated in Pharmacies and SNS with a variation of 41.209 doses. And, according to the most recent information, as of the 24th of September of 2024, a total of 23.434 new doses of the vaccine against COVID 19 were administered (Direção Geral de Saúde [DGS], 2024).

There are no studies indicating the global trend and current percentage of vaccinated dentists. According to the systematic review carried out by Chowdhury and colleagues, in 2022 , the global rate for refusal of vaccination, by dentists, was of 19% (12.8%-25.2% with 95% CI). The majority gave as main reasons concerns on safety, efficacy, adverse effects, and the excessively rapid development of vaccines (Chowdhury et al., 2022). Those data are in agreement with the meta-analysis carried out by Lin and colleagues in 2022, whose results reveled an acceptance rate for SARS-Cov2 vaccination of 81.1% among dentists (Lin et al., 2022).

The main limitation of this longitudinal study was the size of the sample, despite it being representative of the population on study—both dentist and academic teachers of the UFP Dentistry master training. Therefore, these results should not be extrapolated to other types of healthcare communities. It must be stated, that by the time the study started to be

conducted (July 2021), there was no data available regarding those healthcare professionals, thus manifesting the importance of this research for safety and occupational health purposes.

Regarding the literature review conducted to further complement this study's issue, it is possible to state that the SARS-CoV-2 infection rates had tendency growth in time, according to the pandemic evolution and its worldwide expansion—especially during the early times when little to no information was available of the virus and the way it affected the human population, and all the variants that would later appear (Gholami et al., 2023; Senevirathne, 2024; Umakanthan et al., 2020).

As the pandemic continued to grow and millions of people were affected, several vaccines were developed as a way to stop not only the effects of the virus but also to try to reduce the infection rates and continuous propagation of COVID 19 throughout the world.

In the main studies outcomes included in this review, COVID-19 vaccination rates varied according to sex, age, educational level, government trust, previous experiences (such as with *Influenza virus vaccination*), and concerns about side effects and safety, financial status and stability, the employment status, among other reasons. Healthcare workers are also exposed to professional information, which may have affected their decision to become vaccinated and thus making it more difficult for them to advise patients to get vaccinated. As a result, people may have been more concerned about the efficacy and safety of the COVID-19 vaccine, deciding not to get vaccinated (Lin et al, 2022; Luo, 2021; Wang et al., 2021).

According to Wang (2021) people who received the *Influenza virus vaccine* were more likely to accept the COVID-19 vaccine, as well as people with higher education, while women were less likely to accept the vaccine compared to men (Wang et al., 2021).

Several populations all over the world adopted pro-vaccine measures and accepted it, in particular, the healthcare worker population, providers and practitioners, such as medical staff, nurses, doctors, and even dental students, dentists and many more that compose the healthcare systems worldwide.

The way the vaccines were perceived and accepted by healthcare workers and also the general population varied all over the world, as shown in the search conducted and presented previously (Wake, 2022; Wang 2021).

The infection rates of the population in which this study was focused kept-up with the evolution of the pandemic, such as hospitalization and mortality rates, which were higher in the beginning, taking into account the little information on the virus and how to prevent its infection, at that moment (Moltot et al., 2023). Based on WHO surveillance data, between January 2020 and May 2021, COVID-19 was responsible for 3.45 million deaths. As of May of 2021 year, out of the millions of healthcare workers all over the world, 6,643 healthcare workers deaths had been recorded to the WHO. Based on population-based estimations, the number of deaths among healthcare workers associated with COVID-19 was estimated to be roughly 115,493 out of an estimated 135 million healthcare workers worldwide (Gholami et al., 2023).

The projected global willingness to acquire a COVID-19 vaccine was 66.01% globally, despite the fact that people's willingness to undergo immunizations varies substantially within and between populations (Moltot et al., 2023).

While Luo (2021) verified that the overall acceptance of the COVID 19 vaccines was of 51%, the healthcare workers of Ethiopia registered COVID-19 vaccination rate of 54.59% (Moltot, T. et al 2023).

