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RESEARCH ARTICLE

Anxiety among Brazilian Dentists During the COVID-19 Pandemic: A Cross-Sectional Study

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Abstract:

Background:

Despite using biosafety protocols, dentists fear contracting COVID-19 and face economic uncertainties about their professional future caused by the pandemic.

Objective:

This study aimed at determining the prevalence of anxiety and identifying factors associated with it among dentists during the COVID-19 pandemic in Brazil.

Methods:

A cross-sectional study involving 408 Brazilian dental surgeons selected by snowball technique who filled an electronic questionnaire about sex, race, dental specialty, health habits, health-related quality of life, anxiety, and COVID-19-related aspects. Symptoms of anxiety were measured by the Beck anxiety inventory, and health-related quality of life was assessed by the World Health Organization Quality of Life questionnaire. Poisson regression was used to obtain estimates of adjusted prevalence ratios.

Results:

The prevalence rate of anxiety was found to be 27.5% and it was significantly higher among dentists who were afraid of catching COVID-19 (Prevalence Ratio=PR=2.52), and among those who reported sweating, wheezing, and increased heart rate during work (PR=3.67). Afro-American dentists were 48% more anxious than dentists belonging to the white/yellow race. The mean value of the quality of life of anxious dentists compared to non-anxious dentists was 13% lower in the physical domain, 12% lower in the psychological domain, and 7% higher in the social relationship domain.

Conclusion:

The prevalence of anxiety among Brazilian dentists, in the context of economic uncertainty and social distance imposed by the COVID-19 pandemic, is high and associated with the fear of contracting the disease, physical symptomatology of stress, being Afro-American, and altered quality of life in the physical, psychological, and social relationships domains.

Keywords: Anxiety, COVID-19, Dentists, Quality of life, Mental health, Occupational stress.

1. INTRODUCTION

In March 2020, the World Health Organization (WHO) declared a global pandemic of COVID-19 caused by the new

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coronavirus (SARS-CoV-2) after the disease was identified in 114 territories worldwide [1]. In some countries, dental activities were suspended, as they were not considered essential, to control the spread of disease and reduce the transmission, except for urgent and emergency cases and telemonitoring. The sudden suspension of activities caused major financial impacts, especially on dental services, which

are usually costly [2].

In the dental environment, SARS-CoV-2 can be transmitted directly through the inhalation of particles generated by coughing or sneezing from contaminated people, by direct transmission through the exposure of mucous membranes of the eyes, nose, or oral mucosa to infectious particles, and indirectly by contaminated surfaces [3]. Procedures that produce aerosols are common in the dentistry routine. Therefore, they may be responsible for increasing the chances of transmission of the new coronavirus in clinics and dental offices. In addition, the dentist's job requires very close physical contact with patients, exposure to saliva, blood, and other fluids through the instruments. Consequently, the risk of being infected by COVID-19 or transmitting it to patients is high [4].

Despite the existence of national and international biosafety protocols, dentists live with the fear of contracting COVID-19 and face uncertainties about their professional future in the economic recession caused by the pandemic [5]. This context can contribute to the occurrence of anxiety and other mental disorders among dentists.

This study aimed to determine the prevalence of anxiety and identify factors associated with it among dentists in the context of the COVID-19 pandemic in Brazil.

2. MATERIALS AND METHODS

A cross-sectional study was conducted from November, 2020 to February, 2021. Dental surgeons were selected to fill out an electronically sent questionnaire using the snowball technique. Before accessing the Google form® questionnaire, participants signed informed consent to participate in the survey. Collected variables included sex, age, race, income, region of the country, dental specialty, health habits, health-related quality of life, anxiety, and COVID-19-related aspects. The questions related to COVID-19 were rated on a 5-point Likert-type scale. Seven questionnaires containing more than 20% of missing data were discarded.

2.1. Beck Anxiety Inventory (BAI)

Symptoms of anxiety were measured by the Beck anxiety inventory (BAI). The questionnaire has 21-items, rated on a 4-point Likert-type scale, ranging from 0 to 3. The adopted cutoff for BAI was <16 (without anxiety) to ≥16 (with anxiety) [6].

