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Epidemiological profile of Dental professionals in relation to COVID-19 during the pandemic in a brazilian state

Perfil epidemiológico dos profissionais da Odontologia em relação à COVID-19 durante a pandemia em um estado brasileiro

Perfil epidemiológico de los profesionales Dentales en relación al COVID-19 durante la pandemia en un estado brasileño

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Abstract
The aim is to draw an epidemiological profile of dental professionals in Rio Grande do Norte state (RN), Brazil, in relation to COVID-19 infection during the pandemic. In order to obtain the results, a virtual census was carried out with dental professionals registered in the Regional Board of Dentistry of RN (CRO-RN). An online questionnaire was used for data collection, sent via the official CRO-RN email, the WhatsApp app, SMS messages and posted on the institution's social media page. Data were collected between February 2020 and May 2021, corresponding mainly to the numbers of the first wave of the disease in Brazil. A total of 567 dentists responded to the questionnaire, with an average age of 36.67 years (SD=9.56). The sample consisted of 515 dentists and 52 dental assistants, namely Oral Health Technicians and Oral Health Assistants (OHTs and OHAs respectively). The COVID-19 contamination index during this period was 25.74% of the sample, with the highest found in the OHTs (37%). The factors contributing to contamination were working in the west of the state (p=0.011) and having little professional experience (p=0.015), among others. With respect to the impact of income, the private sector was the most affected (p<0.0001), where professionals who were unable to work for 1 to 3 months were the most compromised (p<0.0001). The lack of personal protective equipment (PPE) in the workplace was related to the increase in contamination.
Keywords: SARS-CoV-2; COVID-19; Pandemics; Dentistry; Dentists; Teaching.

Resumo
O objetivo é traçar um perfil epidemiológico dos profissionais de odontologia do estado do Rio Grande do Norte (RN), Brasil, em relação à infecção por COVID-19 durante a pandemia. Para obter os resultados, foi realizado um censo virtual com profissionais da Odontologia cadastrados no Conselho Regional de Odontologia do RN (CRO-RN). Para a coleta de dados foi utilizado um questionário online, enviado pelo e-mail oficial do CRO-RN, pelo aplicativo WhatsApp, mensagens SMS e postado na página das redes sociais da instituição. Os dados foram coletados entre fevereiro de 2020 e maio de 2021, correspondendo principalmente aos números da primeira onda da doença no Brasil. Responderam ao questionário 567 dentistas, com média de idade de 36,67 anos (DP=9,56). A amostra foi composta por 515 cirurgiões-dentistas e 52 auxiliares de consultório dentário, nomeadamente Técnicos de Saúde Oral e Auxiliares de Saúde Oral (TSBs e ASBs respetivamente). O índice de contaminação por COVID-19 nesse período foi de 25,74% da amostra, sendo o maior encontrado nas ESB (37%). Os fatores que contribuíram para a contaminação foram trabalhar na região oeste do estado (p=0,011) e ter pouca experiência profissional (p=0,015), entre outros. Com relação ao impacto da renda, o setor privado foi o mais afetado (p<0,0001), sendo os profissionais que ficaram impossibilitados de trabalhar por 1 a 3 meses os mais comprometidos (p<0,0001). A falta de equipamento de proteção individual (EPI) no local de trabalho esteve relacionada ao aumento da contaminação.
Palavras-chave: SARS-CoV-2; COVID-19; Pandemias; Odontologia; Dentistas; Teaching.

Resumen

El objetivo es dibujar un perfil epidemiológico de los profesionales de la odontología en el estado de Rio Grande do Norte (RN), Brasil, en relación a la infección por COVID-19 durante la pandemia. Para la obtención de los resultados se realizó un censo virtual con profesionales odontólogos registrados en el Consejo Regional de Odontología de RN (CRO-RN). Para la recolección de datos se utilizó un cuestionario en línea, enviado a través del correo electrónico oficial del CRO-RN, la aplicación WhatsApp, mensajes SMS y publicado en la página de redes sociales de la institución. Los datos fueron recolectados entre febrero de 2020 y mayo de 2021, correspondientes principalmente a los números de la primera ola de la enfermedad en Brasil. Respondieron al cuestionario un total de 567 odontólogos, con una edad media de 36,67 años (DE=9,56). La muestra estuvo compuesta por 515 odontólogos y 52 auxiliares dentales, a saber, Técnicos en Salud Bucal y Auxiliares de Salud Bucal (OHT y OHA respectivamente). El índice de contaminación por COVID-19 durante este período fue del 25,74% de la muestra, encontrándose el mayor en los OHT (37%). Los factores que contribuyeron a la contaminación fueron trabajar en el occidente del estado (p=0,011) y tener poca experiencia profesional (p=0,015), entre otros. Con respecto al impacto de los ingresos, el sector privado fue el más afectado (p<0,0001), donde los profesionales que no pudieron trabajar durante 1 a 3 meses fueron los más comprometidos (p<0,0001). La falta de equipos de protección personal (EPP) en el lugar de trabajo se relacionó con el aumento de la contaminación.

