ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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State-Trait Anxiety Levels, Dental Anxiety Levels and Vaccine Hesitancy in a Group of Turkish Dental Patients During COVID-19 Pandemic in Söke Region: Analytical Survey

Söke Bölgesi'nde COVID-19 Pandemi Sürecinde Diş Hekimine Başvuran Bir Grup Türk Hastada Durumluk-Sürekli Anksiyete Seviyelerinin, Dental Anksiyete Seviyelerinin ve Aşıya Karşı Tutumlarının Belirlenmesi: Analitik Araştırma

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ABSTRACT Objective: A new disease called coronavirus disease-2019 (COVID-19), was discovered in the city of Wuhan in China and has quickly reached many countries. During this period, mental health of people was affected negatively. This study aimed to evaluate the anxiety levels of dental patients during the COVID-19 pandemic, determine the reasons for admission to the dental center, and to investigate the rate of COVID-19 vaccine hesitancy. **Material and Methods:** A questionnaire consisting of the stated topics and demographic data was completed by the patients. State-Trait Anxiety Inventory (STAI) scales were used to determine anxiety levels and the Corah-Dental Anxiety Scale (DAS) was also used to assess dental anxiety. **Results:** The DAS scores showed that patients had low levels of dental anxiety, while STAI-State and STAI-Trait scores showed that most patients were moderately anxious. Gender, age, marital status, education, and location of residence were associated with higher DAS and/or STAI scores. Vaccine hesitancy was reported in 28.31% of patients. Side effects and the unknown long-term effects of the COVID-19 vaccine were given as major reasons for vaccine hesitancy (34.13%). **Conclusion:** Our results reveal that there was a concerning level of anxiety and vaccine hesitancy in a group of Turkish dental patients during COVID-19 pandemic in Soke Region.

Keywords: Coronavirus; anxiety; stress; psychological; dental anxiety

ÖZET Amaç: Çin'in Wuhan şehrinde 2019 yılında koronavirüs hastalığı-2019 [coronavirus disease-2019 (COVID-19)] adı verilen yeni bir hastalık keşfedildi ve hızla birçok ülkeye ulaştı. Bu dönemde insanların ruh sağlığı olumsuz etkilendi. Bu çalışmanın amacı, diş hekimine gelen hastaların COVID-19 pandemisi sırasındaki anksiyete düzeylerini değerlendirmek, diş merkezine başvuru nedenlerini belirlemek ve COVID-19 aşı tereddüt oranlarını araştırmaktır. **Gereç ve Yöntemler:** Hastalara, belirtilen konular ve demografik verilerden oluşan anket formu doldurduldu. Anksiyete düzeylerini belirlemek için Durumluk-Sürekli Kaygı Envanteri [State-Trait Anxiety Inventory (STAI)] skalası ve dental anksiyeteyi değerlendirmek için de Corah-Dental Anksiyete Skalası (DAS) kullanıldı. **Bulgular:** DAS skorları, hastaların düşük düzeyde dental anksiyeteye sahip olduğunu gösterirken; STAI-S ve STAI-T skorları, çoğu hastanın orta derecede anksiyeteye sahip olduğunu gösterdi. Cinsiyet, yaş, medeni durum, eğitim ve ikamet yeri daha yüksek DAS ve/veya STAI puanları ile ilişkilendirildi. Hastaların %28,31'inde aşı tereddüdü bildirildi. COVID-19 aşısının yan etkileri ve bilinmeyen uzun vadeli etkileri, aşı tereddüdünün ana nedenleri olarak gösterildi (%34,13). **Sonuç:** Sonuçlarımız COVID-19 pandemisi sırasında Söke Bölgesi'nde diş hekimine başvuran bir grup Türk hastada, anksiyete ve aşı tereddüdü olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Koronavirüs; endişe; stres; psikolojik; diş kaygısı

