

Factors Associated with SARS-CoV-2 Infection among Oral Health Team Professionals

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ABSTRACT

Objective: To analyze the factors associated with the SARS-CoV-2 infection among oral health professionals. **Material and Methods:** This was a cross-sectional study in the city of São Paulo, São Paulo State, Brazil. Professionals from three different categories were included: dental surgeons (DS), dental assistants (DA), and dental hygienists (DH). A questionnaire was created on a digital platform and sent via institutional email to each subject. The questionnaire contained 32 questions about sociodemographic, work, and behavior factors. The data about SARS-CoV-2 infection was confirmed through RT-PCR exams. Descriptive (absolute and relative frequencies) and inferential analyses (chi-squared or Fisher's exact test) ($p < 0.05$) were performed. **Results:** There was a SARS-CoV-2 infection prevalence of 3.8% for DS, 30.0% for DH, and 33.3% for DA. SARS-CoV-2 was associated with a lower income ($p = 0.027$), a lower education level ($p = 0.011$), the category of technical professionals (DA and DH) ($p = 0.025$), and using public transportation to commute to work ($p = 0.009$). **Conclusion:** Sociodemographic factors like lower income and education levels and work factors like job category and public transportation were associated with COVID-19 among professionals on the oral health teams.

Keywords: COVID-19; SARS-CoV-2; Oral Health; Primary Health Care.

Introduction

SARS-CoV-2, the virus discovered in December 2019 in Wuhan, China, is the pathogen responsible for the Coronavirus Disease of 2019 (COVID-19). In March 2020, COVID-19 was categorized by the World Health Organization as the pandemic with the largest impact in the current century. It has introduced challenges to the routines of health professionals [1,2].

As the respiratory tract is the principal form of infection by SARS-CoV-2, the risk of transmission becomes extremely high in clinical dental practice. Besides close contact between the professional and the patient, the routine work process includes the use of equipment that disperses aerosols of potentially contaminated body fluids into the environment [3-7].

Hence, strict biosafety recommendations were published during the pandemic [8,9], including the suspension of elective services, avoiding the use of devices that generate aerosols, a strict use of personal protection equipment (PPE) and the inclusion of additional protection, such as N95/NFFP/or similar masks and face shields [4-6]. However, besides the clinical occupational risk, socioeconomic factors can increase the risk of SARS-CoV-2 infection and deserve greater attention [10].

Studies about SARS-CoV-2 infection in odontology [4,6,7] have been directed at dental surgeons (DS), and little is known about the realities of dental hygienists (DH) and dental assistants (DA), mainly working in essential services such as primary health care (PHC). Hence, the objective of this study was to analyze the prevalence of and the factors associated with the SARS-CoV-2 disease among oral health teams (OHT) in the public dental health system in 2020.

Material and Methods

Study Design

A cross-sectional web survey was conducted in September 2020 with OHT professionals at Clinics I and II of the 11 public health clinics (HC) under the responsibility of the Brazilian Israeli Charitable Society Albert Einstein Hospital (*Sociedade Beneficente Israelita Brasileira Hospital Albert Einstein*), in the south zone of the city of São Paulo, SP, Brazil.

Sample and Data Collection

Dental surgeons (DS), dental assistants (DA), and dental hygienists (DH) were included in the study. Those who were on leave during the data-gathering period of the study were excluded.

A questionnaire was created on a digital platform and sent via institutional email to each subject in the sample, obtained from the human resources department. The questionnaire contained 32 questions about sociodemographic, work, and behavior factors. The data about SARS-CoV-2 infection was confirmed through RT-PCR exams.

The dependent variable of the study was the diagnosis of SARS-CoV-2 infection, dichotomized into: “confirmed” and “unconfirmed”. The independent variables were divided into three categories:

1. Sociodemographic: sex (male or female); age (in years); education level (high school/technical school or college/post-graduate); household income (determined by the median income); relation of the number of inhabitants per room (less than 1, or greater than or equal to 1); comorbidities (yes or no); and having a relative diagnosed with COVID-19 (yes or no).

2. Work: job category (DS, DA, or DH); private (car, bicycle, on foot) or public (bus, metro, train) method of transportation used to commute and the commute time (up to 1 hour or over 1 hour); PPE availability and quality.