2.2. Whoqol-Bref

Health-related quality of life was assessed by the WHOQOL-BREF, a questionnaire that allows a subjective description of how a person feels about the physical health, psychological health, social relations, and the environment in which he or she lives. Domain raw scores range between 4 to 20. Higher scores represent a higher quality of life [7]. WHOQOL-BREF mean (mean±standard deviation) scores of healthy people from Brazil were taken as reference values for physical health, *i.e.*, 16.6±2.1, psychological health, *i.e.*, 15.6±2.1, social relationships, *i.e.*, 15.5±2.6, and environment, *i.e.*, 14.0±2.1 [8].

2.3. Statistical Analysis

The statistical package for Social Sciences (SPSS) version 22 was used for data analysis. Answers to the COVID-19-related questions were coded as Never/Very rarely/Rarely = No and Frequently/Very frequently =Yes. Differences in proportions between groups were evaluated by the chi-squared test or Fisher´s test when indicated and differences in group mean according to the presence or absence of anxiety were evaluated using t-tests.

The reliability of each domain of the WHOQOL-BREF was evaluated using Cronbach's alpha coefficient, an index that measures the reliability of the internal consistency of a scale, by assessing the degree of magnitude in which the items of an instrument are correlated. The Cronbach's alpha value is the correlation between items that belong to an instrument. The acceptable values of Cronbach's alpha should ideally fall between 0.70 to 0.90 [9]. Values from 0.60 to 0.70 were considered as satisfactory [10].

Poisson regression is generally used to analyze longitudinal studies in which the response is the number of episodes of an event over a given time. However, it is also an adequate technique to analyze cross-sectional studies, as a strategy to obtain estimates of prevalence ratios [11 - 13]. In this study, variables associated at P<0.20 were selected for inclusion in a Poisson regression model which, in turn, adopted a 5% significance level. The variables of the final model were selected after adjusting the saturated model by removing the variables with prevalence ratio values exceeding the 5% confidence level. The adequacy of the models was evaluated by the Omnibus test and confirmation of the adjustment was based on the reduction of the Akaike Information Criterion.

3. RESULTS

The study investigated 408 dentists with the following specialties: general practice (22.8%), orthodontics (12.2%), endodontics (9.8%), family health (8.8%), dental prosthesis (8.3%), periodontics (8.1%), implantology (6.1%), pediatric dentistry (5.9%), dentistry (4.4%), facial orthopedics (3.7%), stomatology/radiology (2.0%), and others (7.8%).

The prevalence rate of anxiety among the dentists investigated was 27.5% (n=112). The prevalence of anxiety was particularly high among dentists who graduated 16-20 years ago (PR = 2.81) and among Afro-American professionals (PR = 1.47) (Table **1**).

Moreover, it was found to be significantly higher among dentists who started using stimulants due to the COVID-19 pandemic (PR = 2.01), referred that the high cost of EPIs could hamper the functioning of dentistry services during the COVID-19 pandemic (PR = 2.15), were afraid of catching COVID-19 (P = 2.52), reported sweating, wheezing, and increased heart rate during work (PR = 3.67), feel safe when using personal protective equipment at work (PR = 1.84), and have the support of fellow dentists (PR = 1.70) and other health professionals (PR = 1.79) (Table **2**).

Anxious professionals had lower mean age, lower average monthly income, and lower scores in all four WHOQOL-BREF domains than dentists without anxiety. The Cronbach's alpha

values for the four domains were found to be acceptable, such as physical health, *i.e.*, 0.81, psychological health, *i.e.*, 0.83, social relationships, *i.e.*, 0.67, and environment, *i.e.*, 0.80 (Table **3**).

Table 1. Prevalence (%) of anxiety according to sociodemographic characteristics of 408 dentists, Brazil, 2020.