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The outbreak of coronavirus disease 2019 (COVID-19), which was first detected in the Asian continent in December 2019 and eventually became a worldwide pandemic, has created numerous challenges in healthcare industries not directly related to the management of infectious diseases, including dentistry.[1-3] As dentists are medical professionals at higher risk of contamination and spread of disease, in line with the World Health Organization (WHO) recommendations during this period, most dental clinics have significantly reduced their activities, delayed elective dental treatments and largely only performed emergency treatments.[4] The fear of COVID-19, as a novel, rapidly-spreading virus, has made people more reluctant to enter public areas, including medical and dental hospitals.[5]

Traumatic events can reduce people's sense of security and remind them of the reality of death. Unknowns about when the pandemic will end and the availability of effective COVID-19 treatments, as well as decreased social interaction due to stay-at-home recommendations, can all have a severe negative effect on people's mental health.[6] People are more likely to experience anxiety, depression, fear, and stress during the COVID-19 pandemic.[7]

The development of the COVID-19 vaccine has been a beacon of hope for us to return to our old lives. However, the success of a vaccination program depends on high levels of vaccine acceptance.[8] For a considerable period of time before the emergence of COVID-19, vaccine hesitancy and rejection was on the rise.[9] In 2019, WHO stated that vaccine hesitancy is one of the biggest threats to global health.[10] Studies have been performed to determine the factors affecting COVID-19 vaccine acceptance. These studies reported a significant association between age, gender, income level and COVID-19 vaccine intention.[6,11,12] However, vaccine hesitancy in these studies was evaluated by asking questions about a hypothetical vaccine, as no vaccine was available when these studies were carried out.

The first aim of this study was to assess the anxiety levels of patients who were admitted to the dental center during the COVID-19 pandemic, to correlate anxiety levels with demographic data, and to determine the reasons for the patients' admittance to the dental center. The 2nd aim of the study was to assess the rate of COVID-19 vaccine hesitancy in patients who were admitted to the dental center, to associate it with demographic data and to determine the reasons for hesitancy.

MATERIAL AND METHODS

This study was approved by the Ministry of Health, the Republic of Turkey (No: 2021-04-01T14_38_19). Ethical approval was received from the Ethical Research Committee of the Giresun University (No: KAEK-09, March 4, 2021). This research was performed under the principles of the Declaration of Helsinki.

In order to determine the sample size, G*Power 3.1.9.2 software (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) was used based on a previous study using the following parameters: 85% power and 0.25 effect size.[13] The calculation showed that at least 445 people should be included in the study. The study was conducted on patients who were admitted to the Söke Dental Center between April 2021 and June 2021. All patients were adults, and each patient signed an informed consent form. Patients who stated that they received psychiatric treatment were excluded from the study. Patients who volunteered to participate in the study and completed all questions properly were included in the study.

The survey consisted of 3 main sections. The first section included questions to determine the patients' gender, age, marital status, education, household income, location of residence, the main reason for admittance to the dental center (out of 12 possible answers), and whether the patients were considering vaccination against COVID-19. Vaccine-hesitant patients were asked to select their main reason for vaccine hesitancy from one of 7 possible answers (Figure 1).[11] The final 2 sections consisted of Dental Anxiety Scale (DAS) and State-Trait Anxiety Inventory (STAI) Scales (Table 1, Table 2a, Table 2b).

The Corah-DAS Scale was used to assess dental anxiety. The DAS consisted of 4 specific questions, each determining how the subject would feel in a particular dental situation. Each question had 5 possible responses, ranging from 1 to 5. Therefore, the total

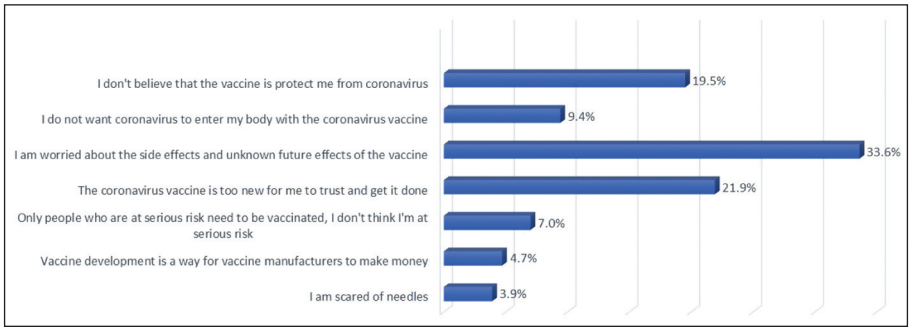

FIGURE 1: Reasons for vaccine hesitancy.

