Analyzing the psychological effects of the COVID-19 pandemic on Turkish dental professionals

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation;
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Abstract

Background. Due to the working conditions, while performing dental procedures, dental professionals may experience a sense fear and anxiety about coronavirus disease 2019 (COVID-19).

Objectives. The aim of this study was to assess the levels of fear and anxiety about COVID-19 among dental professionals by using the Turkish version of the Fear of COVID-19 Scale (FCV-19S) and the Coronavirus Anxiety Scale (CAS), and to explore the risk factors associated with the intensity of fear and anxiety.

Material and methods. This cross-sectional study was conducted between October 16 and October 23, 2020, during the normalization process, by sending an online survey to 813 dental professionals working in public and university hospitals in Turkey. The questionnaire contained questions about socio-demographic characteristics as well as epidemic-related questions. The levels of fear and anxiety were assessed by means of FCV-19S and CAS, respectively.

Results. The sample's mean scores were 18.48 ±5.47 for FCV-19S and 2.17 ±3.08 for CAS. Female participants expressed higher levels of fear of COVID-19 than male participants ($p < 0.05$).

Conclusions. The fear and anxiety levels in dentists during the COVID-19 pandemic were found to be high.

Keywords: Turkey, dental professionals, COVID-19, Fear of COVID-19 Scale, Coronavirus Anxiety Scale

Introduction

In December 2019, multiple cases of pneumonia of unknown etiology were identified in Wuhan, China.[1] The World Health Organization (WHO) named it novel coronavirus disease 2019 (COVID-19) and declared the outbreak of a pandemic on March 11, 2020.[2] The first case of COVID-19 in Turkey was announced on March 11, 2020. Since then, to control COVID-19, the Turkish government implemented precautions, such as social distancing, self-quarantine, travel restrictions, the postponement of scientific, cultural and similar activities, the transition of all educational institutions to the online education system, and the closure of restaurants, museums, movie theaters, swimming pools, sports halls, and hairdressers. Curfew was declared for people over 65 years of age and those with chronic illnesses, defined as being at high risk of contracting the disease, and young people under 20. Moreover, the Turkish Ministry of Health decided to postpone non-urgent dental practices in dental clinics at public and university hospitals.[3] The Turkish Ministry of Health established filiation teams comprised of healthcare professionals (doctors, nurses, dentists) to isolate COVID-19-positive cases from the individuals suspected to be infected. The role of filiation teams was to follow up cases, visit households and collect samples for tests.[4] Turkey began the normalization process on June 1, 2020. Domestic and international travel restrictions were canceled, and kindergartens, restaurants, museums, sports centers, hairdressers, and shopping centers were reopened.[5] Prior to the normalization process, 164,769 cases of COVID-19 were diagnosed and 4,563 deaths occurred in Turkey.[3]

Given the rapid transmission of the disease and the working conditions of dental professionals (exposure to aerosols, saliva, blood, and contaminated body fluids while performing dental procedures), dentists are at extremely high risk of contracting the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes COVID-19.[6] The virus can be detected in infected patients' saliva, which is why saliva is taken into consideration in the diagnosis of COVID-19.[7,8] COVID-19 can cause ulcerations, desquamative gingivitis, xerostomia, mucositis, and stomatitis in the oral cavity.[9] During the COVID-19 pandemic, the number of patients attended by dentists decreased as compared to the pre-pandemic time.[10] In a study conducted among patients who visited Karabük Oral and Dental Health Training and Research Hospital in Turkey, it was observed that the average number of patients per month in the 1-year period before the pandemic was approx. 3.5 times greater as compared to the 1-year period after the COVID-19 pandemic.[11] The majority of dental professionals (80%) provided only emergency treatment,[10] while 5.1–16.9% postponed all dental procedures[10,12] and 13.8% closed their dental clinics.[10] During the pandemic, patients would go to the dentist in case of dental emergency, mostly because of pain (36.6%) and a fractured tooth (36.1%).[13] Although dentists do take extra personal protective measures while performing dental procedures, studies show that 16–24% of dentists working in Turkey have been infected with SARS-CoV-2.[14–16] Due to the cross-contamination caused by aerosols, dental professionals are anxious about being infected and transmitting the infection to their families and friends, which may affect their behavior and make them experience a sense of fear and anxiety.[17] Research has shown that 2.6% of dentists,[18] 5.1% of healthcare professionals[19] and 3.5% of medical students[20] received psychological support during the pandemic.

During the COVID-19 pandemic, studies evaluating individuals' psychological stress and anxiety used various validated scales, including the Generalized Anxiety Disorder 7-item (GAD-7) scale, the Hospital Anxiety and Depression Scale (HADS), the Depression, Anxiety and Stress Scale-21 (DASS-21), the Beck Depression Inventory (BDI), and the Hamilton Depression Rating Scale (HDRS).[21–25] In order to investigate the impact of the COVID-19 pandemic on mental health, psychometric assessment tools, including the Fear of COVID-19 Scale (FCV-19S)[22] and the Coronavirus Anxiety Scale (CAS),[26] have recently been developed. These scales have been translated into different languages to explore their psychometric properties and for validation,[24,27–31] and have been found to be consistent and reliable. The psychological impact of the COVID-19 pandemic on general populations, patients and students has been reported in previous studies,[23,32] while little attention has been given to the psychological distress of dental practitioners.[17,33] However, during the COVID-19 pandemic, knowing factors that affect dentists' fear and anxiety levels is important for the implementation of measures to protect dental professionals against the risk associated with their working conditions.[24] Also, socio-demographic characteristics, such as age, gender, personal and family history of illness, marital status, workplace, and work hours per week, can affect students' and physicians' level of fear of COVID-19.[34] Therefore, it is important to investigate the effect of socio-demographic factors on the level of fear of COVID-19.