Sociodemographic and Occupational Characteristics	With Anxiety		Without Anxiety		PR[b]	95% CI	P
	N	%	N	%			
Sex							
Female	88	29.9	206	70.1	1.42	0.95-2.11	0.071
Male	24	21.1	90	78.9	1		
Time as a Dentist (Years)							
0-5	68	34.0	132	66.0	2.28	0.95-5.47	0.126
6-10	17	25.8	49	74.2	1.93	0.84-4.43	0.186
11-15	11	23.4	36	76.2	2.13	0.99-4.58	0.074
16-20	8	27.6	21	72.4	2.81	1.42-5.52	<0.001
>20	8	12.1	58	87.9	1		
Region[a]							
South and Southeast	32	28.1	82	71.9	1.01	0.71-1.43	0.953
North and Northeast	80	27.8	208	72.2	1		
Race							
Afro-American	64	33.0	130	67.0	1.47	1.06-2.02	0.017
White/Yellow	48	22.4	166	77.6	1		
Economy Sector							
Private	63	27.4	167	72.6	1.13	0.76-1.67	0.540
Public	23	31.9	49	68.1	1.30	0.81-2.09	0.278
Private and Public	26	24.5	80	75.5	1		

[a]6 missing data.
[b]Prevalence Ratio.

Table 2. Prevalence (%) of anxiety according to aspects related to COVID-19 pandemic among dentists, Brazil, 2020.

Aspects Related to COVID-19	With Anxiety		Without Anxiety		PR[a]	95% CI	P
	N	%	N	%			
Contact with Patient with COVID-19							
Yes	24	23.8	77	71.3	0.83	0.56-1.23	0.338
No	88	28.7	219	76.2	1		
Diagnosed with COVID-19							
Yes	7	28.0	18	72.0	1.02	0.53-1.96	0.949
No	105	27.4	278	72.6	1		
Use of Marijuana							
Yes	12	40.0	18	60.0	1.51	0.95-2.42	0.110
No	100	26.5	278	73.5	1		
Started Using Stimulant Due to COVID-19 Pandemic							
No	101	26.1	286	73.9	1		
Yes	11	52.4	10	47.6	2.01	1.29-3.12	0.009
Increased Alcohol Consumption More Than Usual							
No	68	26.3	191	73.7	1		
Yes	44	29.5	105	70.5	1.12	0.82-1.55	0.475
Has Quitted Dentistry Profession Because of the Pandemic							
Yes	92	28.4	232	71.6	1.19	0.93-1.22	0.401
No	20	23.8	64	76.2	1		
High Cost of EPIs could Hamper the Functioning of Dentistry Services during the COVID-19 Pandemic							
Yes	104	29.7	246	70.3	2.15	1.11-4.18	0.011
No	8	13.8	50	86.2	1		

(Table 2) contd.....

Aspects Related to COVID-19	With Anxiety N	With Anxiety %	Without Anxiety N	Without Anxiety %	PRª	95% CI	P
Often Checks The News About COVID-19							
No	12	22.6	41	77.4	1		
Yes	100	28.2	255	71.8	1.24	0.74-2.10	0.400
Because of COVID-19, Work Requires Much More From You							
No	14	24.6	43	75.4	1		
Yes	98	27.9	253	72.1	1.13	0.70-1.85	0.598
Accomplishes all Work Tasks							
No	28	30.1	65	69.9	1.13	0.79-1.85	0.513
Yes	84	26.7	231	73.3	1		
Afraid of Catching COVID-19							
No	14	13.0	94	87.0	1		
Yes	98	32.7	202	67.3	2.52	1.51-4.22	<0.001
Sweat, Wheezing, and Increased Heart Rate During Work							
No	34	13.5	217	86.5	1		
Yes	78	49.7	79	50.3	3.67	2.59-5.20	<0.001
Feels Safe When Using Personal Protective Equipment at Work							
No	59	38.3	95	61.7	1.84	1.34-2.51	<0.001
Yes	53	20.9	201	79.1	1		
Avoid Attending Patients Suspected of COVID-19							
No	30	28.0	77	72.0	1.03	0.72-1.47	0.874
Yes	82	27.2	219	72.8	1		
Has Support of Fellow Dentists							
No	45	33.8	88	66.2	1.70	1.14-2.55	0.008
Yes	67		208		1		
Has Support of Other Health Professionals							
No	85	32.7	175	67.3	1.79	1.22-2.63	0.002
Yes	27	18.2	121	81.8	1		
Feels Able to Manage COVID-19 Cases							
No	46	23.8	147	76.2	1		
Yes	66	30.7	149	63.3	1.29	0.93-1.78	0.121
High Risk of Contamination at Work Environment							
No	20	21.3	74	78.7	1		
Yes	92	29.3	222	70.7	1.38	0.90-2.11	0.126
Decreased the Quality of Social Relationships							
No	10	17.5	47	82.5	1		
Yes	102	29.1	249	70.9	1.66	0.92-2.98	0.071

ª Prevalence Ratio.