Palabras clave: SARS-CoV-2; COVID-19; Pandemias; Odontología; Dentistas; Enseñanza.

1 Introduction

The atypical pneumonia epidemic that occurred in Wuhan, Hubei province, China in December 2019 was a new disease (COVID-19). On January 30, 2020, the World Health Organization (WHO) named the virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) (Wu & Huang, 2020).

With the exponential growth in cases, the WHO classified the epidemic as a public health emergency of international concern, and on March 11, 2020, SARS-coV-2 was officially declared a pandemic. In Brazil, the Ministry of Health (MS) received the first notification of a confirmed case of COVID-19 on February 26, 2020, and its transmission to the community was declared on March 20 of the same year (Mahase, 2020).

The current available evidence shows that the virus that causes COVID-19 can be spread by direct and indirect contact with contaminated surfaces or objects, or proximity to infected people through secretions such as saliva or respiratory particles expelled when an individual coughs, sneezes, speaks or sings (Asadi, et al., 2019).

Patients that test positive for COVID-19 may experience fever, dry cough, dyspnea, muscle fatigue, headache, sore throat, diarrhea, vomiting, ageusia (loss of taste) anosmia (loss of smell) and mucocutaneous manifestations. Oral manifestations such as loss of taste, dry mouth and oral lesions, occur in around half of COVID-19 cases, although whether SARS-CoV-2 can directly infect and replicate in oral tissues, such as the salivary glands or mucosa remains unknown (Huang, et al., 2021).

Given the characteristics of the profession, dentists and their assistants are at high risk of contamination from the COVID-19 virus, since it is present in the cells of oral cavity tissues and these professionals are in close contact with the nasal and oropharyngeal complex of the patient (Hallal, et al., 2020).

In light of the risks that these contacts may pose to the oral health team and their families, the present study aims to draw an epidemiological profile of dental professionals in Rio Grande do Norte state (RN), in relation to SARS-COV-2 during the pandemic.

2 Methodology

2.1 Study design

This is a cross-sectional, descriptive and exploratory cross-sectional study. For data analysis, the respondents in the first sixty days of the research were considered (February 5 to May 4, 2021), based on the prevalence of cases between February 26, 2020 and May 4, 2021 (Pereira, 2018).

2.2 Sample

A census was conducted with dental professionals, considering a universe of 4336 dentists, 1199 oral health technicians (OHTs) and 1817 oral health assistants (OHAs) in Rio Grande do Norte state (RN), Brazil, registered with the Regional Board of Dentistry (CRO). Those who had no email, exhibited an erroneous email or telephone number, had no access to message apps (WhatsApp), which precluded obtaining the form, were excluded, as well as professionals whose license had expired.

2.3 Data collection

The questionnaire was constructed and calibrated for the present study, and an online form created using Google Forms. It was sent via the official CRO-RN email, WhatsApp, SMS messages and posted on the institution's social media page. The protocol was established to minimize losses, strengthen the results with a high response rate and maintain social distancing.

The socioeconomic profile was used to characterize the professionals (Gaspar, et al., 2020) (Table1).

Table 1. Sample characterization based on questionnaire responses.

CHARACTERISTICS	***VARIABLES***	***N***	***%***	***% VALID***
SEX	Male	193	34.0	34.0
	Female	374	66.0	66.0
MARITAL STATUS	Married/Common law	317	55.9	55.9
	Single/Divorced	250	44.1	44.1
YEARS OF EXPERIENCE	Less than 1 year	13	2.3	2.3
	1-5 years	137	24.2	24.2
	6-10 years	150	26.5	26.5
	11-15 years	94	16.6	16.6
	16-20 years	64	11.3	11.3
	21-25 years	48	8.5	8.5
	More than 25 years	61	10.8	10.8
HIGHEST DEGREE	Doctorate	43	7.6	7.6
	Masters	101	17.8	17.8
	Specialization/Residence	268	47.3	47.3
	Undergraduate	103	18.2	18.2
	OHT	39	6.9	6.9
	OHA	13	2.3	2.3
COMORBIDITIES	No	418	73.7	73.7
	Yes	149	26.3	26.3
EMPLOYMENT STATUS	Public	199	35.1	35.1
	Private	193	34.0	34.0
	Both	164	28.9	28.9
	Unemployed	11	1.9	1.9
PRIVATE SERVICE ROUTINE	Normal	351	61.9	61.9
	Urgencies and emergencies	29	5.1	5.1
	I am not working	34	6.0	6.0
	I do not work in the private sector	153	27.0	27.0
PUBLIC SERVICE ROUTINE	Urgencies and emergencies	185	32.6	32.6
	I am not working	113	19.9	21.2
	I do not work in the private sector	54	9.5	10.1
		182	32.1	34.1
COVID-19 TEST	Yes	474	83.6	83.6
	No	93	16.4	16.4
TEST RESULT	Positive	146	25.7	25.7
	Negative	326	57.5	57.5
	Did not undergo/Inconclusive	95	16.8	16.8
SYMPTOM SEVERITY	Asymptomatic	26	4.6	4.6
	Mild (home treatment)	126	22.2	22.2
	Moderate (hospital)	5	0.9	0.9
	Severe (ICU)	2	0.4	0.4
	None	408	72.0	72.0