To our knowledge, no study has yet psychometrically measured dental professionals' psychological responses to the pandemic in Turkey, using scales specific for COVID-19. Thus, there is an unmet need to understand the psychological impact of the COVID-19 pandemic on Turkish dental professionals. The aim of the present study was to assess the level of fear and anxiety about COVID-19 among dentists by using the Turkish version of FCV-19S and CAS, and to explore the factors associated with the intensity of fear and anxiety. The hypothesis was that the levels of fear and anxiety would be high in dentists due to a high risk of disease transmission.

Material and methods

This study was approved by the Research Ethics Committee at the Faculty of Medicine of the Suleyman Demirel University, Isparta, Turkey (2020/355). The study was carried out in accordance with the Declaration of Helsinki standards. Electronic informed consent was obtained from the participants prior to data collection.

Participants

This cross-sectional study was conducted using an online survey from October 16 to October 23, 2020, during the normalization process in Turkey. The inclusion criteria were as follows: (1) being professionally active in dentistry; and (2) accepting to contribute to the research. The exclusion criterion was leaving an incomplete form. The study population included both general dentists and specialists working in public and university hospitals. According to the data from the Turkish Dental Association, there were 15,597 active general dentists and specialists working in public and university hospitals at the time of conducting the survey. Considering this data, the sample size was calculated using a formula based on a 95% confidence level and a 2% margin of error with maximum heterogeneity. The recommended minimum sample size was 242. Before sending the survey to all participants, a pilot study was performed on 20 selected dentists who were not in the same age group. Based on the pilot study results, no changes to the survey were required. The individuals from the pilot study could not participate in the final trial. The contact information of dental professionals was obtained through e-mail, WhatsApp, Facebook, and Instagram. A total of 850 questionnaires were distributed among dental professionals by Google Forms (Alphabet Co., Mountain View, USA). A group of 813 participants completed in full the questionnaire forms.

Measures

The survey contained questions about socio-demographic characteristics as well as epidemic-related questions. The fear and anxiety levels of participants were assessed by means of FCV-19S and CAS, respectively.

The FCV-19S, with Cronbach's alpha (α) value of 0.82, consists of 7 items on a 5-point Likert scale, with scores ranging from 7 to 35.[22] In the study, both a bifactor model[22] and a two-factor model[27] were used. The validity and reliability of the Turkish version of FCV-19S were verified by Satici et al.[29]

The CAS consists of 5 items that assess the physiological anxiety among individuals with a 5-point Likert scale (rating from 0 to 4), with robust reliability (α = 0.93).[26] The psychometric properties and validity of the Turkish version of CAS were verified by Evren et al.[35]

Statistical analysis

The data was analyzed statistically using IBM SPSS Statistics for Windows, v. 22.0 (IBM Corp., Armonk, USA). The participants' descriptive characteristics were examined. The association between gender and work setting was assessed with the χ^2 test. As the variables were not normally distributed, the Mann–Whitney U test and the Kruskal–Wallis test were used for the comparison of the groups. The Bonferroni–Dunn test results are shown in Latin letters in superscript. The level of statistical significance was set at a p-value of 0.05.

Cronbach's α, and the correlations between each item score and the total score were calculated. The correlation was considered as weak if $r < 0.30$, moderate if the r-value was in the range of 0.30–0.59, and strong if $r \geq 0.60$.[36] A p-value <0.001 was considered statistically significant for the correlations.

Results

Participant characteristics

Of the 813 respondents, more than half were females (n = 553; 68%). The majority (58.9%) were aged 23–30 years, followed by 27.3% aged 31–40 years. A total of 200 (24.6%) respondents had been working for more than 11 years, and 438 (53.9%) for less than 5 years. At the time of the survey, 39.4% reported that they treated an average of at least 11 patients a day, and 83.4% of them were working in public hospitals. The study population had an almost equal representation of single and married individuals. Ninety-three (11.4%) had systemic diseases. The characteristics of the respondents are shown in Table 1.

Only 52 (6.4%) dental professionals had been diagnosed as COVID-19-positive. In addition, 80.0% knew someone who had been infected with SARS-CoV-2, and 31.2% were members of filiation teams. While social media was the data tool most frequently used by dentists (70.4%), it was closely followed by television/news (65.2%). Uncertainty during the pandemic concerned more than half of the participants, and 61.4% were suspicious about being infected when they felt symptoms similar to those of COVID-19 (Table 2).

Results and factors associated with FCV-19S and CAS

The sample's mean scores were 18.48 ±5.47 with a range of 7–35 for FCV-19S, and 2.17 ±3.08 with a range of 0–20 for CAS. Females expressed higher levels of fear of COVID-19 than males (19.22 ±5.28 and 16.91 ±5.54, respectively) (Table 3). In addition, the results suggest a trend among young adults (age groups: 23–30 years

Table 1. Characteristics of the participants ($N = 813$)

