



Evaluation of anxiety levels among dentists working during the COVID-19 pandemic

Tunahan Döken,¹ Melike Bayram,¹ Emre Bayram,¹
 Hilal Ekmen,¹ Şeyma Nur Gerçekcioğlu¹

¹Department of Endodontics, Tokat Gaziosmanpaşa University Faculty of Dentistry, Tokat, Turkey

Purpose: To use the “state and trait anxiety scale” to examine the anxiety levels among dentists caring for patients during the coronavirus disease 19 (COVID-19) pandemic, and compare it to the levels observed in the pre-pandemic period.

Methods: This study included 500 dentists working during and before the COVID-19 pandemic, and participants were asked to complete a questionnaire form containing 40 questions using Google Forms. A score ranging between 1/–1 and 4/–4 was assigned to each question based on whether it was a positive or negative characteristic, and a constant of 50 was added to the total score. A higher anxiety score indicated an increase in the anxiety levels of the individual.

Results: A statistically significant difference in state-trait anxiety inventory scores was observed between men and women ($p < 0.001$). The state anxiety scale scores were seen to decrease with increasing age ($p < 0.001$). No statistically significant differences in trait anxiety scale scores were observed between institutions, although dentists working in public hospitals exhibited higher state anxiety scale scores ($p < 0.05$). Dentists with 1–4 years of experience had the highest trait anxiety scale scores, while those with ≥ 10 years of experience demonstrated lower state anxiety scale scores ($p < 0.05$).

Conclusion: The levels of anxiety among dentists were seen to increase after the COVID-19 pandemic.

Keywords: Anxiety level, COVID-19, dentist, pandemic.

Introduction

Coronavirus disease 19 (COVID-19), a respiratory infection caused by a new virus belonging to the coronavirus family (1), was first detected on December 31st, 2019 in Wuhan, Hubei province, China. In Turkey, the first case of COVID-19 was detected on March 10th, 2020, and the first associated death occurred on March 15th, 2020. By April 2020, COVID-19 had spread throughout Turkey, as declared by the Minister of Health, Fahrettin Koca. As of

April 2021, the ongoing pandemic has caused over 137 million infections and 2.9 million deaths globally, with the corresponding numbers in Turkey being 3.9 million infections and 34,000 deaths (2,3).

In an attempt to control the spread of COVID-19, various restrictive measures were implemented globally, and the consequent effects on normal life led to an increase in the incidence of psychological disorders such as anxiety, de-

Cite this article as: Döken T, Bayram M, Bayram E, Ekmen H, Gerçekcioğlu ŞN. Evaluation of anxiety levels among dentists working during the COVID-19 pandemic. Turk Endod J 2021;6:45-49.

Correspondence: Melike Bayram. Department of Endodontics, Tokat Gaziosmanpaşa University Faculty of Dentistry, Tokat, Turkey.

Tel: +90 356 – 212 42 22 e-mail: melikealaca@yahoo.com

Submitted: April 19, 2021 Accepted: June 28, 2021

©2021 Turkish Endodontic Society



pression, and post-traumatic stress disorder in the general population (4–8).

The primary route of transmission of COVID-19 is via droplets and aerosols, which are generated frequently during dental treatments. This puts dentists, patients, and staff at serious risk of contracting infection (9), resulting in both physical and psychological stress among healthcare professionals (10). A recent review evaluating the effects of the COVID-19 pandemic on medical personnel found increased incidence of depressive symptoms and anxiety among healthcare workers globally (11).

The “State and trait anxiety scale” developed by Spielberger et al. in 1970 is a Likert-type questionnaire scale that uses 20 questions to separately measure the levels of state and trait anxiety in individuals. The total score ranges between 20 and 80, with a higher score indicating greater levels of anxiety (12), and a 4-point scale ranging from “none” to “totally” is used to assess the final scores. The validity and reliability of this questionnaire in Turkey was first assessed by Öner in 1977, and the test was adapted to Turkish society by Öner and Le Compte in 1985 (13).

The aim of the current study was to use the “State and trait anxiety scale” to examine the levels of anxiety among dentists caring for patients during the COVID-19 pandemic, and to compare it to the levels observed in the pre-pandemic period. The hypothesis was that the COVID-19 pandemic would result in increased levels of anxiety among dentists.

Materials and Methods

This study was approved by the Tokat Gaziosmanpaşa University Clinical Research Ethics Committee (reference number: 21-KAEK-013). A power analysis was carried out using G Power 3.1.9.2, and a study sample of 500 individuals was considered sufficient for an effect size of 0.71, error level of 0.05, and study power of 95%.