Table 3. Age, monthly income, and WHOQOL-BREF scores (mean ± SD) according to anxiety among 408 dentists, Brazil, 2020.

WHOQOL-BREF Domain	With Anxiety N=112	Without Anxiety N=296	P
Age (Years)	31.7 ± 7.7	35.4 ± 10.7	<0.001
Monthly Income (Reais)	4,982 ± 5,020	6,370 ± 4,843	0.011
Physical	12.5 ± 2.9	15.5 ± 2.2	<0.001
Psychological	12.0 ± 2.9	14.9 ± 2.4	<0.001
Social Relationships	12.5 ± 3.7	14.2 ± 3.1	<0.001
Environment	12.5 ± 2.5	14.5 ± 2.4	<0.001

Table 4. Results of Poisson regressions having the prevalence ratio of anxiety as the dependent variable among dentists from Salvador, Brazil, 2020.

Predictors (Referent)	Saturated Model (N=402)			Adjusted Model (N=408)		
	PR	95% CI	P	PR$_{adj}$	95% CI	P
Sex (Masculine)	1.19	0.81-1.76	0.369	-	-	-
Age, in Years	1.01	0.98-1.04	0.514	-	-	-
Family Monthly Income, in Reais	1.00	1.00-1.00	0.183	-	-	-
Time as a Dentist (>20 years)	1.62	0.64-4.19	0.300	-	-	-
Use of Marijuana (No)	1.46	0.93-2.29	0.102	-	-	-
Started Using Stimulant Due to COVID-19 Pandemic (No)	0.88	0.53-1.47	0.632	-	-	-
High Cost of EPIs Could Hamper Functioning of Dentistry Service (No)	0.81	0.43-1.56	0.535	-	-	-
Feels Safe When Using Personal Protective Equipment at Work (Yes)	1.16	0.86-1.57	0.335	-	-	-
Feels Able to Manage COVID-19 Cases (Yes)	0.79	0.61-1.04	0.093	-	-	-
High Risk of Contamination at Work Environment (No)	1.14	0.78-1.68	0.499	-	-	-
Decreased the Quality of Social Relationships (No)	1.18	0.73-1.92	0.504	-	-	-
Has Support of Fellow Dentists (Yes)	1.17	0.87-1.58	0.300	-	-	-
Has Support of Other Health Professionals (Yes)	1.16	0.80-1.67	0.436	-	-	-
Race (White/Yellow)	1.40	1.05-1.85	0.020	1.48	1.13-1.95	0.005
Afraid of Catching COVID-19 (No)	1.92	1.24-2.97	0.004	1.82	1.17-2.81	0.007
Sweat, Wheezing and Increased Heart Rate During Work (No)	2.16	1.52-3.05	<0.001	2.19	1.55-3.10	<0.001
Physical Domain (Units, Ranging 4-20)	0.87	0.80-0.95	0.001	0.87	0.81-0.93	<0.001
Psychological Domain (Units, Ranging 4-20)	0.90	0.82-0.97	0.008	0.88	0.82-0.95	0.001
Social Domain (Units, Ranging 4-20)	1.08	1.02-1.14	0.005	1.07	1.02-1.12	0.005
Environment Domain (Units, Ranging 4-20)	0,99	0.92-1.06	0.689	-	-	-

PR$_{adj}$ - Adjusted prevalence ratio.