Variable		Gender			Work setting			Total
		M	F	p-value	public hospital	university hospital	p-value	
Age [years]	23–30	120 (46.2)	359 (64.9)	<0.001*	208 (48.8)	271 (70.0)	<0.001*	479 (58.9)
	31–40	93 (35.8)	129 (23.3)		125 (29.3)	97 (25.1)		222 (27.3)
	41–54	36 (13.8)	58 (10.5)		81 (19.0)	13 (3.4)		94 (11.6)
	≥55	11 (4.2)	7 (1.3)		12 (2.8)	6 (1.6)		18 (2.2)
Professional experience [years]	0–5	107 (41.2)	331 (59.9)	<0.001*	193 (45.3)	245 (63.3)	<0.001*	438 (53.9)
	6–10	68 (26.2)	107 (19.3)		92 (21.6)	83 (21.4)		175 (21.5)
	11–14	27 (10.4)	42 (7.6)		39 (9.2)	30 (7.8)		69 (8.5)
	≥15	58 (22.3)	73 (13.2)		102 (23.9)	29 (7.5)		131 (16.1)
Average number of patients treated daily	1–3	24 (9.2)	64 (11.6)	0.001*	19 (4.5)	69 (17.8)	<0.001*	88 (10.8)
	4–6	60 (23.1)	165 (29.8)		55 (12.9)	170 (43.9)		225 (27.7)
	7–10	47 (18.1)	133 (24.1)		85 (20.0)	95 (24.5)		180 (22.1)
	≥11	129 (49.6)	191 (34.5)		267 (62.7)	53 (13.7)		320 (39.4)
Specialty	general dentistry	140 (53.8)	239 (43.2)	<0.001*	379 (100)	0 (0)	<0.001*	379 (46.6)
	restorative dentistry	12 (4.6)	32 (5.8)		4 (0.9)	40 (10.3)		44 (5.4)
	orthodontics	17 (6.5)	41 (7.4)		2 (0.5)	56 (14.5)		58 (7.1)
	endodontics	10 (3.8)	47 (8.5)		8 (1.9)	49 (12.7)		57 (7.0)
	oral surgery	23 (8.8)	17 (3.1)		6 (1.4)	34 (8.8)		40 (4.9)
	pediatric dentistry	14 (5.4)	87 (15.7)		10 (2.3)	91 (23.5)		101 (12.4)
	prosthodontics	18 (6.9)	29 (5.2)		9 (2.1)	38 (9.8)		47 (5.8)
	periodontology	16 (6.2)	38 (6.9)		6 (1.4)	48 (12.4)		54 (6.6)
	oral diagnostics and radiology	10 (3.8)	23 (4.2)		2 (0.5)	31 (8.0)		33 (4.1)
Marital status	single	92 (35.4)	310 (56.1)	<0.001*	160 (37.6)	242 (62.5)	<0.001*	402 (49.4)
	married	168 (64.6)	243 (43.9)		266 (62.4)	145 (37.5)		411 (50.6)
Systemic disease	yes	31 (11.9)	62 (11.2)	0.675	59 (13.8)	34 (8.8)	0.023	93 (11.4)
	no	229 (88.1)	491 (88.8)		367 (86.2)	353 (91.2)		720 (88.6)
Participant living	alone	59 (22.7)	186 (33.6)	<0.001*	87 (20.4)	158 (40.8)	<0.001*	245 (30.1)
	with a family	43 (16.5)	119 (21.5)		94 (22.1)	68 (17.6)		162 (19.9)
	with a partner	152 (58.5)	230 (41.6)		240 (56.3)	142 (36.7)		382 (47.0)
	with a friend/friends	6 (2.3)	18 (3.3)		5 (1.2)	19 (4.9)		24 (3.0)
Smoking/Alcohol consumption	smoking	108 (41.5)	97 (17.5)	<0.001*	116 (27.2)	89 (23.0)	0.165	205 (25.2)
	alcohol consumption	85 (32.7)	123 (22.2)	0.001*	90 (21.1)	118 (30.5)	0.002*	208 (25.6)
	none	121 (46.5)	386 (69.8)	<0.001*	265 (62.2)	242 (62.5)	0.924	507 (62.4)
Family member aged ≥65 years and/or with a chronic disease	≥65 years of age	142 (54.6)	288 (52.1)	0.274	236 (55.4)	194 (50.1)	0.076	430 (52.9)
	a chronic disease	168 (64.6)	386 (69.8)	0.081	289 (67.8)	265 (68.5)	0.453	554 (68.1)
	both	104 (40.0)	230 (41.6)	0.362	189 (44.4)	145 (37.5)	0.027*	334 (41.1)
Total		260 (32.0)	553 (68.0)	–	426 (52.4)	387 (47.6)	–	813 (100)

Data presented as number (percentage) (n (%)). M – male; F – female; * statistically significant (χ^2 test).

Table 2. Evaluation of the participants' characteristics according to the Fear of COVID-19 Scale (FCV-19S) and the Coronavirus Anxiety Scale (CAS)