The questionnaire survey was carried out between February 2021 and March 2021 using Google Forms, and 700 dentists who treated patients during and before the COVID-19 pandemic were included in the study. The response rate was 84% (n = 500), and the survey forms included 40 questions (Appendix 1). Positive scores (which increases the total anxiety score) were assigned for articles 3, 4, 6, 7, 9, 12, 13, 14, 17, and 18, while negative scores (which decreases the total anxiety score) were given for articles 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20. In the trait anxiety scale, questions 21, 26, 27, 30, 33, 36, and 39 include negative expressions. A score ranging between 1/–1 and 4/–4 was given for each question based on whether it was a positive or negative characteristic, and a constant of

50 was added to the total score. The final score ranged between 20 and 80, with a higher total anxiety score indicating greater levels of anxiety in the individual completing the questionnaire (14–16). A constant of 35 was added to the trait anxiety scores. The total score value obtained from both scales ranged between 20 and 80, with higher scores indicating greater anxiety (15). The data obtained were recorded as percentages using descriptive statistical methods in Microsoft Excel.

Statistical Method

The descriptive characteristics of the study groups were analyzed, and quantitative data were presented as mean \pm standard deviation. Differences between groups were analyzed using the independent samples t-test or Mann-Whitney U, and one way analysis of variance tests. A p-value <0.05 was considered to be statistically significant, and all analyses were carried out using a statistical software (IBM SPSS Statistics 19, SPSS inc., IBM, Somers, NY).

Results

The distribution of gender, age, and institutional and professional experience of the dentists participating in the study are shown in Table 1.

A significant difference in the trait anxiety scale and state anxiety scale scores was observed between males and females ($p < 0.001$; Table 2).

No significant differences in trait anxiety scale scores were observed between different age groups. With regard to the state anxiety scale scores, no statistically signifi-

Table 1. Descriptive characteristics of study sample (n = 500)

	n	%
Gender		
Male	131	26.2
Female	369	73.8
Age		
20–24	79	15.8
25–29	198	39.6
30–34	80	16.0
35–39	82	16.4
>40	61	12.2
Establishment		
Public hospital	180	36.0
Private clinic	133	26.6
University hospital	187	37.4
Experience		
1–4 years	256	51.2
5–9 years	73	14.6
>10 years	171	34.2

cant differences were observed between the 20–24 and 25–29 year age groups and the 35–39 and >40 year age groups. However, a significantly lower level of anxiety was observed in individuals aged 35–39 and >40 years compared to those aged 20–24 and 25–29 years. Individuals between the ages of 30 and 34 years exhibited anxiety scores similar to that exhibited by other groups ($p < 0.001$; Table 3).

No statistically significant differences in trait anxiety scale scores were observed between institutions. In contrast, evaluation of the state anxiety scale scores showed that dentists working in oral and dental health centers exhibited a significantly higher level of anxiety compared to those working in private clinics. Moreover, the anxiety levels of dentists working in the university hospital was found to be similar to that exhibited by dentists working in other establishments ($p < 0.05$; Table 4).

Table 2. Distribution of Anxiety Scale Scores by gender (n = 500)

	Gender		p
	Male (n = 131)	Female (n = 369)	
Trait Anxiety Scale Form Score	32.79 ± 2.66	34.01 ± 2.63	<0.001*
State Anxiety Scale Form Score	43.08 ± 9.72	50.11 ± 10.35	<0.001*

* $p < 0.05$ is considered significant.

Table 3. Distribution of Anxiety Scale Scores by age (n = 500)

	Age					p
	20–24 (n = 79)	25–29 (n = 198)	30–34 (n = 80)	35–39 (n = 82)	>40 (n = 61)	
Trait Anxiety Scale Form Score	33.99 ± 3.16	34.01 ± 2.61	33.18 ± 2.63	33.38 ± 2.68	33.36 ± 2.25	0.071
State Anxiety Scale Form Score	50.76 ± 9.99 ^(a)	49.49 ± 9.99 ^(a)	48.68 ± 10.97 ^(ab)	45.04 ± 9.94 ^(b)	44.9 ± 12.41 ^(b)	<0.001*

* $p < 0.05$ is considered significant. **Different letters indicate statistically significant differences.