TABLE 1: Corah's Dental Anxiety Scale.

1. If you had to go to dentist tomorrow, how would you feel about it?
a. I would look forward to it as a reasonably enjoyable experience.
b. I wouldn't care one way or the other.
c. I would be a little uneasy about it.
d. I would be afraid that it would be unpleasant and painful.
e. I would be very frightened of what the dentist might do.
2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?
a. Relaxed.
b. A little uneasy.
c. Tense.
d. Anxious.
e. So anxious that I sometimes break out in a sweat or almost feel physically sick.
3. When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?
a. Relaxed.
b. A little uneasy.
c. Tense.
d. Anxious.
e. So anxious that I sometimes break out in a sweat or almost feel physically sick.
4. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?
a. Relaxed.
b. A little uneasy.
c. Tense.
d. Anxious.
e. So ancious that I sometimes break out in a sweat or almost feel physically sick.

scores range from 4 to 20. An individual was considered as anxious if total score was ≥13 and highly anxious if it was ≥15.[14]

STAI was developed by Spielberger and is used to assess anxiety.[15] STAI consists of 2 sub-scales, STAI-State (STAI-S) and STAI-Trait (STAI-T). STAI-S is used to assess anxiety at a particular time and STAI-T is used to assess the underlying anxiety level. The 2 scales consist of 20 different statements, each of which is scored 1-4. The total scores range from 20 to 80. A total of 20-37 points indicated little or no anxiety, a total of 38-44 points indicated moderate anxiety, and a total of 45-80 points indicated extreme anxiety.[16]

TABLE 2a: Spielberger State Anxiety Inventory (STAI-I).

		Not at all	Somewhat	Moderately so	Very much so
1	I feel calm	1	2	3	4
2	I feel secure	1	2	3	4
3	I am tense	1	2	3	4
4	I feel strained	1	2	3	4
5	I feel at ease	1	2	3	4
6	I feel upset	1	2	3	4
7	I am presently worrying over possible misfortunes	1	2	3	4
8	I feel satisfied	1	2	3	4
9	I feel frightened	1	2	3	4
10	I feel comfortable	1	2	3	4
11	I feel self-confited	1	2	3	4
12	I feel nervous	1	2	3	4
13	I am jittery	1	2	3	4
14	I feel indecisive	1	2	3	4
15	I am relaxed	1	2	3	4
16	I feel content	1	2	3	4
17	I am worried	1	2	3	4
18	I feel confused	1	2	3	4
19	I feel confused	1	2	3	4
20	I feel pleasant	1	2	3	4

TABLE 2b: Spielberger Trait Anxiety Inventory (STAI-II).

		Almost never	Sometimes	Often	Almost always
21	I feel pleasant	1	2	3	4
22	I feel nervous and restless	1	2	3	4
23	I feel satisfied with myself	1	2	3	4
24	I wish I could be as happy as others seem to be	1	2	3	4
25	I feel like a failure	1	2	3	4
26	I feel rested	1	2	3	4
27	I am “calm, cool, and collected”	1	2	3	4
28	I feel that difficulties are piling up so that I can not overcome them	1	2	3	4
29	I worry too much over something that really doesn’t matter	1	2	3	4
20	I am happy	1	2	3	4
31	I have disturbing thoughts	1	2	3	4
32	I lack self-confidence	1	2	3	4
33	I feel secure	1	2	3	4
34	I make decisions easily	1	2	3	4
35	I feek inadequate	1	2	3	4
36	I am content	1	2	3	4
37	Some unimportant thought runs through my mind and bothers	1	2	3	4
38	I take disappointments so keenly that I can’t pput them out of my mind	1	2	3	4
39	I am a steady person	1	2	3	4
40	I get in state of tension or turnoil as I think over my recent concerns and interests	1	2	3	4