Variable		n (%)	FCV-19S	p-value	FCV-19S psycho-logical	p-value	FCV-19S emotional	p-value	CAS	p-value
COVID-19 diagnosis[1]	yes	52 (6.4)	17.88 ±2.67	0.320	8.33 ±3.03	0.302	9.56 ±2.87	0.546	2.58 ±2.67	0.044*
	no	761 (93.6)	18.52 ±5.48		8.76 ±3.13		9.76 ±3.78		2.14 ±3.10	
If you have ever experienced symptoms similar to those of COVID-19, did you suspect that you had SARS-CoV-2?[2]	I felt similar symptoms and suspected COVID-19	499 (61.4)	19.25 ±5.44[a]		9.12 ±3.22[a]		10.12 ±2.65[a]		9.18 ±2.90[b]	
	I felt similar symptoms, but didn't suspect COVID-19	78 (9.6)	17.41 ±5.38[b]	<0.001*	8.33 ±2.82[a]	<0.001*	9.08 ±2.85[b]	<0.001*	1.50 ±2.54[b]	<0.001*
	I haven't felt any similar symptoms so far	236 (29.0)	17.21 ±5.29[b]		8.03 ±2.90[b]		9.18 ±2.90[b]		1.19 ±2.16[b]	
Did you know anyone infected with COVID-19?[1]	yes	650 (80.0)	18.47 ±5.42	0.859	8.74 ±3.11	0.835	9.73 ±2.76	0.682	2.21 ±3.14	0.278
	no	163 (20.0)	18.55 ±5.68		8.72 ±3.22		9.83 ±2.86		1.99 ±2.82	
If yes, who was it?[1]	1st degree relatives	155 (19.1)	18.68 ±5.64	0.722	8.94 ±3.29	0.403	9.74 ±2.77	0.968	2.57 ±3.51	0.087
	2nd and 3rd degree relatives	227 (27.9)	18.42 ±5.10	0.849	8.69 ±2.90	0.921	9.73 ±2.63	0.862	2.09 ±3.11	0.463
	friends	463 (56.9)	18.58 ±5.45	0.500	8.72 ±3.09	0.964	9.86 ±2.79	0.157	2.32 ±3.07	0.018*
	neighbors	204 (25.1)	19.08 ±5.72	0.096	9.13 ±3.33	0.062	9.95 ±2.86	0.143	2.68 ±3.48	0.002*
What is your source of information about COVID-19?[1]	social media	572 (70.4)	18.72 ±5.45	0.096	8.82 ±3.19	0.423	9.91 ±2.68	0.032*	2.21 ±3.01	0.116
	Ministry of Health/ WHO websites	472 (58.1)	18.86 ±5.66	0.024*	8.97 ±3.20	0.009*	9.89 ±2.88	0.059	2.43 ±3.37	0.054
	television/ news	530 (65.2)	18.79 ±5.45	0.028*	8.88 ±3.11	0.058	9.91 ±2.75	0.023*	2.23 ±3.04	0.195
	research articles	211 (26.0)	19.44 ±5.20	0.001*	9.14 ±2.94	0.006*	10.30 ±2.68	0.001*	2.19 ±3.04	0.940
	none	46 (5.7)	15.37 ±5.11	<0.001*	7.09 ±2.44	<0.001*	8.28 ±3.02	0.001*	1.04 ±2.13	0.002*
Have you taken a role in filiation teams?[1]	yes	254 (31.2)	18.04 ±5.69	0.046*	8.65 ±3.23	0.371	9.39 ±2.92	0.014*	2.54 ±3.49	0.180
	no	559 (68.8)	18.68 ±5.36		8.77 ±3.08		9.91 ±2.70		2.00 ±2.86	
How long have you been a member of a filiation team? [months][2]	0	559 (68.8)	18.68 ±5.36		8.77 ±3.08		9.91 ±2.70[a]		2.00 ±2.86	
	0–1	73 (9.0)	18.58 ±5.55		8.95 ±3.17		9.63 ±2.73[ab]		2.44 ±3.61	
	2–3	106 (13.0)	17.22 ±5.44	0.056	8.15 ±3.00	0.240	9.07 ±2.93[b]	0.033*	2.35 ±2.92	0.642
	4–5	34 (4.2)	17.68 ±5.40[a]		8.59 ±3.06		9.09 ±3.10[ab]		2.71 ±3.94	
	≥6	41 (5.0)	19.49 ±6.57		9.46 ±3.89		10.02 ±3.05[a]		3.10 ±4.21	
Are your working and resting areas crowded during the day?[1]	yes	597 (73.4)	18.80 ±5.47	0.007*	8.88 ±3.14	0.027*	9.92 ±2.74	0.006*	2.22 ±3.02	0.069
	no	216 (26.6)	17.59 ±5.40		8.32 ±3.05		9.28 ±2.85		2.02 ±3.22	
Do you feel uncertainty about the COVID-19 pandemic[2]	yes	511 (62.9)	20.60 ±4.90[a]		9.77 ±3.05[a]		10.83 ±2.38[a]		2.85 ±3.45[a]	
	sometimes	268 (33.0)	15.56 ±4.16[b]	<0.001*	7.23 ±2.36[b]	<0.001*	8.33 ±2.24[b]	<0.001*	1.15 ±1.87[b]	<0.001*
	no	34 (4.2)	9.68 ±2.56[c]		4.97 ±1.36[c]		4.71 ±1.45[c]		0.00 ±0.00[c]	

Data presented as *n* (%) or as mean ± standard deviation (*M* ±*SD*). COVID-19 – coronavirus disease 2019; SARS-CoV-2 – severe acute respiratory syndrome coronavirus 2; WHO – World Health Organization; different letters in superscript show differences in the mean rank; * statistically significant ([1] Mann–Whitney *U* test; [2] Kruskal–Wallis test).

Table 3. Analyzing the scales according to the gender and work setting of dental professionals