Comparing both healthcare workers and the general population (Wang et al., 2021; Wake, 2022), the general population (81.65%) was more willing to accept the vaccination than the healthcare workers (65.65%)(Wang et al., 2021).

Regarding the healthcare workers studied by Wake (2022), it was observed that Germany (N=200) and the United States (US) (N=5,287) reported the smallest and the biggest sample sizes of vaccination, respectively. Thus, among healthcare workers, the percentage of those with a favorable attitude toward the COVID-19 vaccine ranged from 21% to 95%. In terms of non-healthcare workers, 90 from the United States of America and 32.361 from the United Kingdom were the smallest and greatest sample sizes, respectively, that were reported. As a result, among non-healthcare workers , the prevalence of a favorable attitude toward the COVID-19 vaccine varied from 21.4% to 91.99%. (Wake, 2022).

This can be associated with the level of knowledge and information available to healthcare professionals in general, making them more cautious in the acceptance of the vaccine compared to the information available and presented to the general population, as previously mentioned (Lin et al, 2022; Luo, 2021; Wang et al., 2021).

Also, due to the nature of their work and the closeness of the dental team to the patients, dentists are among the healthcare professionals entitled as having the highest risk of infection during the COVID-19 pandemic, due to the rapid dissemination of SARS-CoV-2 through saliva droplets during various aerosol-generating dental procedures. However, because of the nature of their clinical training in the dental colleges, dental students—who make up a small percentage of the oral healthcare workforce—are at the same risk of contracting COVID-19 as dental practitioners. The vaccination rates on both of those populations were significantly high, being also higher in dental practitioners (81.1%) than in dental students (60.5%).Some authors reported that this reduction of acceptance by the dental students came from their mistrust of the government and vaccination statistics provided by the pharmaceutical industry (Lin et al., 2022).

Despite the values of acceptance of the vaccines being significatively high according to overall six studies, by some authors it was considered as low (Moltot et al. 2023), as poor, (Lin et al. 2022), and as unsatisfying (Wake, 2022).

There are still needs for periodic assessments of this and other viral and microbiological agents' infection rates, as well as needs for evaluating the effectiveness of antiviral and antimicrobial vaccination in communities of healthcare professionals, who simultaneously had frequent contact with dental students, as part of their medical training— as is the case of dentistry masters trainings—as health-promoting measures and possible occupational risks inherent of diverse professional/academic environments.

5. Conclusion

This longitudinal pilot study was performed among a population of both professional, dental academic professors and dentists, in a dental academic environment, and had as main goal to assess both infection and vaccination rates by a self-administered inquiry applied in July 2021, December 2021 and June 2022. It made possible to draw the following conclusions:

- The sample consisted of 47 participants, 75.8 % of the total study population, 32 (68.1%) of whom were female and 15 (31.9 %) male with a mean age of 42.38 years (26 to 65 years); the range age did not differ by gender.

- Only 8.5% (n=4) were diagnosed with SARS-CoV-2 infection until July of 2021 year; in December 2021, only 2.1% (n=1) tested positive for COVID-19. Most of SARS-CoV-2 infections occurred between December 2021 and June 2022, with 40.4% (n= 19) of individuals self-reported the diagnose of SARS-CoV-2 infection or COVID-19 disease.

- Only 8.5% (n=4) of the individuals had not been vaccinated against SARS-CoV-2 in July 2021, 14.9% (n=7) had one dose of vaccine and 76.6% (n=36) had two doses of the SARS-CoV-2 vaccine; All of the unvaccinated individuals (n=4) were women, with an average age of 45.8±13.7 years. In June 2022, only 6.4% (n=3) of the individuals were unvaccinated, 19.1% (n=9) had received 2 doses of the vaccine, and 74.5% (n=35) had received 3 doses of the SARS-CoV-2 vaccine.

- No significant associations were found between demographic variables, namely gender, age, and SARS-CoV-2 infection. The existence of chronic pathologies was also not found to be related to the previous diagnosis of COVID-19 disease. Professional activity, in terms of teaching/clinical teaching at the academic dentistry degree and/or professional activity as a dentist, was not significantly related to the diagnosis of SARS-CoV-2 infection in the period prior to vaccination.