Table 4. Distribution of Anxiety Scale Scores by establishment (n = 500)

	Establishment			p
	Public hospital (n = 180)	Private clinical (n = 133)	University hospital (n = 187)	
Trait Anxiety Scale Score	33.87 ± 2.59	33.58 ± 2.51	33.59 ± 2.92	0.518
State Anxiety Scale Score	49.81 ± 11.1 ^(a)	46.76 ± 11.34 ^(b)	47.86 ± 9.49 ^(ab)	0.034*

* $p < 0.05$ is considered significant. **Different letters in table indicate statistically significant differences.

Table 5. Distribution of Anxiety Scale Scores by experience (n = 500)

	Experience			p
	1–4 years (n = 256)	5–9 years (n = 73)	>10 years (n = 171)	
Trait Anxiety Scale Score	34.02 ± 2.76 ^(a)	33.26 ± 2.74 ^(ab)	33.37 ± 2.52 ^(b)	0.016*
State Anxiety Scale Score	49.61 ± 10.11 ^(a)	49.95 ± 10.65 ^(a)	45.55 ± 10.94 ^(b)	<0.001*

* $p < 0.05$ is considered significant. **Different letters in table indicate statistically significant differences.

Dentists with 1 to 4 years of experience exhibited significantly higher trait anxiety scale scores compared to those with 10 or more years of experience, while those with 5–9 years of experience exhibited scores similar to the other groups. Dentists with 1–4 and 5–9 years of experience exhibited similar state anxiety scale scores, while those with 10 or more years of experience demonstrated lower levels of anxiety ($p < 0.05$; Table 5).

Discussion

Dentistry is an extremely stressful profession that requires intensive theoretical knowledge combined with interpersonal communication and clinical skills (17,18). Stress often has psychological consequences such as high levels of burnout (19–21), disappointment, mental disturbances related to mood changes, and decreased concentration (22,23). It may also affect physical health, resulting in increased incidence of illness, anorexia, and digestive problems (19,24). The rapid increase in the number of affected countries and individuals during the COVID-19 pandemic has resulted in increased feelings of uncertainty and anxiety about contracting the infection (25,26). The nature of this disease, the long incubation period (up to 14 days), the fact that it may present asymptotically or severely enough to cause death, and the lack of definitive treatments or vaccines significantly contribute to the increased

levels of stress among healthcare professionals, especially dentists (27). Moreover, a significant lack of masks and disinfectants, sensational headlines, and false news further increase the levels of anxiety and fear (28).

To date, numerous scales such as the dental environmental stress, Beck depression inventory, and the state-trait anxiety inventory (STAI) have been used to assess the current psychological state of individuals (29). STAI-1 assesses the anxiety state of an individual at a certain time and under certain conditions, while STAI-2 is an important index determining how an individual feels regardless of the situation and circumstances (30). It also provides a more comprehensive assessment because of its contents (29,30). In the current study, the STAI scales were used as they allow evaluation of anxiety over a longer period of time as well as comparison of anxiety levels during periods of psychological variability such as a pandemic.

This study aimed to compare the anxiety levels of dentists working during the COVID-19 pandemic to the levels exhibited by them in the pre-pandemic period using the “state and trait anxiety scale.” This survey study relied on subjective reports provided by the dentists only. Based on the findings, the null hypothesis was rejected and the COVID-19 pandemic was found to increase the anxiety levels of dentists. This could likely be attributed to the increased risk of transmission associated with formation of droplets and aerosols during dental treatments.

Ozdede et al. and Cao et al. reported no statistically significant differences in stress levels between females and males in their study (30,31). In contrast, Al-Rabiaah et al., reported significantly higher levels of stress among females compared to males (32). In the current study, a statistically significant difference in stress levels was observed between males and females, and this could be explained by the fact that females were more likely to be affected emotionally during difficult situations and to report symptoms of stress and anxiety compared to males.

A previous study found that the recorded levels of anxiety were higher among young dentists and females compared to older dentists and males. This could be attributed to the fact that older dentists were more experienced in dealing with stressful circumstances, making them more confident and less prone to anxiety (27). The findings of the current study were in agreement with this, with the anxiety levels of more experienced dentists being significantly lower than those with lesser experience.

Mahde et al., reported high anxiety levels caused by the COVID-19 pandemic among dentists, and this was particularly true for those working in the public sector compared to those working in private clinics (27). The findings of the current study were similar, with dentists working in

public hospitals exhibiting higher levels of anxiety. A possible explanation for this could be the fact that dentists working in the public sector were likely to encounter more patients and were also occasionally assigned to the radiation team as part of COVID-19 measures.