POSSBLE RELATION WITH WORK ACTIVITIES	Yes	57	10.1	10.1
	No	73	12.9	12.9
	None	384	67.7	67.7
	I do not know	53	9.3	9.3
MONTHS TOTALLY INACTIVE	I did not stop	135	23.8	23.8
	Less than 1 month	87	15.3	15.3
	1 month	68	12.0	12.0
	2 months	59	10.4	10.4
	3 months	47	8.3	8.3
	4 months	26	4.6	4.6
	5 months	19	3.4	3.4
	6 months	30	5.3	5.3
	7 months	11	1.9	1.9
	8 months	7	1.2	1.2
	9 months	12	2.1	2.1
	10 months	19	3.4	3.4
	I do not work during the pandemic	47	8.3	8.3
IMPACT ON INCOME	None	223	39.3	39.3
	10%	59	10.4	10.4
	20%	74	13.1	13.1
	30%	94	16.6	16.6
	40%	54	9.5	9.5
	50%	63	11.1	11.1
TRAINING OR QUALIFICATION BY EMPLOYERS	Yes	163	28.7	28.7
	No	404	71.3	71.3
SPONTANEOUS TRAINING OR QUALIFICATION BY EMPLOYERS	Yes	353	62.3	62.3
	No	214	37.7	37.7
TRAINING OR QUALIFICATION WAS SATISFACTORY	Yes	214	37.7	37.7
	No	18	3.2	3.2
	Partially	152	26.8	26.8
	I had no training	183	32.3	32.3

Source: Research data.

2.4 Data analysis

The database was analyzed in SPSS Statistics 22.0. Frequencies, percentages, mean and standard deviation (SD) were used for descriptive assessment. Pearson's chi-squared and Fisher's Exact tests were applied to determine significant associations ($p<0.05$).

2.5 Ethical aspects

All the participants were instructed regarding the research procedures and gave written informed consent. The study was approved by the Research Ethics Committee (CAAE: 40184220.2.00005537) of the Federal University of Rio Grande do Norte (UFRN), and followed all the guidelines of National Health Council (CNS) Resolution 466/12 for research involving human beings.

3 Results

A total of 567 responded to the questionnaire. The sample was characterized based on the questionnaire responses (Table 1).

In relation to COVID-19 diagnostic tests, 474 (83.6%) of the participants underwent examinations. A total of 802 tests were applied, with some of the professionals reporting more than one. Of these, 303 were rapid tests, 276 serological and 223 RT-PCR. Of the 303 rapid tests, 81 (26.73%) were performed in a private laboratory and 222 (73.27%) by the national health system (SUS in Portuguese). Of the 276 serological tests, 124 (44.93%) were carried out in a private laboratory and 152

(55.07%) by the SUS. Of the 223 RT-PCR tests, 59 (26.46%) occurred in a private laboratory and 164 (73.54%) in the SUS, and 93 (16.4%) participants reported not undergoing any test.

Table 2. Association between testing positive for COVID-19 and specialty.