STATISTICAL ANALYSIS

SigmaPlot 12.5 software (Systat Software Inc, San José, CA, USA) was used for statistical analysis. Descriptive statistics were used to examine the data obtained, and the chi-square test was used to examine the categorical data. The Shapiro-Wilk test was used

for testing normality. Differences between average anxiety parameters for 2 groups were evaluated using the t-test in parametric conditions and the Mann-Whitney U test in non-parametric conditions. The difference between the means of more than 2 groups was determined by one-way ANOVA and post-hoc Tukey's test in parametric conditions, and Kruskal-Wallis test and post-hoc Dunn test in nonparametric conditions. The Pearson correlation test was used to determine correlations. Statistical significance was considered at $p<0.05$.

TABLE 3: Reasons for application to the oral and dental health center.

Reasons	Number
Toothache	60
Tooth abscess	27
Dental caries	145
Gingival problems	54
Dental trauma	2
Prosthetic restoration	44
Impacted third molar	57
Orthodontic treatment	10
Dental bleaching	16
Temporomandibular joint disorders	16
Halitozis	8
Other	6
Total	445

RESULTS

A total of 445 patients were included in the study. The main reasons given for patients' visits were dental caries (145/445), toothache (60/445), impacted 3rd molar (57/445) and gingival problems (54/445) (Table 3). The frequency distribution of variables and the comparison with DAS, STAI-S and STAI-T are shown in Table 4. The mean DAS score was 9.43±3.33, and women had significantly higher

TABLE 4: Frequency distribution of variables and the comparison with DAS, STAI-S and STAI-T.

	n (%)	DAS		STAI-S		STAI-T	
Variables		Mean±SD	p value	Mean±SD	p value	Mean±SD	p value
Sex			0.005*		0.009*		0.738
Female	229 (51.5)	9.89±3.44		44.07±11.23		41.92±6.97	
Male	216 (48.5)	8.94±3.15		41.37±10.26		42.07±8.39	
Age			0.590		0.230		0.028*
18-39	239 (53.7)	9.49±3.34		42.32±11.29		41.47±8.24	
40-80	206 (46.3)	9.36±3.33		43.27±10.29		42.60±7.06	
Marital status			0.875		0.020*		0.220
Married	275 (61.8)	9.42±3.32		43.7±10.26		42.35±7.44	
Never married/divorced/widowed	170 (38.2)	9.46±3.37		41.24±11.59		41.42±8.16	
Education			0.047*		0.564		0.002*
Below high school	42 (9.4)	8.26±3.13		42.59±9.54		44.66±7.08	
High school	101 (22.7)	9.77±3.67		41.46±11.27		42.77±8.43	
University	239 (53.7)	9.63±3.24		43.16±10.79		41.93±7.5	
Postgraduate or above	63 (14.2)	8.92±3.07		43.44±11.24		39.21±7.07	
Monthly household income			0.839		0.053		0.181
<250 €	84 (18.9)	9.18±3.52		41.21±9.82		42.32±7.22	
250-500 €	139 (31.2)	9.48±3.26		41.68±11.44		42.99± 8.41	
500-750 €	126 (28.3)	9.69±3.32		43.3±10.52		41.37±7.57	
750-1,000 €	47 (10.6)	9.34±3.35		46.81±9.32		41.96±7.86	
>1,000 €	49 (11.0)	9.18±3.29		43.18±12.19		40.25±6.58	
Living location			0.830		0.039*		0.145
City	409 (91.9)	9.46±3.36		43.06±10.92		42.14±7.71	
Town	36 (8.1)	9.17±3.07		39.33±9.32		40.39±7.89	

DAS: Dental Anxiety Scale; STAI-S: State-Trait Anxiety Inventory-State; STAI-T: State-Trait Anxiety Inventory-Trait; SD: Standard deviation; *p<0.05.

scores than men (p=0.005). There was a significant difference between DAS and the level of education (p=0.047). Patients with high school degrees had significantly higher scores compared to those who did not (p=0.027).