Scale	Item	Gender			Work setting			Total
		M	F	p-value	public hospital	university hospital	p-value	
FCV-19S	1. I am most afraid of COVID-19.	3.03 ±1.09	3.44 ±0.97	<0.001*	3.27 ±1.07	3.36 ±0.99	0.280	3.31 ±1.03
	2. It makes me uncomfortable to think about COVID-19.	3.18 ±1.18	3.76 ±0.97	<0.001*	3.56 ±1.11	3.59 ±1.04	0.850	3.57 ±1.08
	3. My hands become clammy when I think about COVID-19.	1.78 ±0.90	1.97 ±0.93	0.002*	1.95 ±0.97	1.87 ±0.88	0.348	1.91 ±0.93
	4. I am afraid of losing my life because of COVID-19.	2.76 ±1.25	2.91 ±1.17	0.065	2.79 ±1.21	2.94 ±1.18	0.084	2.86 ±1.20
	5. When watching news and stories about COVID-19 on social media, I become nervous or anxious.	2.74 ±1.15	3.38 ±1.01	<0.001*	3.17 ±1.09	3.19 ±1.11	0.588	3.18 ±1.10
	6. I cannot sleep because I'm worrying about getting COVID-19.	1.62 ±0.82	1.70 ±0.82	0.107	1.74 ±0.85	1.60 ±0.78	0.018*	1.67 ±0.82
	7. My heart races or palpitates when I think about getting COVID-19.	1.81 ±0.98	2.04 ±1.05	0.002*	2.02 ±1.06	1.91 ±1.00	0.147	1.97 ±1.03
	total FCV-19S score	16.91 ±5.54	19.22 ±5.28	<0.001*	18.50 ±5.71	18.46 ±5.21	0.798	18.48 ±5.47
	FCV-19S psychological score	7.94 ±3.11	9.10 ±3.07	<0.001*	8.88 ±3.24	8.57 ±2.99	0.301	8.73 ±3.13
	FCV-19S emotional score	8.97 ±2.96	10.12 ±2.62	<0.001*	9.62 ±2.89	9.89 ±2.66	0.208	9.75 ±2.78
CAS	How often have you experienced the following problems over the last 2 weeks?							
	1. I felt dizzy, lightheaded or faint when I read or listened to news about the coronavirus.	0.20 ±0.58	0.42 ±0.79	<0.001*	0.37 ±0.77	0.34 ±0.70	0.775	0.35 ±0.73
	2. I had trouble falling or staying asleep, because I was thinking about the coronavirus.	0.41 ±0.77	0.67 ±0.89	<0.001*	0.66 ±0.93	0.51 ±0.78	0.077	0.59 ±0.86
	3. I felt paralyzed or frozen when I thought about or was exposed to information about the coronavirus.	0.16 ±0.03	0.25 ±0.63	<0.001*	0.25 ±0.66	0.19 ±0.56	0.245	0.22 ±0.61
	4. I lost interest in eating when I thought about or was exposed to information about the coronavirus.	0.44 ±0.05	0.54 ±0.78	0.007*	0.58 ±0.87	0.44 ±0.68	0.073	0.51 ±0.79
	5. I felt nauseous or had stomach problems when I thought about or was exposed to information about the coronavirus.	0.32 ±0.75	0.57 ±0.89	<0.001*	0.59 ±0.94	0.39 ±0.75	0.003*	0.49 ±0.85
	total CAS score	1.54 ±2.81	2.46 ±3.15	<0.001*	2.44 ±0.36	1.87 ±2.70	0.003*	2.17 ±3.08

Data presented as *M ±SD*. * statistically significant (Mann–Whitney *U* test).

and 31–40 years) to have higher scores on FCV-19S and CAS than other participants, but still no statistically significant differences were observed ($p > 0.05$). Other socio-demographic characteristics of the participants, including their professional experience, the average number of patients treated daily, the marital status, the people the participants live with, and having a family member over 65 years of age and/or with a chronic disease, had no statistically significant effect on the FCV-19S and CAS scores ($p > 0.05$). In contrast, professional areas did affect the fear and anxiety levels ($p < 0.05$) (Table 4). Individuals who had had a COVID-19 diagnosis showed much lower FCV-19S scores as compared to those who had not, but this difference was not statistically significant ($p > 0.05$). The FCV-19S and CAS scores of the participants who stated that they were suspicious when they felt symptoms similar to those of COVID-19, and stated that they were worried about the uncertainty regarding COVID-19 were found to be statistically significantly higher in comparison with the scores of others ($p < 0.05$). Knowing an individual

who had been diagnosed with COVID-19 had no effect on the FCV-19S and CAS scores ($p > 0.05$) (Table 2).

Psychometric properties

The Cronbach's α measure of internal consistency was 0.875 for FCV-19S and 0.852 for CAS, suggesting that both scales had sufficiently high reliability. The reliability of the scale was found to be very high for the corrected item–total correlations of all 7 items in FCV-19S (all *r*-values ≥0.70). The inter-item correlations ranged between 0.397 and 0.709 for FCV-19, and between 0.398 and 0.607 for CAS. The results of the correlation analysis showed that the FCV-19 scores were strongly positively correlated with the FCV-19 psychological ($r = 0.932$; $p < 0.001$) and emotional ($r = 0.930$; $p < 0.001$) response scores. The CAS scores were found to be moderately positively correlated with the FCV-19S scores ($r = 0.566$; $p < 0.001$). It was observed that the higher an individual's perceived stress level, the higher their anxiety level was (Table 5 and Table 6).