SPECIALTY			***POSITIVE TEST***	***NO***	***TOTAL***	***P***
OHT	Yes	N	17	24	41	
		%	41.5%	58.5%	100.0%	0.017*
	No	N	129	397	526	
		%	24.5%	75.5%	100.0%	
OHA	Yes	N	10	17	27	
		%	37.0%	63.0%	100.0%	0.169
	No	N	136	404	540	
		%	25.2%	74.8%	100.0%	
GENERAL PRACTITIONER	Yes	N	58	143	201	
		%	28.9%	71.1%	100.0%	0.210
	No	N	88	278	366	
		%	24.0%	76.0%	100.0%	
MAXILLOFACIAL	Yes	N	8	28	36	0.617
		%	22.2%	77.8%	100.0%	
	No	N	138	393	531	
		%	26.0%	74.0%	100.0%	
IMPLANTOLOGIST	Yes	N	8	35	43	
		%	18.6%	81.4%	100.0%	0.265
	No	N	138	386	524	
		%	26.3%	73.7%	100.0%	
ENDODONTIST	Yes	N	17	44	61	
		%	27.9%	72.1%	100.0%	0.689
	No	N	129	377	506	
		%	25.5%	74.5%	100.0%	
ORTHODONTIST	Yes	N	25	82	107	
		%	23.4%	76.6%	100.0%	0.531
	No	N	121	339	460	
		%	26.3%	73.7%	100.0%	
PROSTHETIST	Yes	N	18	67	85	
		%	21.2%	78.8%	100.0%	0.296
	No	N	128	354	482	
		%	26.6%	73.4%	100.0%	
OFH	Yes	N	8	18	26	
		%	30.8%	69.2%	100.0%	0.549
	No	N	138	403	541	
		%	25.5%	74.5%	100.0%	
RESTORATIVE DENTISTRY	Yes	N	8	35	43	
		%	18.6%	81.4%	100.0%	0.265
	No	N	138	386	524	
		%	26.3%	73.7%	100.0%	
PEDIATRIC DENTISTRY	Yes	N	12	23	35	
		%	34.3%	65.7%	100.0%	0.233
	No	N	134	398	532	
		%	25.2%	74.8%	100.0%	
SPECIAL PATIENTS	Yes	N	1	8	9	
		%	11.1%	88.9%	100.0%	0.311
	No	N	145	413	558	
		%	26.0%	74.0%	100.0%	
PERIODONTICS	Yes	N	5	15	20	
		%	25.0%	75.0%	100.0	0938%
	No	N	141	406	547	
		%	25.8%	74.2%	100.0%	

OTHERS	Yes	N	31	76	107	
		%	29.0%	71.0%	100.0%	0.397
	No	N	115	345	460	
		%	25.0%	75.0%	100.0%	

** OHT PR= 2.18 (95%CI=1.13-4.18). PR = Prevalence ratio, OFH = orofacial harmonization*

Source: Research data.

Professionals who worked in the western part of the state, those who were not satisfied with the training and those who had little experience were more associated with COVID-19 contamination (Table 3).

Table 3. Associations between occupational characteristics and location of positive COVID-19 tests.

CHARACTERISTICS			***POSITIVE TEST***	***NO.***	***TOTAL***	***P***
PROFESSIONAL VARIABLES	Dentist	N	129	386	515	
		%	25.0%	75.0%	100.0%	0.230
	Technician	N	17	35	52	
		%	32.7%	67.3%	100.0%	
ALTO OESTE REGION OF RIO GRANDE DO NORTE	Yes	N	21	31	52	
		%	40.4%	59.6%	100.0%	0.011*
	No	N	125	390	515	
		%	24.3%	75.7%	100.0%	
MIDWEST RIO GRANDE DO NORTE	Yes	N	2	10	12	
		%	16.7%	83.3%	100.0%	0467
	No	N	144	411	555	
		%	25.9%	74.1%	100.0%	
WESTERN RIO GRANDE DO NORTE	Yes	N	40	86	126	
		%	31.7%	68.3%	100.0%	0.081
	No	N	106	335	441	
		%	24.0%	76.0%	100.0%	
SÉRIDO REGION OF RIO GRANDE DO NORTE	Yes	N	31	86	117	
		%	26.5%	73.5%	100.0%	0.814
	No	N	115	335	450	
		%	25.6%	47.4%	100.0%	
CENTRAL RIO GRANDE DO NORTE	Yes	N	7	17	24	
		%	29.2%	70.8%	100.0%	0.696
	No	N	139	404	543	
		%	25.6%	74.4%	100.0%	
AGRESTE REGION OF RIO GRANDE DO NORTE	Yes	N	7	18	25	
		%	28.0%	72.0%	100.0%	0.792
	No	N	139	403	542	
		%	25.6%	74.4%	100.0%	
EASTERN RIO GRANDE DO NORTE	Yes	N	64	204	268	
		%	23.9%	76.1%	100.0%	0.335
	No	N	82	217	299	
		%	27.4%	72.6%	100.0%	
DO YOU WORK IN THE PUBLIC OR PRIVATE SECTOR?	Public	N	64	135	199	
		%	32.2%	67.8%	100.0%	0.081
	Private	N	44	149	193	
		%	22.8%	77.2%	100.0%	
	Both	N	36	128	164	
		%	22.0%	78.0%	100.0%	
	Unemployed	N	2	9	11	
		%	18.2%	81.8%	100.0%	
IF YOU HAD TRAINING ON COVID-19 DO YOU THINK IT WAS SATISFACTORY?	Yes	N	42	172	214	
		%	19.6%	80.4%	100.0%	
	No	N	7	11	18	
		%	38.9%	61.1%	100.0%	<0.0001*
	Partially	N	57	95	152	
		%	37.5%	62.5%	100.0%	
	I had none	N	40	143	183	
		%	21.9%	78.1%	100.0	