The mean STAI-S score was 42.76±10.84. Women, married patients, and patients living in the city had significantly higher STAI-S scores (p=0.009, p=0.020 and p=0.039, respectively). The mean STAI-T score was 41.99±7.73. There was a significant difference between STAI-T and the level of education (p=0.002). Patients without high school degrees had significantly higher scores than those who had postgraduate degrees or above (p=0.003). There was a statistically significant association between age and STAI-T, with older patients exhibiting higher levels of anxiety (p=0.028). DAS, STAI-S and STAI-T were significantly positively correlated with each other (p<0.01). Of the patients, 28.31% were unsure about being vaccinated for COVID-19 and 126 patients stated that they did not want to be vaccinated. Vaccine hesitancy for COVID-19 was significantly associated with all variances (Table 5). Vaccine hesitancy scores were significantly higher among women, younger patients, unmarried, divorced or widowed patients, patients with lower education and incomes, and patients living in towns (p<0.05). Of patients, 33.6% stated that the main reason for vaccine hesitancy was the side effects and unknown future effects of a COVID-19 vaccine. The least marked reason for vaccine hesitancy was fear of needles, with only 3.9% of patients choosing this option (Figure 1). There was no statistically signif-

TABLE 5: The distribution of variables and the comparison with vaccine hesitancy.

			Have you been vaccinated or are you considering being vaccinated?		
		Total sample n (%)	Yes n (%)	No n (%)	p value
Sex					0.042*
	Female	229 (51.5)	154 (67.3)	75 (32.7)	
	Male	216 (48.5)	165 (76.4)	51 (23.6)	
Age					<0.001*
	18-39	239 (53.7)	146 (61.1)	93 (38.9)	
	40-80	206 (46.3)	173 (84.0)	33 (16.0)	
Marital status				0.043*	
	Married	275 (61.8)	207 (75.3)	68 (24.7)	
	Never married/divorced/widowed	170 (38.2)	112 (65.9)	58 (34.1)	
Education					0.006*
	Below high school	42 (9.4)	26 (61.9)	16 (38.1)	
	High school	101 (22.7)	65 (64.4)	36 (35.6)	
	University	239 (53.7)	173 (72.4)	66 (27.6)	
	Postgraduate or above	63 (14.2)	55 (87.3)	8 (12.7)	
Monthly household income					<0.001*
	<250 €	84 (18.9)	42 (50.0)	42 (50.0)	
	250-500 €	139 (31.2)	95 (68.4)	44 (31.6)	
	500-750 €	126 (28.3)	101 (80.2)	25 (19.8)	
	750-1,000 €	47 (10.6)	41 (87.2)	6 (12.8)	
	>1,000 €	49 (11.0)	40 (81.6)	9 (18.4)	
Living location					<0.001*
	City	409 (91.9)	304 (74.3)	105 (25.7)	
	Town	36 (8.1)	15 (41.7)	21 (58.3)	
*p<0.05.					

*p<0.05.

icant relationship between DAS, STAI-S, STAI-T and vaccine hesitancy ($p>0.05$). Patients who applied to the clinic due to halitosis, vaccine acceptance percent was highest among the group (87.5%). Patients who applied to the clinic due to dental trauma and other reasons, vaccine hesitancy percent was highest among their groups (50%).

DISCUSSION

In this study, the anxiety levels of patients who were admitted to the dental center during the COVID-19 pandemic, the reasons for admittance to the dental center, the rate of COVID-19 vaccine hesitancy, and the reasons for vaccine hesitancy were evaluated.