3. Behavior: safety (yes or no); fear of infection (yes or no); feels informed about COVID-19 (yes or no); sources of information (institutional, TV, internet, others).

Data Analysis

The data was analyzed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY, USA). Descriptive (absolute and relative frequencies) and inferential analyses (chi-squared or Fisher's exact test) ($p < 0.05$) were performed.

Ethical Clearance

The study was approved by the Committee of Ethics in Research of the Municipal Health Secretariat of São Paulo (Protocol No. 4.363.698).

Results

Sixty-four (64) oral health professionals participated in the study, with a response rate of 77.1%. The majority of the participants were women (84.4%), ≤ 44 years old (60.9%), white (51.6%), bachelor's degree or higher (50.0%), monthly salary of \leq BRL \$5,000 (54.7%) and an average of < 1 inhabitant per room (78.9%).

The general prevalence of SARS-CoV-2 infection was 20.3% and by job category, DS (3.8%), DH (30.0%), and DA (33.3%). In addition, SARS-CoV-2 infection was associated with professionals with a lower education level ($p = 0.011$) and lower salary level ($p = 0.027$) (Table 1).

Table 1. Sociodemographic factors associated with SARS-CoV-2 infection among oral health team professionals.

Variables	COVID-19				Total		p-value
	No N	%	Yes N	%	N	%	
Sex							
Male	8	80.0	2	20.0	10	15.6	0.979
Female	43	79.6	11	20.4	54	84.4	
Age							
≤ 44 years old	39	78.0	11	22.0	39	60.9	0.715*
≥ 45 years old	12	85.7	2	14.3	12	18.8	
Race							
White	29	87.9	4	12.1	33	51.6	0.124*
Other (Black, Brown and Asian)	22	71.0	9	29.0	31	48.4	
Education							
High school / Technical school	21	65.6	11	34.4	32	50.0	0.011*
Bachelor's / Post-graduate	30	93.8	2	6.2	32	50.0	
Monthly Income (BRL)							
$\leq 5,000$	24	68.6	11	31.4	35	54.7	0.027*
$> 5,000$	27	93.1	2	6.9	29	45.3	
Number of Inhabitants per room							
< 1	44	80.0	1	20.0	45	78.9	0.665*
≥ 1	6	75.0	6	25.0	12	21.1	
Comorbidities							
No	44	80.0	11	20.0	55	85.9	0.999*
Yes	7	77.8	2	22.2	9	14.1	
Relative with COVID-19							
No	44	83.0	9	17.0	53	82.8	0.213*
Yes	7	63.6	4	36.4	11	17.2	

*Fisher's exact test ($p < 0.05$).

Most participants were dental surgeons (40.6%), used private transportation to go to work (64.1%), and commuted for up to 1 hour (62.5%). During the pandemic, the professionals were not reallocated to another service (84.4%), nor did they change their duties (70.3%). They did not feel safe to carry out their job (51.6%) and were afraid of SARS-CoV-2 infection (85.9%). In relation to the information about COVID-19, 96.9% felt informed, 92.2% received information from the institution, and 98.4% took one or more e-learning courses about COVID-19. SARS-CoV-2 infection was associated with DAs and DHs ($p=0.025$), the use of public transportation to commute to work ($p=0.009$), and no access to information on the internet ($p=0.027$) (Table 2).

Table 2. Work and behavior factors associated with SARS-CoV-2 infection among oral health team professionals.