MONTHS INACTIVE	I did not stop	N	39	96	135	0.452
		%	28.9%	71.1%	100.0	
	1-3 months	N	61	200	261	
		%	23.4%	76.6%	100.0%	
	More than 3 months	N	46	125	171	
		%	26.9%	73.1%	100.0%	
HOW MANY YEARS OF EXPERIENCE DO YOU HAVE?	Less than 1 year	N	6	7	13	
		%	46.2%	53.8%	100.0%	
	1-5 years	N	46	91	137	
		%	33.6%	66.4%	100.0%	
	6-10 years	N	42	108	150	
		%	28.0%	72.0%	100.0%	0.015*
	11-15 years	N	13	81	94	
		%	13.8%	86.2%	100.0%	
	16-20 years	N	14	50	64	
		%	21.9%	78.1%	100.0%	
	21-25 years	N	10	38	48	
		%	20.8%	79.2%	100.0%	
	More than 25 years	N	15	46	61	
		%	24.6%	75.4%	100.0%	
DID THE COVID-19 INFECTION HAVE ANY RELATION WITH YOUR DENTAL ACTIVITIES?	Yes	N	47	10	57	
		%	82.5%	17.5%	100.0%	
	No	N	57	16	73	
		%	78.1%	21.9%	100.0%	0.660
	I was not infected	N	0	384	384	
		%	0.0%	100.0%	100.0%	
	I do not know	N	42	11	53	
		%	79.2%	20.8%	100.0%	

**PR for years of experience and satisfaction: not possible to calculate; Alto Oeste PR= 2.11 (1.17-3.81).*

Source: Research data.

Being younger and single are associated with having a positive test (Table 4).

Table 4. Associations between the clinical characteristics of the participants and COVID-19 tests.

CHARACTERISTICS	***VARIABLES***		***POSITIVE TEST***	***NO.***	***TOTAL***	***P***
SEX	Male	n	54	139	193	
		%	28.0%	72.0%	100.0%	0.383
	Female	n	92	282	374	
		%	24.6%	75.4%	100.0%	
AGE	20-30 years	n	60	114	174	
		%	34.5%	65.5%	100.0%	0.005*
	31-40 years	n	46	186	232	
		%	19.8%	80.2%	100.0%	
	41-50 years	n	29	74	103	
		%	28.2%	71.8%	100.0%	
	51 years or older	n	11	47	58	
		%	19.0%	81.0%	100.0%	
MARITAL STATUS	Married/Common law	n	71	246	317	
		%	22.4%	77.6%	100.0%	0.040*
	Single/Divorced	n	75	175	250	
		%	30.0%	70.0%	100.0%	
COMORBIDITIES	No	n	101	317	418	
		%	242.%	75.8%	100.0%	0.157
	Yes	n	45	104	149	
		%	30.2%	69.8%	100.0%	

**RP age= not possible to calculate; marital status HR =1.10 (1.03-1.22).*

HR = hazard ratio. Source: Research data.

For negative responses (no) regarding the availability of PPE, questions on PFF2/N95 masks, aprons, safety glasses and rubbing alcohol showed significant associations with a positive response for COVID-19 tests (Table 5).

Table 5. Association between PPE availability and the COVID-19 test.