- Vaccination rate was of 91.5% (n=43) until July 2021 and of 93.6% (n=44) in June 2022. No significant association was found for age, gender, the existence of chronic pathologies, or clinical activity/clinical teaching and the number of vaccine doses or lack of vaccination.

- When asked about the clinical activity carried out during confinement period (March to May 2020), around 63.8% (n=30) reported that worked as a dentist. From June 2020 to June 2021, 93.6% (n=44) of respondents reported having simultaneously worked as a dentist and as a clinical teacher of the Dentistry Master Training. The cumulative frequency of working hours per week, in terms of simultaneous clinical and academic activity, was superior to 40 hours/week for 36% (n=17) of respondents and between 25 and 40 hours/week for 32% (n=15) of respondents. Two respondents (26%) reported working less than 25 hours/week and 3 (6%) did not work at all during the reference period.

-No significant associations were found between demographic variables—namely gender, age, and SARS-CoV-2 infection. Clinical teaching activities at the Dentistry Master and/or professional activity as a dentist, did not show a significant relationship with the diagnosis of SARS-CoV-2 infection, in the period prior to vaccination (until July 2021) or in the time after the end of the study—1 year after vaccination (June 2022).

The descriptive review performed also allowed to also state the following conclusions:

There was an increasing infection rates in the beginning of the pandemic. The acceptance of vaccination made a significant change in the behavior of the population regarding contact and interaction, as well as a positive change in terms of work and restrictions.

To evaluate the rates of infection and vaccination, several types of surveys were used—such as, inquiries with yes or no response, online questionnaires via email, telephone, text message, personal interview, or self-administered to the population of healthcare workers and providers in focus, such as dental students, dentists, nurses, physicians.

Vaccination rates were as low as 51% and as high as 65.65% among the population of healthcare workers. Among Dental students and Dental care professionals (dentists), the vaccination rates were higher—81.1% and 60.5%, respectively.

We can also conclude that even though the acceptance of the vaccine was high in healthcare workers, the fact that many didn’t accept it and weren’t vaccinated can resonate with the concern for its efficiency, safety, and adverse effects, as reported in some studies. More knowledge of research must be developed among those healthcare professionals in order to contribute to preventive policies and higher attitudes on Safety and Occupational Health.

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Annexes

Annex A- On-line Self-administered Survey (Information, informed consent and self-completion survey, Portuguese language, in July 2021).

Avaliação em saúde ocupacional sobre infeção por SARS CoV-2 e imunidade por vacina COVID-19 dos docentes médicos dentistas do Mestrado Integrado em Medicina Dentária-UFP (MIMD-UFP).

Caro/a docente e médico dentista da comunidade académica do MIMD-UFP,

Qual a condição de saúde ocupacional relativo a história de infeção por SARS CoV-2 e o qual a estado de imunidade adquirida pela vacina COVID-19 dos docentes universitários médicos dentistas que lecionam o ensino clinico do MIMD-UFP, no período de um ano?
Para responder a esta questão, estamos a implementar a Investigação *"Condição de saúde por SARS CoV-2 e monitorização quantitativa da imunidade dos docentes médicos dentistas do MIMD-UFP, em tempos de infeção por SARS CoV-2 e vacina COVID-19"*, no âmbito da investigação epidemiológica, observacional e prospetiva em Medicina Dentária, da Faculdade de Ciências da Saúde e do Serviço de Saúde e Risco Ocupacional da Universidade Fernando Pessoa Universidade do Porto, com a equipa de investigação: Patricia Manarte Monteiro, Mary Duro, Dina Alves, Joana Domingues, Liliana Teixeira e Sandra Gavinha.
Nesta investigação realizaremos o levantamento de dados demográficos, de história passada e/ou presente de infeção por SARS CoV-2 e/ou COVID-19, dados sobre vacina COVID-19 e horas de contacto profissional no âmbito do ensino e atividade profissional de medicina dentária dos docentes médicos dentistas do MIMD-UFP. Adicionalmente, e se manifestar autorização e aceitar participar na segunda parte desta investigação implementaremos o programa de monitorização analítico da estado de imunidade dos docentes médicos dentistas, aos 1 mês, aos 6 meses e 12 meses após vacinação COVID-19.
Para o sucesso desta investigação, solicitamos a sua colaboração, respondendo ao inquérito, com uma duração de cerca de 10 minutos. Só após completar o inquérito e validar a sua autorização e aceitação para participar no estudo analítico de monitorização de imunidade é que pode ser contactado pela equipa de investigação, em três momentos distintos (após 1, 6 e 12 meses), para colheira de amostra sanguínea e integrar o programa de monitorização analítica de imunidade.
Para responder o inquérito, utilize o link: Inquerito
A sua colaboração é extremamente importante, para o sucesso desta investigação académica e para a monitorização da saúde em tempos de infeção por SARS CoV-2.