Variables	COVID-19				Total		p-value
	No		Yes		N	%	
	N	%	N	%			
Job Category							
DS	25	96.2	1	3.8	26	40.6	
DA	12	66.7	6	33.3	18	28.1	
DH	14	70.0	6	30.0	20	31.3	
Transportation Method to Commute to Work							
Private (car, bicycle, on foot)	37	90.2	4	9.8	41	64.1	0.009*
Public (bus, metro, train)	14	60.9	9	39.1	23	35.9	
Commute Time to Work							
Up to 1h	34	85.0	6	15.0	40	62.5	0.173
Over 1h	17	70.8	7	29.2	24	37.5	
Reallocated to Another Service							
No	43	79.6	11	20.4	54	84.4	0.999*
Yes	8	80.0	2	20.0	10	15.6	
Changed Job Duties							
No	36	80.0	9	20.0	45	70.3	0.999*
Yes	15	78.9	4	21.2	19	29.7	
Felt Safe Carrying out Their Job							
No	26	78.8	7	21.2	33	51.6	0.854
Yes	25	80.6	6	19.4	31	48.4	
Afraid of Infection							
No	8	88.9	1	11.1	9	14.1	0.672*
Yes	43	78.2	12	21.8	55	85.9	
Felt informed about COVID-19							
No	1	50.0	1	50.0	2	3.1	0.368*
Yes	50	80.6	12	19.4	62	96.9	
Information from the Company							
No	4	80.0	1	20.0	5	7.8	0.999*
Yes	47	79.7	12	20.3	59	92.2	
Information from the TV							
No	4	66.7	2	33.3	6	9.4	0.593*
Yes	47	81.0	11	19.0	58	90.6	
Information from the Internet							
No	3	42.9	4	57.1	7	10.9	0.027*
Yes	48	84.2	9	15.8	57	89.1	
Information from Other Sources							
No	46	79.3	12	20.7	58	90.6	0.999*
Yes	5	83.3	1	16.7	6	9.4	
Took an e-learning Course							
No	1	100.0	0	0.0	1	1.6	0.999*
1 or more courses	50	79.4	13	20.6	63	98.4	
Took an in-person Course							
No	17	77.3	5	22.7	22	34.4	0.728
1 or more courses	34	81.0	8	19.0	42	65.6	

*Fisher's exact test ($p<0.05$).

PPE was made available by the employer for more than 80.0% of all the OHT professionals surveyed. Hair nets, glasses, and disposable gowns were the most available PPE, and face shields (15.9%) were the least available (Figure 1).

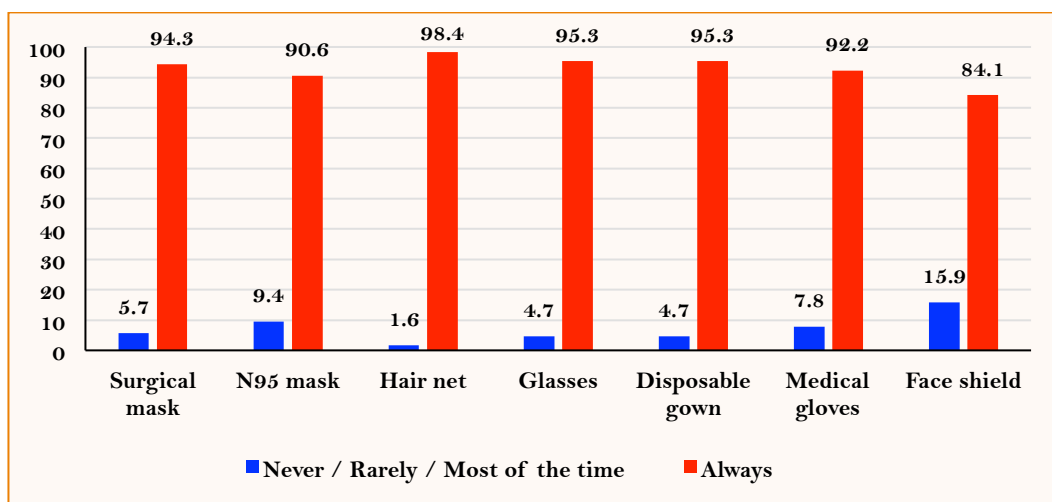


Figure 1. Distribution of the availability of personal protection equipment (PPE) for oral health team professionals. São Paulo-SP, 2020.

Regarding the condition/quality of the PPE, glasses were the highest rated (100.0%) and face shields were the lowest rated (30.5%) (Figure 2).