PPE			***POSITIVE TEST***	***NO.***	***TOTAL***	***P***
GLOVES	Yes	n	95	309	404	
		%	23.5%	76.5%	100.0%	0.056
	No	n	51	111	162	
		%	31.5%	68.5%	100.0%	
CONVENTIONAL SURGICAL MASKS	Yes	n	67	212	279	
		%	24.0%	76.0%	100.0%	0.340
	No	n	79	208	287	
		%	27.5%	72.5%	100.0%	
PFF2 OR N95 MASK	Yes	n	78	265	343	
		%	22.7%	77.3%	100.0%	0.039*
	No	n	68	155	223	
		%	30.5%	69.5%	100.0%	
FACE SHIELD	Yes	n	88	281	369	
		%	23.8%	76.2%	100.0	0.147
	No	n	58	139	197	
		%	29.4%	70.6%	100.0%	
SURGICAL CAP	Yes	n	95	300	395	
		%	24.1%	75.9%	100.0%	0.149
	No	n	51	120	171	
		%	29.8%	70.2%	100.0%	
SHOE COVERS	Yes	n	42	112	154	
		%	27.3%	72.7%	100.0%	0.623
	No	n	104	308	412	
		%	25.2%	74.8%	100.0%	
APRON	Yes	n	52	191	243	
		%	21.4%	78.6%	100.0%	0.038*
	No	n	94	229	323	
		%	29.1%	70.9%	100.0%	
IMPERMEABLE GOWN	Yes	n	43	131	174	
		%	24.7%	75.3%	100.0%	0.695
	No	n	103	289	392	
		%	26.3%	73.7%	100.0%	
PERMEABLE GOWN	Yes	n	31	86	117	
		%	26.5%	73.5%	100.0%	0.846
	No	n	103	289	392	
		%	26.3%	73.7%	100.0%	
SAFETY GLASSES	Yes	n	83	291	374	
		%	22.2%	77.8%	100.0%	0.006*
	No	n	63	129	192	
		%	32.8%	67.2%	100.0%	
70% RUBBING ALCOHOL	Yes	n	96	312	408	
		%	23.5%	76.5%	100.0%	0.048*
	No	n	50	108	158	
		%	31.6%	68.4%	100.0%	
OTHERS	Yes	n	5	12	17	
		%	29.4%	70.6%	100.0%	0.729
	No	n	141	408	549	
		%	25.7%	74.3%	100.0%	

PFF/N95 PR= 1.11 (95%ci=1.01-1.23); Apron PR = 1.10 (95%CI=1.01-1.22); Safety glasses PR = 1.15 (95%CI=1.03-1.29); Rubbing alcohol PR = 1.11 (95%CI=1.01-1.26).*

Source: Research data.

There was a significant association with occupational characteristics, with the private sector the most affected, primarily dentists (Table 6).

Table 6. Assessment of the impact on income.

			IMPACT ON INCOME			
CHARACTERISTICS	**VARIABLES**		**NONE**	**YES, THERE WAS AN IMPACT**	**TOTAL**	**P**
DO YOU WORK IN THE PUBLIC OR PRIVATE HEALTH SECTOR?	Public	n	124	75	199	
		%	62.3%	37.7%	100.0%	
	Private	n	50	143	193	
		%	25.9%	74.1%	100.0%	<0.0001*
	Both	n	44	120	164	
		%	26.8%	73.2%	100.0%	
	Unemployed	n	5	6	11	
		%	45.5%	54.5%	100.0%	
HOW WAS YOUR COVID-19 INFECTION CLASSIFIED	Asymptomatic	n	9	17	26	
		%	34.6%	65.4%	100.0%	
	Mild (home treatment)	n	50	76	126	
		%	39.7%	60.3%	100.0%	
	Moderate (hospital)	n	0	5	5	A
		%	0.0%	100.0%	100.0%	
	Severe (ICU)	n	1	1	2	
		%	50.0%	50.0%	100.0%	
	I was not infected	n	163	245	408	
		%	40.0%	60.0%	100.0%	
TRAINING	Dentist	n	184	331	515	
		%	35.7%	64.3%	100.0%	<0.0001*
	Technician	n	39	13	52	
		%	75.0%	25.0%	100.0%	
MONTHS INACTIVE	I did not stop	n	78	57	135	
		%	57.8%	42.2%	100.0%	<0.0001*
	1-3 months	n	74	187	261	
		%	28.4%	71.6%	100.0%	
	More than 3 months	n	71	100	171	
		%	41.5%	58.5%	100.0%	
HOW MANY YEARS OF EXPERIENCE DO YOU HAVE?	Less than 1 year	n	5	8	13	
		%	38.5%	61.5%	100.0%	
	1-5 years	n	60	77	137	
		%	43.8%	56.2%	100.0%	
	6-10 years	n	68	82	150	
		%	45.3%	54.7%	100.0%	
	11-15 years	n	39	55	94	
		%	41.5%	58.5%	100.0%	0.100
	16-20 years	n	19	45	64	
		%	29.7%	70.3%	100.0%	
	21-25 years	n	14	34	48	
		%	29.2%	70.8%	100.0%	
	More than 25 years	n	18	43	61	
		%	29.5%	70.5%	100.0%	
INDICATE YOUR HIGHEST DEGREE	Doctorate	n	14	29	43	
		%	32.6%	67.4%	100.0%	
	Masters	n	38	63	101	
		%	37.6%	62.4%	100.0%	
	Specialization/ Residence	n	93	175	268	
		%	34.7%	65.3%	100.0%	<0.0001*