Table 4. Analyzing the scales according to the participants' characteristics

	Variable	FCV-19S	*p*-value	FCV-19S psycho-logical	*p*-value	FCV-19S emotional	*p*-value	CAS	*p*-value
Age [years][2]	23–30	18.59 ±5.34	0.180	8.78 ±3.05	0.388	9.81 ±2.74	0.097	2.07 ±2.93	0.152
	31–40	18.73 ±5.73		8.81 ±3.29		9.93 ±2.80		2.47 ±3.24	
	41–54	17.82 ±5.36		8.53 ±3.13		9.29 ±2.77		2.16 ±2.49	
	≥55	16.00 ±5.70		7.67 ±3.12		8.33 ±3.24		1.06 ±2.01	
Professional experience [years][2]	0–5	18.63 ±5.42	0.439	8.82 ±3.14	0.630	9.81 ±2.74	0.237	2.07 ±2.92	0.317
	6–10	18.71 ±5.45		8.75 ±3.07		9.95 ±2.77		2.52 ±3.23	
	11–14	18.28 ±5.59		8.52 ±3.12		9.75 ±2.81		2.13 ±3.39	
	≥15	17.79 ±5.59		8.53 ±3.20		9.27 ±2.90		2.05 ±3.21	
Average number of patients treated daily[2]	1–3	17.81 ±4.69	0.613	8.32 ±2.64	0.708	9.49 ±2.48	0.476	1.99 ±2.51	0.779
	4–6	18.48 ±5.45		8.76 ±3.05		9.72 ±2.75		2.20 ±2.90	
	7–10	18.79 ±5.23		8.77 ±3.15		10.02 ±2.52		2.27 ±3.42	
	≥11	18.49 ±5.82		8.80 ±3.29		9.69 ±3.02		2.14 ±3.14	
Specialty[2]	general dentistry	18.51 ±5.82[abc]	0.019*	8.92 ±3.27[abc]	0.007*	9.59 ±2.97[ab]	0.026*	2.42 ±3.28[ab]	0.012*
	restorative dentistry	18.73 ±6.06[ab]		8.86 ±3.50[abc]		9.86 ±2.95[ab]		2.39 ±3.38[ab]	
	orthodontics	18.57 ±3.96[bc]		8.67 ±1.99[ab]		9.90 ±2.43[ab]		1.48 ±2.11[bc]	
	endodontics	19.60 ±5.42[a]		9.21 ±3.17[a]		10.39 ±2.52[a]		3.05 ±3.56[a]	
	oral surgery	17.00 ±4.11[bc]		7.35 ±2.49[d]		9.65 ±2.17[ab]		1.45 ±2.14[c]	
	pediatric dentistry	19.30 ±4.21[a]		8.93 ±2.54[a]		10.37 ±2.36[a]		1.70 ±2.72[c]	
	prosthodontics	17.21 ±5.57[bc]		7.92 ±3.32[cd]		9.30 ±2.88[ab]		1.62 ±3.27[c]	
	periodontology	16.83 ±6.44[c]		8.07 ±3.60[bcd]		8.76 ±3.10[b]		2.13 ±2.95[bc]	
	oral diagnostics and radiology	19.52 ±5.08[a]		8.94 ±3.30[ab]		10.58 ±2.21[a]		1.76 ±1.95[abc]	
Marital status[1]	single	18.56 ±5.43	0.498	8.76 ±3.11	0.676	9.80 ±2.74	0.626	2.20 ±3.13	0.951
	married	18.41 ±5.51		8.71 ±3.14		9.70 ±2.83		2.13 ±3.03	
Systemic disease[1]	yes	20.65 ±5.83	<0.001*	10.07 ±3.40	<0.001*	10.58 ±2.86	0.002*	3.23 ±4.11	0.008*
	no	18.20 ±5.36		8.56 ±3.05		9.64 ±2.76		2.03 ±2.89	
Participant living[1]	alone	18.51 ±5.42	0.836	8.75 ±3.09	0.630	9.76 ±2.70	0.984	2.01 ±2.98	0.191
	with a family	18.71 ±5.46		8.90 ±3.20		9.82 ±2.77		2.48 ±3.58	
	with a partner	18.35 ±5.47		8.62 ±3.09		9.73 ±2.82		2.07 ±2.86	
	with a friend/friends	18.75 ±6.32		9.29 ±3.67		9.46 ±3.18		3.21 ±3.60	
Smoking/Alcohol consumption[1]	smoking	17.81 ±5.46	0.038*	8.39 ±3.07	0.056	9.42 ±2.89	0.083	2.19 ±3.35	0.314
	alcohol consumption	18.25 ±5.57	0.427	8.62 ±3.27	0.352	9.63 ±2.76	0.463	2.56 ±3.25	0.013*
	none	18.64 ±5.55	0.206	8.82 ±3.16	0.251	9.82 ±2.81	0.284	2.06 ±2.97	0.335
Family member aged ≥65 years and/or with a chronic disease[1]	≥65 years of age	18.31 ±5.56	0.339	8.66 ±3.17	0.398	9.65 ±2.87	0.321	2.19 ±3.03	0.525
	a chronic disease	18.74 ±5.55	0.064	8.88 ±3.15	0.039*	9.85 ±2.84	0.092	2.32 ±3.18	0.036*
	both	18.39 ±5.66	0.594	8.71 ±3.21	0.617	9.68 ±2.92	0.695	2.22 ±3.08	0.622

Data presented as *M ±SD*. Different letters in superscript show differences in the mean rank; * statistically significant ([1] Mann–Whitney *U* test; [2] Kruskal–Wallis test).

Table 5. Factor analysis and the measures of internal consistency reliability of the Fear of COVID-19 Scale (FCV-19S)

Item	Descriptive statistics		Factor loading	Corrected item–total correlation r-value p-value	Inter-item correlations r-value p-value							Variance
	M ±SD	Me			1	2	3	4	5	6	7	
1. I am most afraid of COVID-19.	3.31 ±1.03	3	0.768	0.774 <0.001*	1.000	0.606 <0.001*	0.494 <0.001*	0.566 <0.001*	0.566 <0.001*	0.443 <0.001*	0.471 <0.001*	57.677
2. It makes me uncomfortable to think about COVID-19.	3.57 ±1.08	4	0.754	0.757 <0.001*	0.606 <0.001	1.000	0.432 <0.001*	0.496 <0.001*	0.648 <0.001*	0.397 <0.001*	0.440 <0.001*	13.197
3. My hands become clammy when I think about COVID-19.	1.91 ±0.93	2	0.745	0.732 <0.001*	0.494 <0.001*	0.432 <0.001*	1.000	0.509 <0.001*	0.466 <0.001*	0.562 <0.001*	0.570 <0.001*	7.807
4. I am afraid of losing my life because of COVID-19.	2.86 ±1.20	3	0.757	0.773 <0.001*	0.566 <0.001*	0.496 <0.001*	0.509 <0.001*	1.000	0.476 <0.001*	0.459 <0.001*	0.515 <0.001*	6.551
5. When watching news and stories about COVID-19 on social media, I become nervous or anxious.	3.18 ±1.10	3	0.766	0.771 <0.001*	0.556 <0.001*	0.648 <0.001*	0.466 <0.001*	0.476 <0.001*	1.000	0.416 <0.001*	0.507 <0.001*	5.797
6. I cannot sleep because I'm worrying about getting COVID-19.	1.67 ±0.82	2	0.738	0.706 <0.001*	0.443 <0.001*	0.397 <0.001*	0.562 <0.001*	0.459 <0.001*	0.416 <0.001*	1.000	0.709 <0.001*	4.840
7. My heart races or palpitates when I think about getting COVID-19.	1.97 ±1.03	2	0.787	0.772 <0.001*	0.471 <0.001*	0.440 <0.001*	0.570 <0.001*	0.515 0.507	0.507 <0.001*	0.709 <0.001*	1.000	4.131
Total FCV-19S	18.48 ±5.47	18	AVE	–	–	–	–	–	–	–	–	–
Cronbach's α	0.875		CR	–	–	–	–	–	–	–	–	–

Me – median; AVE – average variance extracted; CR – composite reliability; * statistically significant (p < 0.001).