A key limitation of the current study was its cross-sectional design, thus providing evidence from a single point in time during the pandemic. Further studies examining different stages of the pandemic in a larger number of countries and including more participants are required.

Conclusion

Based on the findings of this study, it can be concluded that the anxiety levels among dentists were seen to increase after the COVID-19 pandemic.

Authorship Contributions: Concept: H.E., T.D.; Design: E.B., M.B., T.D.; Supervision: E.B., Ş.N.G., M.B.; Materials: Ş.N.G., T.D.; Data: T.D., E.B.; Analysis: E.B.; Literature search: Ş.N.G., T.D.; Writing: T.D., M.B., H.E.; Critical revision: M.B., E.B., T.D.

Source of Funding: None declared.

Conflict of Interest: None declared.

Ethical Approval: The study protocol was approved by the Tokat Gaziosmanpaşa University Clinical Research Ethics Committee (date: 14.01.2021, protocol no: 21-KAEK-013).

References

1. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R. Features, evaluation, and treatment of coronavirus (COVID-19). In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2021.
2. World Health Organization, Turkey: WHO Coronavirus disease (COVID-19) dashboard. 2020. Available at: <https://covid19.who.int/region/euro/country/tr>. Accessed Apr 2021.
3. Choi EPH, Hui BPH, Wan EYF. Depression and anxiety in Hong Kong during COVID-19. *Int J Environ Res Public Health* 2020; 17: 3740. [CrossRef]
4. Blekas A, Voitsidis P, Athanasiadou M, et al. COVID-19: PTSD symptoms in Greek health care professionals. *Psychol Trauma* 2020; 12: 812–9. [CrossRef]
5. Liu CH, Zhang E, Wong GTF, Hyun S, Hahm HC. Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: Clinical implications for U.S. young adult mental health. *Psychiatry Res* 2020; 290: 113172. [CrossRef]
6. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res* 2020; 288: 112954. [CrossRef]