	Undergraduate	n	39	64	103	
		%	37.9%	62.1%	100.0%	
	OHT	n	30	9	39	
		%	76.9%	23.1%	100.0%	
	OHA	n	9	4	13	
		%	69.2%	30.8%	100.0%	
WHAT IS YOUR TREATMENT ROUTINE IN THE PRIVATE SECTOR?	Normal	n	89	262	351	
		%	25.4%	74.6%	100.0%	
	Urgencies and emergencies	n	8	21	29	
	I am not working	%	27.6	72.4%	100.0%	<0.0001*
		n	14	20	34	
		%	41.2%	58.8%	100.0%	
	I am not working in the private sector	n	112	41	153	
		%	73.2%	26.8%	100.0%	
WHAT IS YOUR TREATMENT ROUTINE IN THE PUBLIC SECTOR?	Normal	n	89	96	185	
		%	48.1%	51.9%	100.0%	
	Urgencies and emergencies	n	59	54	113	
		%	52.2%	47.8%	100.0%	
	I am not working	n	20	34	54	<0.0001*
		%	37.0%	63.0%	100.0%	
	I do not work in the public sector	n	42	140	182	
		%	23.1%	76.9%	100.0%	

Occupational characteristics PR, Months inactive, Highest degree, Routine: not possible to calculate; Training PR =2.57 (95%CI=1.59-4.13); Private PR=1.49 (95%CI=1.31-1.69); A: unable to undergo the test (n less than 5).*

Source: Research data.

The time the professionals remained inactive demonstrated a significant association with private work and a greater frequency of professionals who responded that they returned to work in less than 3 months (Table 7).

Table 7. Assessment of inactive time.

			MONTHS INACTIVE				
CHARACTERISTIC	**VARIABLES**		**DID NOT STOP**	**1-3 MONTHS**	**MORE THAN 3 MONTHS**	**TOTAL**	**P**
AGE	20-30 years	n	46	71	57	174	0.487
		%	26.4%	40.8%	32.8%	100.0%	
	31-40 years	n	54	115	63	232	
		%	23.3%	49.6%	27.2%	100.0%	
	41-50 years	n	23	51	29	103	
		%	22.3%	49.5%	28.2%	100.0%	
	51 years or more	n	12	24	22	58	
		%	20.7%	41.4%	37.9%	100.0%	
DO YOU WORK IN THE PUBLIC OR PRIVATE SECTOR?	Public	n	62	53	84	199	A
		%	31.2%	26.6%	42.2%	100.0%	
	Private	n	30	121	42	193	
		%	15.5%	62.7%	21.8%	100.0%	
	Both	n	42	85	37	164	
		%	25.6%	51.8%	22.6%	100.0%	
	Unemployed	n	1	2	8	11	
		%	9.1%	18.2%	72.7%	100.0%	
DID YOU WORK IN THE PRIVATE SECTOR?	Yes	n	52	26	78	156	<0.001*
		%	33.3%	16.7%	50.0%	100.0%	
	No	n	83	235	92	410	
		%	20.2%	57.3%	22.4%	100.0%	

** Private PR =1.57 (95%CI=1.26-1.92) A: unable to undergo the test (n less than 5)*

Source: Research data.

4 Discussion

The number of individuals contaminated by COVID-19, considering cases accumulated up to the final data collection of this study, corresponds to 5.81% of the general population and 5.42% of RN (Lais, 2020). Based on the questionnaires received, 25.74% of the 567 professionals were infected. This result shows the high contamination prevalence in dental professionals in the state. The hypothesis that dental professionals are more susceptible to the disease was also raised by Oliveira (Oliveira, et al., 2020).

It is important to note the hypothesis that the contamination of dental professionals may have occurred away from work. For this reason, a question was included regarding the possibility of participants' being infected during their work-

related activities. Considering only these data, we found a 10.05% contamination rate, twice as high as that of the general population of RN.

A study conducted with professionals from Hospital São Paulo - UNIFESP tested 878 individuals, showing that the highest prevalence of SARS-CoV-2 occurred in the cleaning staff (30.8%, n = 8/26) (Escudero, et al., 2020). Thus, it is important to consider that not only higher-level professionals should be included in priority groups, but all those involved in the health unit, underscoring OHA/OHTs in the dentistry field. Our results show that around ¼ of the professionals in the present study that underwent COVID-19 testing were positive for the disease. There was a positive association between OHTs and COVID-19 contamination (p = 0.017), but none for higher level specialties.

Since women predominate significantly in dentistry, a larger number are exposed to the disease (Costa, et al., 2010; Morita, et al., 2010). According to Fiocruz (Fiocruz, 2021), women account for 70% of health professionals worldwide. In the present study, there is also a higher prevalence of women in dentistry; however, this difference did not result in a significant association between sex and positive COVID-19 contamination COVID-19 (p=0.383).