Table 6. Factor analysis and the measures of internal consistency reliability of the Coronavirus Anxiety Scale (CAS)

Item	Descriptive statistics		Factor loading	Corrected item–total correlation r-value p-value	Inter-item correlations r-value p-value					Variance
	M ±SD	Me			1	2	3	4	5	
1. I felt dizzy, lightheaded or faint when I read or listened to news about the coronavirus.	0.35 ±0.73	0	0.779	0.665 <0.001*	1.000	0.530 <0.001*	0.550 <0.001*	0.398 <0.001*	0.480 <0.001*	63.488
2. I had trouble falling or staying asleep, because I was thinking about the coronavirus.	0.59 ±0.86	0	0.818	0.832 <0.001*	0.530 <0.001	1.000	0.466 <0.001*	0.536 <0.001*	0.555 <0.001*	11.876
3. I felt paralyzed or frozen when I thought about or was exposed to information about the coronavirus.	0.22 ±0.61	0	0.789	0.575 <0.001*	0.550 <0.001*	0.466 <0.001*	1.000	0.436 <0.001*	0.457 <0.001*	9.229
4. I lost interest in eating when I thought about or was exposed to information about the coronavirus.	0.49 ±0.85	0	0.798	0.773 <0.001*	0.398 <0.001*	0.536 <0.001*	0.436 <0.001*	1.000	0.607 <0.001*	8.289
5. I felt nauseous or had stomach problems when I thought about or was exposed to information about the coronavirus.	3.18 ±1.10	0	0.800	0.778 <0.001*	0.480 <0.001*	0.555 <0.001*	0.457 <0.001*	0.607 <0.001*	1.000	7.118
Total CAS	2.17 ±3.08	0	AVE	–	–	–	–	–	–	–
Cronbach's α	0.852		CR	–	–	–	–	–	–	–

* statistically significant (p < 0.001).

Discussion

The present study was conducted from October 16 to October 23, 2020, when the number of COVID-19 cases was increasing around the world during the 2nd wave of the pandemic. On October 16, 2020, when we started the survey, 343,955 people had tested positive for COVID-19 in Turkey; 1,812 of them were novel cases. Up to that day, the total number of deaths had been reported to be 9,153.[3] According to the WHO, as of October 16, 2020, more than 30 million confirmed cases and more than 1 million deaths worldwide had been reported.[2] At the end

of the survey on October 23, 2020, there were 357,693 confirmed cases, 2,165 of them novel, and 9,658 people had died in Turkey.[3] However, this data does not reflect the true prevalence of COVID-19, since COVID-19 tests are performed on people with symptoms. Thus, efforts to diagnose the majority of those who have mild symptoms or are asymptomatic have failed.

Dental professionals are at the front line in the fight against the pandemic, and are vulnerable to debilitating fear and anxiety. Many published studies found high levels of psychological distress among dental professionals.[17,23,32] In order to understand the psychological effects of COVID-19, the fear and anxiety levels in individuals must be measured using psychometric tools. The first documented psychopathology-related tests for COVID-19 are FCV-19S and CAS.[21] The FCV-19S and CAS scores in our study were lower as compared to some other similar studies,[21,22,24,26,28,29,35,37] but higher than those reported in others.[27,30] The discrepancies among these studies may be caused by differences in culture, the age of participants, the study design, the population, and the time of data collection.

Female participants had higher FCV-19 and CAS scores than male participants in this study. This may be due to the imbalance in the sample's gender composition (the scarcity of male participants) or the gender differences in sensitivity to stress, which was also identified in recent studies.[23,27,28,31,38] Conversely, there are also studies showing that gender does not affect the fear levels.[22,33,39]

Although aging increases the risk of COVID-19 infection and the mortality rate,[40] our findings show that the FCV-19S scores were higher in the younger age groups (23–30 years and 31–40 years) than in older individuals; however, age was not significantly associated with the FCV-19S or CAS scores ($p > 0.05$). This result is consistent with those of previous studies with regard to age differences.[30,41] Older dental professionals with more professional experience are thought to have lower FCV-19S and CAS scores due to their better stress management, as they have experienced many similar situations throughout their lives. In a previous study, dentists who were older were more likely to think about retiring early and changing their career away from dentistry.[42] Consequently, there were conflicting results regarding differences in the levels of fear of COVID-19 between older and younger individuals.[43]

In this study group, the percentages of general dentists and specialists were similar. The levels of fear and anxiety differed according to professional areas. The lowest FCV-19S scores were observed in periodontists, followed by oral surgeons, prosthodontists, and orthodontists. However, differences in the number of male and female specialists working in their professional areas may have affected the scores. The long duration of treatment and thoughts of exposure to a greater viral load may have caused higher FCV-19S scores in pedodontists and endodontists. In addition, higher scores in oral diagnostics and

radiology specialists may be due to large numbers of patients they attend and to a wide age range of patients. The age-related risk factors may influence the anxiety levels of radiologists due to the fact that this department includes patients from all age groups.

In this study, the number of patients treated daily had no effect on dentists' stress levels. However, reducing the number of patients treated daily and increasing the chair time between two patients can be helpful in preventing cross-infection, as there is time to disinfect contaminated areas.[44] While 70.4% of the dentists who treated ≥7 patients daily worked in public hospitals, no difference was found between institutions in terms of FCV-19S scores ($p > 0.05$). It is thought that continuing education while working in university hospitals may cause mental fatigue, and that treating more patients daily in public hospitals may increase physical fatigue in dentists. The fact that dentists working in public hospitals are more open to external stimuli may have contributed to their statistically significantly higher CAS scores ($p < 0.05$).