Para qualquer esclarecimento adicional, por favor, entrar em contacto através do e-mail: patmon@ufp.edu.pt

Esta investigação visa efetuar o levantamento descritivo de história de infeção por SARS CoV-2 e/ou COVID-19, dados sobre vacina COVID-19 e horas de contacto profissional no âmbito do ensino e atividade profissional de medicina dentária dos docentes médicos dentistas do MIMD-UFP.
Solicitamos a sua colaboração, respondendo ao seguinte inquérito, com uma duração de cerca de 10 minutos.
O mesmo pretende obter uma análise descritiva para responder á questão: Qual a condição de saúde ocupacional relativa a história de infeção por SARS CoV-2, dados da vacina COVID-19 e horas contato clinico no âmbito do ensino e atividade profissional dos docentes médicos dentistas do MIMD-UFP.
_____Aceito e autorizo participar nesta investigação mediante o preenchimento do seguinte **inquérito** constituído por 5 grupos de questões (dados demográficos, história passada e/ou presente de infeção por SARS CoV-2 ou COVID-19; dados de vacina COVID-19; Horas de contacto presencial em atividade de ensino clinico e profissional; Informação e consentimento informado para integrar de modo voluntário e gratuito o programa de monitorização analítico da estado de imunidade aos 1 mês, aos 6 meses e 12 meses, após vacinação COVID-19).
Sim
Não
____Autorizo que os dados agora recolhidos sejam usados pela equipa de investigação, de forma totalmente anonimizada para publicação científica devidamente autorizada
Sim
Não

Se resposta for SIM acesso ao INQUÉRITO
INQUERITO DE AUTO-PREENCHIMENTO

1- Dados Demográficos
Nome completo:
Data de Nascimento: ____/___/_____ (DD/MM/AAAA)
Idade:
Conselho de residência:
Contacto institucional UFP email:
Contato Telemovel : + 351_____

2- História passada e/ou presente de infeção por SARS CoV-2
2.1. Teve diagnóstico prévio de infeção por SARS CoV-2 ou COVID-19? Não ___ Sim ___
o SIM

a) Há quantos dias testou positivo? _____
b) Teve sintomas? (temperatura (>37,5ºC), tosse, dificuldade respiratória, dores musculares, rinorreia (pingo nonariz/nariz entupido), odinofagia (dor de garganta), espirros, diarreia, náuseas/vómitos, perda de olfato ou paladar?
o Ainda tem___ quais? _____

o NÃO

2.2. Contactou com alguém diagnosticado com infeção SARS Cov-2 ou COVID-19? Não ___Sim___

o SIM

a) Há quantos dias testou positivo? _____
b) Teve sintomas? (temperatura (>37,5ºC), tosse, dificuldade respiratória, dores musculares, rinorreia (pingo nonariz/nariz entupido), odinofagia (dor de garganta), espirros, diarreia, náuseas/vómitos, perda de olfato ou paladar?
o Ainda tem___ quais? _____

o NÃO

2.3- Tem sintomas de infeção SARS CoV-2 ou COVID-19 á data de hoje ? (Febre tempª >37,5) dificuldade respiratória, Rinorreia, Espirros, dores
garganta, diarreia, náuseas/vómitos, perda de olfato (cheiro) ou padalar (sabor)?)
 Sim. Quais?_____
 Há quanto tempo (numero de dias) ?_____
 Não, nunca tive_____
 Tomou antipiréticos nas últimas 4 Horas? Sim ___ Não ___