In this study, the anxiety levels of patients were evaluated using DAS and STAI scales. The mean DAS scores are lower than 13 which is similar to previous studies. But it is slightly higher than pre-COVID-19 studies.[17,18] STAI-S and STAI-T scores showed that most patients were moderately anxious. In studies that examined anxiety and depression during the COVID-19 pandemic, it was reported that higher levels of anxiety were detected in women.[6,18] Consistent with previous studies, women had significantly higher DAS and STAI-S scores than men in this study. These results could be partly explained by research that suggests that women are more affected by negative emotional states than men.[19] The difference in dental anxiety according to gender may be due to reported differences in pain thresholds between men and women.[20]

In the present study, there was a significant association between anxiety and age according to STAI-T scores. Similar to our survey, Hyland et al. reported that participants aged 65 and older had the highest levels of anxiety compared to other age groups.[18] In light of the knowledge that older age groups are more vulnerable to COVID-19-related deaths, it is perhaps not unexpected that anxiety is higher in this demographic.[21]

In this study, we have demonstrated that patients living in towns had higher STAI-S scores than patients living in the city. Other studies have shown that anxiety levels were higher in people living in cities or urban areas, similar to our study.[22,23] Considering that viruses can be transmitted more easily in urban areas with high human population densities, it is perhaps to be expected that people living in the city center have higher levels of anxiety.[6] In addition, it has been reported that people living in urban areas could be anxious because of school closures, business interruptions, and social distancing.[22]

Many dental procedures generate aerosols and droplets, which are often contaminated with bacteria, viruses and blood, and can thus spread infection in the clinic.[24] Therefore, it has been recommended that only emergency procedures are performed during the COVID-19 pandemic.[4] A study conducted in the early phase of the pandemic found that the proportion of patients admitted to the dental service for emergency treatment was high.[5] In this study, a total of 89 (20%) patients were admitted to the dental center with toothache, abscess and trauma complaints. As our survey was conducted after the first year of the pandemic, it is thought that the number of applications to dental clinics for non-urgent procedures has increased as people have now become more accustomed to living with the pandemic.

In this study, vaccine hesitancy was found to be 28.31%. In another study, vaccine hesitancy was found to be 31%.[25] Hesitancy or resistance to the COVID-19 vaccine was reported in 26.1% of adults in seven European countries and 33% in the United States.[26,27] In a systematic review, it was stated that the intention to get vaccinated was 60%.[28] These differences in vaccine hesitancy rates could be due to differences in the timing of studies, how questions were specifically phrased in the studies, and differences in social structure between countries.

In this study, we found that vaccine hesitancy was higher in women than in men. This finding is consistent with gender-related differences observed in other vaccine rejection and hesitancy studies.[25-28] These findings might be more generally explained by the observation that women are more likely to avoid risky behaviors, men's reportedly higher perception of the dangers of COVID-19 and lesser belief in conspiratorial claims about the virus.[29,30] Vaccine hesitancy in these individuals can perhaps be explained

by less awareness and acquisition of health information, and a lack of trust in healthcare professionals.[29] Similar to other studies conducted in the United Kingdom (UK), we found that younger patients were more likely to express vaccine hesitancy in this study.[11,25]

A study conducted in the UK found that the principal cause of vaccine hesitancy was concern over the unknown long-term effects of the COVID-19 vaccine, consistent with the findings from our study.[31]

One limitation of the present study is that, as all participants were selected from a single center, the results cannot be generalized to the wider population. For future research, we would recommend that studies should be conducted at different phases of the pandemic and extended to more centers with larger sample sizes.

CONCLUSION

These results show that patients with dental trauma and other complaints, vaccine hesitancy percent was highest among their groups. The results also indicate a level of anxiety and vaccine hesitancy during the COVID-19 pandemic. Additionally, it can be said that these findings may assist future campaigns targeting COVID-19 vaccine hesitancy. Health professionals should be careful to promote confidence in the vaccine and minimize misinformation. Considering the negative effect of the COVID-19 outbreak on mental health, crisis-focused psychological support programs for individuals should be established during the pandemic and professionals from all health disciplines, including dentists, should cooperate in this regard.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Pınar Naiboğlu;* ***Design:*** *Arif Yiğit Güler;* ***Control/Supervision:*** *Sevde Göksel;* ***Data Collection and/or Processing:*** *Arif Yiğit Güler;* ***Analysis and/or Interpretation:*** *Sevde Göksel;* ***Literature Review:*** *Pınar Naiboğlu;* ***Writing the Article:*** *Pınar Naiboğlu, Sevde Göksel;* ***Critical Review:*** *Arif Yiğit Güler.*

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