Although it is thought that being married and living with a family may influence dentists' stress levels due to their concern not only for themselves, but also for the health of the individuals with whom they live, in our study, which had an almost equal representation of single and married individuals, these factors had no effects on the FCV-19S and CAS scores. In a previous study, single people were found to have a higher level of fear of COVID-19 than married people.[45] The lack of social support may be associated with high levels of fear of COVID-19.

Given the important role of the body's immune system, people who have chronic medical conditions are at higher risk of becoming infected with SARS-CoV-2 and being hospitalized due to COVID-19.[33] Thus, it was not surprising to find higher FCV-19S and CAS scores in dentists who cope with systemic illnesses than in healthy participants in this study. There are also studies showing that systemic illnesses are associated with increased levels of distress.[25,31] Having asthma, diabetes, cardiovascular disease symptoms, and more than one disease increased experiencing mild to extremely severe levels of stress in comparison with healthy individuals.[46] The disruption of the healthcare systems during the pandemic may contribute to increased anxiety and depression scores. Among individuals diagnosed with COVID-19, the anxiety prevalence was reported to be 47% (34–61%).[23] In this study, since almost all of the dentists diagnosed with COVID-19 were under the age of 40, no statistically significant relationship was observed between a COVID-19 diagnosis and the FCV-19S scores. However, in people with a diagnosis of COVID-19, the news in various media informing of a possible increase in future health problems may cause higher CAS scores.[32] In our study, no effect of having a relative being diagnosed with COVID-19 on the FCV-19 and CAS scores was observed; however, in similar studies, the anxiety levels were found to be higher

in people with at least one family member, relative or friend with a COVID-19 diagnosis.[25,31,32,37]

In our study, lower FCV-19S scores were observed in dentists who had a role in filiation teams. This result is thought to be due to the fact that dentists mainly worked in the field in the early stages of the COVID-19 pandemic, while most of them worked on the patient-tracking system during our survey period. However, it has been reported that healthcare workers can have increased stress levels due to their working outside the hospital conditions, to which they are accustomed.[47] Avoiding being in crowded areas, following the social distancing rules and minimizing social contact can slow the spread of SARS-CoV-2. However, 73.4% of the dentists participating in our study stated that they could not always apply these rules in their working and resting areas, and in this group, a thought of an increased risk of being infected with SARS-CoV-2 may have caused increased FCV-19S and CAS scores.

In this study, the fact that most of the dentists received news about COVID-19 via social media caused an increase in the levels of fear. The WHO has emphasized that people should minimize their exposure to news about COVID-19, obtain information only from reliable sources and only during certain hours, as spending a longer time watching COVID-19-related news is one of the important risk factors for distress.[23,48] This is in agreement with our finding that the FCV-19S and CAS scores were lower in dentists who did not follow information about COVID-19. The increasing anxiety related to the uncertainty regarding the COVID-19 pandemic among dental professionals is directly associated with misinformation about COVID-19, COVID-19's rapid transmission rate, and its morbidity and mortality rates. The FCV-19S and CAS scores increased significantly depending on the anxiety levels experienced due to uncertainty ($p < 0.05$).

During the pandemic, the WHO and the U.S. Centers for Disease Control and Prevention (CDC) prepared various recommendations to healthcare professionals on the management of stress, anxiety and uncertainty. In addition, the WHO offered psychological support to healthcare professionals in order to reduce the spread of COVID-19 among healthcare professionals. The CDC advice to healthcare professionals includes maintaining an adequate sleep and nutrition program, physical exercise, relaxation techniques, such as breathing exercises and meditation, taking a break from watching and reading news about the pandemic (especially on social media), and allocating time for hobbies outside of work.[49] However, due to the excessive workload of healthcare professionals, the application of these recommendations is quite limited.

Limitations and strengths

There are some limitations to the present study. First, since the fear and anxiety levels in the dental professionals participating in this study from the period prior to the pandemic are not known, an increase in these levels is unknown. Second, since this is a cross-sectional study, our findings reflect only a certain period of the pandemic. Third, during the data collection period, there were several online surveys related to COVID-19. Fourth, only scales related to COVID-19 were included, as it was thought that participants might be reluctant to participate in a longer questionnaire.

Notwithstanding these limitations, there are several strengths that distinguish our study from others. First, this study provides valuable data regarding the psychological effects of COVID-19 on Turkish dental professionals that were obtained using FCV-19S and CAS. Second, both the bifactor and two-factor models of FCV-19S were used. Third, the study participants were dentists who must have worked within severe restrictions in state institutions due to the pandemic.

Conclusions

In our study, which used scales specific for COVID-19, the fear and anxiety levels in dental professionals during the pandemic were found to be high. The continuing uncertainty, along with the prolonged period of the pandemic, cause these levels to increase. Healthcare professionals who are at risk, and therefore feel anxious, may find it difficult to provide adequate and quality service to all patients. It may be beneficial to enhance some programs, such as Mental Health Support System (RUHSAD), an online therapy outlet developed during the pandemic period, in order to provide psychological support to healthcare professionals.

In addition, providing the necessary conditions for healthcare workers as mandated by the state, complying with the rules required during the pandemic, and providing support to reduce the overload of healthcare professionals in the community would be beneficial in reducing the fear and anxiety levels.

Ethics approval and consent to participate

The ethical approval was provided by the Research Ethics Committee at the Faculty of Medicine of the Suleyman Demirel University, Isparta, Turkey (2020/355). All participants provided informed written consent prior to the investigations.

Data availability

All data analyzed during this study is included in this published article.

Consent for publication

Not applicable.

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