3- Dados sobre vacinação COVID-19

3.1- Foi vacinado?
SIM
Não

3.2 - SE SIM
Data: 1ª dose:____/____/_____ 2ªdose:____/____/_____

3.3- Qual a vacina que lhe foi administrada?
Vacina: Pfizer _____ | Moderna _____ | AstraZeneca _____ | Johnson & Johnson _____

3.4-Teve algum sintoma?
SIM
Quais?_____

Quantos dias teve sintomas ?_____

NÃO

3.5-. Tem alguma destas doenças crónicas? (quadro com sim, não)
Diabetes
Doença cardiovascular (exclui hipertensão)
Doença pulmonar crónica (exclui asma)
Asma
Obesidade (IMC = 30)
Doença auto-imune (ex. artrite reumatóide, lupus)
Doença inflamatória
Outra(s) doença(s). Quais?
Doença hepática crónica
Cancro (nos últimos 5 anos)
Imunodeficiência(primária ou adquirida)
Doença hematológica ou de coagulação

3.6. Fez colheita/ análise de sangue/soro entre junho 2020 e a data atual?
_Sim
Hemograma
Número de plaquetas
SARS CoV-2(IgM e IgG)
_Não

4- Dados sobre atividade ensino clínico MIMD (CPMD-UFP) e medicina dentária (externo á CPMD-UFP)
4.1- Entre março 2020 e maio 2020 exerceu atividade profissional de médico dentista?
Sim
Não

4.2- Entre Junho 2020 e Junho 2021 exerceu ou ainda exerce:
___ Apenas ensino prático clinico MIMD na clínica pedagógica MD-UFP (CPMD-UFP)
___ Apenas atividade profissional de médico dentista externa á CPMD-UFP
___ Ambas as atividades (ensino e atividade de médico dentista)
___ Nenhuma as atividades (ensino e atividade de médico dentista)

4.3- Qual o número médio de horas semanais em que exerceu ensino prático clinico CPMD <u>ou</u> atividade médico dentista externa CPMD-UFP?
__ 0 (zero) horas por semana
__ < 5 horas por semana
__ ≥ 5 e < 15 horas por semana
__ ≥ 15 e < 25 horas por semana
__ ≥ 25 e < 40 horas por semana
__ ≥ 40 horas por semana

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Annex B - Main description of the 6 included articles, abstracts (Table 5.1).