7. Salari N, Hosseinian-Far A, Jalali R, *et al.* Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health* 2020; 16: 57. [\[CrossRef\]](#)
8. Hyland P, Shevlin M, McBride O, *et al.* Anxiety and depression in the Republic of Ireland during the COVID-19 pandemic. *Acta Psychiatr Scand* 2020; 142: 249–56.
9. Ren Y, Feng C, Rasubala L, Malmstrom H, Eliav E. Risk for dental healthcare professionals during the COVID-19 global pandemic: An evidence-based assessment. *J Dent* 2020; 101: 103434. [\[CrossRef\]](#)
10. Wu P, Fang Y, Guan Z, *et al.* The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry* 2009; 54: 302–11. [\[CrossRef\]](#)
11. Bohlken J, Schömig F, Lemke MR, Pumberger M, Riedel-Heller SG. COVID-19 pandemic: Stress experience of healthcare workers - a short current review. *Psychiatr Prax* 2020; 47: 190–7. [\[CrossRef\]](#)
12. Spielberger CD, Gorsuch RL, Lushene RE. *Manual for state-trait anxiety inventory*. California: Consulting Psychologists Press; 1970. p. 23–49.
13. Öner N, Le Compte A. *Durumluk-sürekli kaygı envanteri el kitabı*. İstanbul: Boğaziçi Üniversitesi Yayınları; 1983.
14. Coşkun Y, Akkaş G. Engelli çocuğu olan annelerin sürekli kaygı düzeyleri ile sosyal destek algıları arasındaki ilişki. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi* 2009; 10: 213–27.
15. Öner N. *Türkiye’de kullanılan psikolojik testler: Bir başvuru kaynağı*, [Psychological tests used in Turkey: A reference resource]. 3rd ed. İstanbul: Boğaziçi Üniversitesi Yayınları; 1997. p. 5–9.
16. Alacacioğlu A, Yavuzsen T, Diriöz M, Yeşil L, Bayrı D, Yılmaz U. Kemoterapi alan kanser hastalarında anksiyete düzeylerindeki değişiklikler. *Uluslararası Hematoloji-Onkoloji Dergisi* 2007; 17: 87–93.
17. Polychronopoulou A, Divaris K. Perceived sources of stress among Greek dental students. *J Dent Educ* 2005; 69: 687–92. [\[CrossRef\]](#)
18. Sanders AE, Lushington K. Effect of perceived stress on student performance in dental school. *J Dent Educ* 2002; 66: 75–81. [\[CrossRef\]](#)
19. Gorter R, Freeman R, Hammen S, Murtomaa H, Blinkhorn A, Humphris G. Psychological stress and health in undergraduate dental students: fifth year outcomes compared with first year baseline results from five European dental schools. *Eur J Dent Educ* 2008; 12: 61–8. [\[CrossRef\]](#)
20. Dahan H, Bedos C. A typology of dental students according to their experience of stress: a qualitative study. *J Dent Educ* 2010; 74: 95–103. [\[CrossRef\]](#)
21. Davis EL, Tedesco LA, Meier ST. Dental student stress, burnout, and memory. *J Dent Educ* 1989; 53: 193–5.
22. Cohen H, Hurwitz M, Lanesman B, Myburg N, Prinsloo B. The perception and response to stress by dental students of the University of Witwatersrand. *Diastema* 1982; 10: 16–21.
23. Perera FP, Estabrook A, Hewer A, *et al.* Carcinogen-DNA adducts in human breast tissue. *Cancer Epidemiol Biomarkers Prev* 1995; 4: 233–8.
24. Silverstein ST, Kritz-Silverstein D. A longitudinal study of stress in first-year dental students. *J Dent Educ* 2010; 74: 836–48. [\[CrossRef\]](#)
25. Aker S, Midik Ö. The views of medical faculty students in Turkey concerning the COVID-19 pandemic. *J Community Health* 2020; 45: 684–8. [\[CrossRef\]](#)
26. Bao Y, Sun Y, Meng S, Shi J, Lu L. 2019-nCoV epidemic: address mental health care to empower society. *Lancet* 2020; 395: e37–8. [\[CrossRef\]](#)
27. Mahdee AF, Gul SS, Abdulkareem AA, Qasim SSB. Anxiety, practice modification, and economic impact among Iraqi dentists during the COVID-19 outbreak. *Front Med (Lausanne)* 2020; 7: 595028. [\[CrossRef\]](#)
28. Ayitrey FK, Ayitrey MK, Chiwero NB, Kamasah JS, Dzuvor C. Economic impacts of Wuhan 2019-nCoV on China and the world. *J Med Virol* 2020; 92: 473–5. [\[CrossRef\]](#)
29. Peker I, Alkurt MT, Usta MG, Turkbay T. The evaluation of perceived sources of stress and stress levels among Turkish dental students. *Int Dent J* 2009; 59: 103–11.
30. Özdede M, Sahin SC. Views and anxiety levels of Turkish dental students during the COVID-19 pandemic. *J Stoma* 2020; 73: 123–8. [\[CrossRef\]](#)
31. Cao W, Fang Z, Hou G, *et al.* The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res* 2020; 287: 112934. [\[CrossRef\]](#)
32. Al-Rabiaah A, Temsah MH, Al-Eyadhy AA, *et al.* Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. *J Infect Public Health* 2020; 13: 687–91. [\[CrossRef\]](#)

Appendix 1. STAI FORM TX – I

	Never	Somewhat	Moderately	Very Much
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 am 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.	(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-confident.	(1)	(2)	(3)	(4)
12. I feel nervous.	(1)	(2)	(3)	(4)
13. I feel 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 steady.	(1)	(2)	(3)	(4)
20. I feel pleasant.	(1)	(2)	(3)	(4)
21. Usually I feel pleasant.	(1)	(2)	(3)	(4)
22. Usually I tire nervous and restless.	(1)	(2)	(3)	(4)
23. Usually I feel satisfied with myself.	(1)	(2)	(3)	(4)
24. I wish I could be as happy as others seem.	(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.	(1)	(2)	(3)	(4)
29. I worry too much over something.	(1)	(2)	(3)	(4)
30. Usually I am happy.	(1)	(2)	(3)	(4)
31. I am inclined to take things hard.	(1)	(2)	(3)	(4)
32. Usually I lack self-confidence.	(1)	(2)	(3)	(4)
33. Usually I feel safe.	(1)	(2)	(3)	(4)
34. I make decisions easily.	(1)	(2)	(3)	(4)
35. I feel inadequate.	(1)	(2)	(3)	(4)
36. Usually I am content.	(1)	(2)	(3)	(4)
37. Some unimportant thought runs.	(1)	(2)	(3)	(4)
38. I take disappointments so keenly.	(1)	(2)	(3)	(4)
39. I am steady person.	(1)	(2)	(3)	(4)
40. I get in a state of tension or turmoil.	(1)	(2)	(3)	(4)