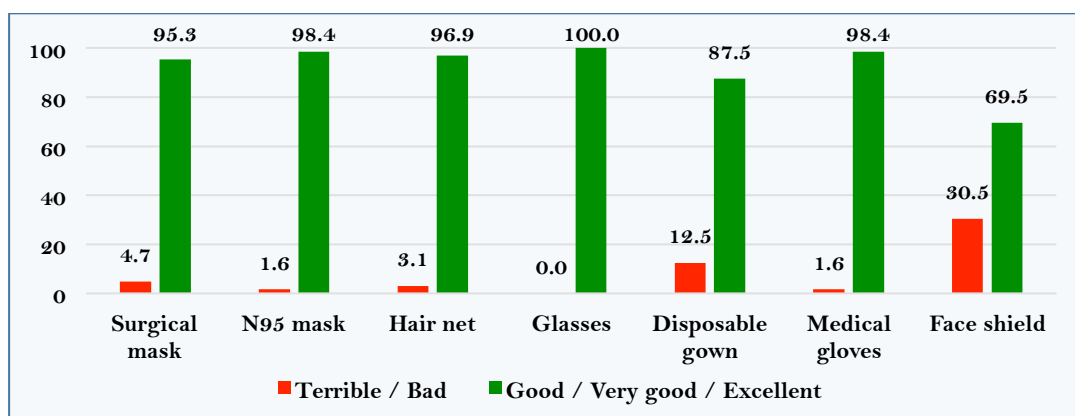


Figure 2. Distribution of the condition/quality of personal protection equipment (PPE) available to the oral health team professionals.

Discussion

The prevalence of SARS-CoV-2 infection among oral health professionals was high, and well above the general population [11,12], and produced results that were discrepant with studies done with DSs in Italy (0.25%) [13] and the United States (16%) [7]. This fact may be due to methodological differences, the time of the survey, and the phase of the epidemic curve in each country and the locally adopted preventative measures. It should be taken into consideration that in São Paulo, SP, at the time of the study, the Municipal Health Secretariat only allowed emergency clinical dental procedures at the SUS (*Sistema Único de Saúde*) public health network [13].

SARS-CoV-2 infection, in this study, was associated with the technical job category (DH and DA), in people with lower income, lower education level, and who used public transportation to commute to work. Thus, income inequalities can play an important role in the impact of COVID-19 in Brazil, through these contextual effects [14-16], even among health professionals.

The greater levels of SARS-CoV-2 infection among oral health professionals at the technical level, i.e., with lower levels of education, corroborate current findings [17-19]. The education level influences knowledge, behaviors, and appropriate practices related to preventing infection in the work environment and outside of it [20,21]. However, the work process in this context must also be considered: two people are recommended to reduce the amount of working time and the risk in the procedure. This increases the risk of similar aerosols. The technical team also washes and sterilizes the materials and cleans the room [9]. Thus, they can be more prone to SARS-CoV-2 infection [22-24].

The use of public transportation like the bus, train, and metro was associated with SARS-CoV-2 infection. Thus the method of transportation becomes a work factor as important as the clinic environment itself. In this sense, health services need to rethink their professionals' methods of transportation, which put their own health and that of their colleagues and users at risk. Different from the health services that adopted the use of PPE and strict biosafety protocols [4-7] to reduce the risks of infection, the precautions taken on public transportation depend on the actions of public entities and the adherence of the users [25,26]. This fact is further compounded in studies done in a cosmopolitan city like São Paulo.





As found in the literature [13,24-27], the health professionals feel informed about COVID-19; they have access to the necessary PPE and evaluated it as being of good quality. However, they showed a high prevalence of feeling unsafe, afraid, and anxious about the risk of infection, as shown in other studies [21,23]. This factor can explain the high levels of adherence to adopting preventative measures, for example, the use and a more careful removal of PPE, which culminates in the decrease of infection [20,21,28].







Regarding limitations, this study excluded people who were on leave, which could have excluded people with symptoms and no diagnosis. However, it should be highlighted that all the participants of this study are on strategic family health teams working in public health clinics, explaining why they work 40 hours per week and receive good salaries as compared to other Brazilian cities. This is why they nearly always work exclusively at this job, which can reduce the understanding about the possibility of infection at other workplaces.

Conclusion

The prevalence of SARS-CoV-2 was high among oral health professionals in primary health care (PHC) and was associated with sociodemographic factors, such as a lower salary and education level, and work factors, such as the category of technical professional and the use of public transportation. The professionals showed a high prevalence of ongoing education, mainly e-learning, and the availability of high-quality PPE. In spite of feeling prepared for the work process during the COVID-19 pandemic, they felt unsafe, afraid, and anxious about the risk of infection.

Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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