Initially, twenty variables were selected to compose the saturated Poisson regression model, but only six of them remained in the final, adjusted model. The final model estimated that the prevalence of anxiety was 48% higher among dentists of the Afro-American race than among dentists belonging to the white/yellow race. The prevalence of anxiety was 2.19 times higher among professionals who reported sweating, wheezing, and increased heartbeat during work (PR = 2.19) and 1.82 times higher among those who were afraid of catching COVID (PR = 1.82). The model also estimated that the health-related quality of life of anxious dentists was 13% lower (PR = 0.87) in the physical domain, 12% lower (PR =0.88) in the social relationship domain, and 7% higher (PR = 1.07) than non-anxious dentists. The adjusted model performed satisfactorily, as revealed by the reduction in the Akaike Information Criterion (from 454.142 in the saturated to 432.404 in the adjusted model) and through the Omnibus test (<0.001; p = 0.38) (Table **4**).

4. DISCUSSION

In this study, the prevalence of anxiety found among the dentists investigated was found to be high, *i.e.*, 27.5%. However, comparisons of this prevalence with those from other studies [5, 14 - 17] were found to be contradictory because of different methods used for evaluating anxiety.

Anxiety levels were higher in professionals who were afraid of contracting COVID-19 than in those who were not afraid, as found in dentists from Brazil [5], Israel [14], Pakistan [15], Italy [16], and India [17]. Public health emergencies often cause fear and expose the population to mental stress. In the context of the COVID-19 pandemic, dentists' fear and anxiety can be explained by the risks related to the practice of dentistry, due to the close physical contact with patients, aerosols, and saliva, which enable the contamination by the disease. Besides, the virus can remain on inanimate surfaces for hours or days, which can also contribute to the increased route of contamination [2].

Fear, together with anxiety, can be triggering factors for clinical manifestations, such as sweating, wheezing, and increased heart rate during work. Dentists who reported these signs and symptoms had a prevalence of anxiety 2.19 times higher than those who did not report them. The presence of these signs can be considered a proximal factor of anxiety.

The practice of dentistry was extremely affected during the period of the pandemic, especially during the period of data collection of this study, with the suspension or limitation of elective dental care and the continuation of urgent procedures, only. These changes had financial impacts and raised new concerns for dentists [1]. In addition, due to the pandemic, new biosafety protocols had to be implemented, leading to an increase in the cost of personal protective equipment [18]. All these factors can be considered as triggers for increased levels of anxiety in the population studied.

This study also found that the prevalence of anxiety was higher in African American dentists than in dentists belonging to the white/yellow race. African Americans are a vulnerable group to the development of mental disorders and anxiety, due to exposure to various stressors and systemic barriers,

especially during a health crisis, such as the COVID-19 pandemic [19 - 21].

Poorer WHOQOL-BREF scores in the quality-of-life physical and psychological domains and higher scores in the social relationship's domain were strongly associated with a higher prevalence of anxiety. These changes can be explained by the physical distance and social isolation caused by the pandemic and also by a possible increase in the dentist's loneliness, a profession that is generally practiced with few colleagues around.

Important limitations of this study are the non-random sampling and the relatively small number of professionals who participated in the survey; 408 out of the 359,569 dentists registered in the Brazilian Federal Council of Dentistry [22]. Furthermore, the distribution of dentists according to the Brazil regions occurred unevenly, most of them proceeding from the North and Northeast regions.

CONCLUSION

This study found that the prevalence of anxiety among Brazilian dentists, in the context of economic uncertainty and social distance imposed by the COVID-19 pandemic, is high and it is associated with the fear of contracting the disease, physical symptomatology of stress, being Afro-American, and altered quality of life in the physical, psychological, and social relationships domains. Greater attention to dentists' anxiety is needed in order to help them to cope with the uncertain scenarios caused by the COVID-19 pandemic.

ETHICS APPROVAL AND CONSENT TO PARTI-CIPATE

This research protocol was approved by the National Ethics Review Committee of the National Council of Health, Brazilian Ministry of Health, number 4.008.150.

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. The reported experiments on humans are in accordance with the Helsinki Declaration, version 2013.

CONSENT FOR PUBLICATION

Study participants provided electronic informed consent prior to the survey.

STANDARDS OF REPORTING

STROBE guidelines and methodologies were ollowed in this study.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author [L.L-.K], upon reasonable request.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial, or otherwise.

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