Dentists with a higher prevalence of COVID-19 had less than one year of experience (46.2%), and those with 11 to 15 years (13.8%) had a lower prevalence of the disease (p = 0.015). A study conducted in Saudi Arabia with dental professionals on the practice and attitude of dentists towards the COVID-19 pandemic showed statistically significant differences with years of work experience (p = 0.008) (Al-Khalifa, et al., 2020), demonstrating that more experienced individuals were more concerned with the issue.

In relation to COVID-19 contamination, 16.4% of the sample underwent no testing. Testing health professionals is essential to providing the information and indicators needed for strategies that reflect concrete measures, allowing a safe return to activities and minimizing the possibility of new epidemic outbreaks (Barreto, et al., 2020).

Among the large regions of RN, the Alto Oeste had proportionally the highest number of contaminated professionals with a statistically significant association (p = 0.011). This region is geographically limited to two states (Paraíba and Ceará). According to Santos (Santos, et al., 2020), in Northeastern Brazil, Ceará state had the second highest number of cases and deaths. During the same data collection period, the highest incidence in the same region occurred in epidemiological week 12 (Brasil, 2020), in Ceará (288.7 cases/100,000 inhab.).

In regard to professional training, the federal government implemented the "Brazil count on me" program in April 2020, aimed at training health professionals, to combat COVID-19 in the regions of greatest need (Brasil, 2020). However, 71.3% of the respondents received no COVID-19 training. Given that lack of training was associated with having tested positive for the disease (p = 0,0001), it may have contributed to a larger number of cases up to the collection date.

With respect to comorbidities, this study shows that the number of professionals with chronic disease is relevant (26.3%). The literature demonstrates an association between comorbidities and worsening patient outcomes (Ye, et al., 2020); however, in the present study, it was not possible to correlate comorbidity as a risk factor for the contamination of professionals and worsening symptoms.

PPE is a preventive strategy during dental procedures, including the use of white coats/impermeable aprons, surgical caps, surgical masks, PFF2/N95 masks, safety glasses, face-shields, surgical clothes/aprons and scrubs, shoe covers and 70% rubbing alcohol (CFO, 2020; Peng, et al., 2020). The data of the present study showed that PPE unavailability exhibited statistically significant associations with positive COVID-19 tests for PFF2/N95 masks (p = 0.039); aprons (p = 0.038); safety glasses (p = 0.006); and alcohol (p = 0.048). A test performed with 1,829 public health professionals in Brazil in all the states revealed that 49.4% of the respondents reported having received PPE continuously, 44.4% one or a few times and 6.2 % not once during the pandemic (Friocruz, 2021).

In dental procedures, droplets and aerosols spread in all directions over a distance of more than 2.0 m from the perimeter of the oral cavity (Barreto, et al., 2011). In a study carried out on droplet/aerosol dispersion in the dental environment

using *Lactobacillus casei*, it was determined that microparticles are capable of contaminating the environment (p <0.0001). When the experiment was conducted with an individual protection barrier, droplet dispersion declined by 94.28% (Gomes, et al., 2020).

The COVID-19 pandemic has posed numerous challenges to dental professionals, including an impact on family income. A significant association was found with the workplace (p < 0.0001), training (p < 0.0001) and time inactive (p < 0.0001), the most affected being dentists working in the private sector and those who remained inactive for 1 to 3 months.

In a study performed with 766 Brazilian urologists during the first two months of the pandemic, urologists in the private sector were more likely to experience a decline in income when compared with those working in the public sector (p <0.0001) (Gomes, et al., 2020). These data corroborate those of the present study with respect to the impact on the income of health professionals.

During the pandemic many professionals had to stop or reduce their activities. However, there was a significant association between the professionals who continued working and the private sector (p < 0.001), albeit without greater risk of contamination.

Among the limitations of this study is the non-response of some professionals due to inactive emails, and the fact that the data are preliminary because the pandemic is ongoing.

5. Conclusions

1- The rates of COVID-19 contamination among dental professionals were higher than those of the general population in RN.

2- Professionals classified as OHTs were the most affected by COVID-19 when compared to other dental professionals.

3- Younger professionals with less experience had higher COVID-19 contamination rates.

4- Lack of training and the unavailability of PFF2 masks, safety glasses, aprons and 70% rubbing alcohol exhibited a higher relationship with a positive COVID-19 test.

5- The disease in these professionals was milder than that reported in the literature.

6-The private sector professionals lost more income.

7- The Alto Oeste region of RN experienced high contamination rates among the dental professionals.

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