Reference	Aims	Materials and Methods	Results	Conclusions
Gholami et al., 2023	To document emerging evidence on disease prevalence, clinical outcomes, and vaccination rates of healthcare workers.	Three databases were surveyed resulting on 108 final articles between July–December 2020 (period 1) and January–June 2021 (period 2).	Amongst the overall 980,000 healthcare workers identified, in period 1, the estimates were 6.1% (95% CI, 4.1–8.8) for the PCR positivity rate. In period 2, the PCR positivity rate was 8.1% (95% CI, 4.6–13.8). Our analysis indicated a healthcare workers vaccination rate of 59.0% (95% CI, 39.4–76.1).	Studies from the latter half of 2020 to the first half of 2021 showed a slight increasing trend in PCR positivity among healthcare workers, along with improved clinical outcomes in the 1-year period of exposure. These results correlate well with the improving uptake of COVID-19 vaccination globally.
Moltot et al., 2023	To determine the level of COVID-19 vaccine acceptance among healthcare professionals in Ethiopia.	This review was reported using the PRISMA checklist. Eleven articles were retrieved, then extracted on Excel, and exported to STATA version 11 software for meta-analysis.	The pooled prevalence of vaccine acceptance and it is 95% CI were presented using forest plots. The estimated pooled prevalence of COVID-19 vaccine acceptance among healthcare professionals in Ethiopia with a random-effects model was 54.59% (95% CI: 42.49, 66.69) through a heterogeneity index (I2) of 99.1% ($p < .001$), which is relatively low.	Therefore, it is important to identify and remove any myths or obstacles preventing healthcare professionals from accepting the COVID-19 vaccination.
Lin et al., 2022	To critically appraise and analyze the acceptability of COVID-19 vaccination among dental students and dental practitioners.	This review was registered in the PROSPERO database (CRD42021286108) based on PRISMA guidelines. Cross-sectional articles on the dental students' and dental practitioners' acceptance towards COVID-19 vaccine published between March 2020 to October 2021 were searched in eight online databases.	Ten studies were included of which three studies focused on dental students and seven studies focused on dental practitioners. Single-arm meta-analysis revealed that dental practitioners had a high level of vaccination acceptance (81.1%) than dental students (60.5%).	Despite the high degree of acceptance of COVID-19 vaccination among dental practitioners, dental students still demonstrated poor acceptance.

Wake A. D., 2022	To determine the global pro-vaccination attitude and associated factors towards COVID-19 vaccine among healthcare workers and nonhealthcare workers.	Different databases such as PubMed, Scopus, EMBASE, and Google Scholar were used. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) 2020 flowchart diagram and PRISMA checklist were used for study screening, selection, and inclusion into this systematic review and meta-analysis. Newcastle-Ottawa Scale (NOS) quality assessment criteria for cross-sectional studies were used to assess the included articles.	The meta-analysis revealed that the global pooled prevalence of pro-vaccination attitude towards COVID-19 vaccine among both healthcare workers and non- healthcare workers was 61.30% (95%CI: 56.12, 66.47, $I2 = 99.8\%$: $p = 0.000$).	This meta-analysis revealed that the global estimated pooled prevalence of pro-vaccination attitude towards COVID-19 vaccine among both healthcare workers and non- healthcare workers was unsatisfactory. Globally, there is a need for a call for action to cease the crisis of this pandemic.
Luo et al., 2021	To gain insight into willingness and its influencing factors to vaccinate against COVID-19 among health care workers and provide a scientific basis for more reasonable epidemic prevention and control strategies.	A comprehensive literature search was conducted in 4 English databases (PubMed, EMBASE, Web of Science and the Cochrane Library) and 4 Chinese databases (Chinese National Knowledge Infrastructure (CNKI), the Chongqing VIP Chinese Science (VIP), Wanfang Database and China Biomedical Literature Database (CBM)) to collect the related studies.	Nine records with a total of 24,952 subjects were included in this meta-analysis. The results of this meta-analysis revealed that the pooled effect value of COVID-19 vaccination willingness among healthcare workers using a random-effects model was 51% (95% confidence interval (CI) 0.41-0.62). The impact of occupation on healthcare workers intention to get vaccinated could not yet be definitively confirmed (OR 0.85, 95% CI 0.69-1.06, $P = .160$, I2 = 85.5%).	COVID-19 vaccination acceptance of healthcare workers was at moderate level.
Wang et al., 2021	Aimed to estimate the coronavirus disease 2019 (COVID-19) vaccine acceptance rate and identify predictors associated with acceptance.	To this end, we searched PubMed, Web of Science, Cochrane Library, and Embase databases until November 4, 2020. Meta-analyses were performed to estimate the rate with 95% confidence intervals (CI).	Thirty-eight articles, with 81,173 individuals, were included. The pooled COVID-19 vaccine acceptance rate was 73.31% (95%CI: 70.52, 76.01). Studies using representative samples reported a rate of 73.16%. The pooled acceptance rate among the general population (81.65%) was higher than that among healthcare workers (65.65%).	National- and individual-level interventions can be implemented to improve COVID-19 vaccine acceptance before large-scale vaccine rollout.