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Comparison of the Frequencies of Dentistry Examinations Among Chronic Patients at High-Risk for COVID-19 Before and During the Pandemic: A Cross-Sectional Study

COVID-19 İçin Yüksek Riskli Kronik Hastalarda Pandemi Öncesi ve Pandemide Diş Hekimliği Muayene Sıklıklarının Karşılaştırılması: Kesitsel Bir Çalışma

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ABSTRACT Objective: This study aims to evaluate the frequency of dental examinations among chronic patients, a high-risk group for the coronavirus disease-2019 (COVID-19), before and during the pandemic. **Material and Methods:** A total of 27,757 patient records were evaluated. Patients with diabetes mellitus, hypertension, cardiovascular (DHC) diseases, chronic respiratory diseases and chronic kidney failure and transplant patients, cancer patients, pregnant women and patients aged above 65 years were accepted as having risky chronic health conditions for COVID-19. However, those with at least 2 or 3 of DHC diseases were considered as a separate group. The frequencies of patient groups' dental examinations were statistically compared for the period before and during the pandemic. In addition, the frequencies of patient groups dental examinations were also compared by gender for the general population and patients over 65 years of age. **Results:** The frequency of dental examinations statistically significant decreased among both male and female patients, aged over 65 years and general population during the pandemic compared to before period in DHC patients ($p<0.05$). There was no statistically significant decrease in the frequency of dental examinations during the pandemic compared to the previous period in any disease group (except DHC) in the general male population and males over 65 years of age ($p>0.05$). **Conclusion:** Risky patients in DHC group were more careful in dental examinations during the pandemic. Men with risky chronic conditions may not have been feel anxious about COVID-19 when they referred to the dentist during the pandemic.

Keywords: Dental service; COVID-19; chronic disease

ÖZET Amaç: Bu çalışmada, koronavirüs hastalığı-2019 [coronavirus disease-2019 (COVID-19)] için yüksek risk grubu olan kronik hastalarda, pandemi öncesi ve pandemi sırasında diş muayenesi sıklığının değerlendirilmesi amaçlanmaktadır. **Gereç ve Yöntemler:** Toplam 27.757 hasta kaydı değerlendirildi. Diabetes mellitus, hipertansiyon, kardiyovasküler (DHK) hastalıklar, kronik solunum yolu hastalıkları ve kronik böbrek yetersizliği ve nakil hastaları, kanser hastaları, gebeler ve 65 yaş üstü hastalar COVID-19 açısından riskli kronik sağlık durumlarına sahip olarak kabul edildi. Bununla beraber; DHK hastalıklarından en az 2 veya 3'ü olanlar ayrı bir grup olarak kabul edildi. Pandemi öncesi ve pandemi sırasında hasta gruplarının dental muayene sıklıkları istatistiksel olarak karşılaştırıldı. Ayrıca genel nüfus ve 65 yaş üstü hastalar için hasta grupları, dental muayene sıklıkları cinsiyete göre de karşılaştırıldı. **Bulgular:** Pandemi sırasında, hem erkek hem de kadın hastalarda, 65 yaş üstü ve genel popülasyonda dental muayene sıklığı DHK hastalarında önceki döneme göre istatistiksel olarak önemli düzeyde azaldı ($p<0,05$). Genel erkek popülasyonunda ve 65 yaş üstü erkek hastalarda, herhangi bir hastalık grubunda (DHK hariç) pandemi döneminde bir önceki döneme göre dental muayenesi sıklığında istatistiksel olarak anlamlı bir azalma olmadı ($p>0,05$). **Sonuç:** Riskli DHK grubundaki hastalar, pandemi döneminde dental muayene konusunda daha dikkatli davrandılar. Riskli kronik rahatsızlıkları olan erkekler, pandemi sırasında diş hekimine başvurduklarında COVID-19 hakkında endişe hissetmemiş olabilirler.

Anahtar Kelimeler: Dental servis; COVID-19; kronik hastalık

An epidemic, developed due to a new coronavirus in Wuhan, China, in December 2019, could not be brought under control and spread to the whole world, causing a pandemic called coronavirus disease-2019 (COVID-19).[1] In November 2020, the number of COVID-19 cases in the United States of

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America (USA) exceeded 11.8 million, including more than 250,000 deaths.[2] On May 11, 2021, just 2 months after the first COVID-19 case in Türkiye, the number of COVID-19 cases reached 139,771, including 3,841 deaths.[3] One of the most comprehensive reports on the data of patients affected by COVID-19 infection (including 72,314 COVID-19 cases) was prepared by the Chinese Center for Disease Control and Prevention (CDC). This report found the rate of infection as 10.5% in patients with cardiovascular disease, 7.3% in diabetics, 6.3% in patients with chronic lung disease, 6% in patients with hypertension and 5.6% in cancer patients.[1] One report published by the CDC determined that approximately 8 out of 10 COVID-19-related deaths in the USA occurred in individuals over the age of 65 years.[4]

Although a clear and precise relationship between dental treatment or surgical procedures and transmission of COVID-19 has not been demonstrated yet, there is a potential for this transmission in these medical interventions due to the formation of contaminated fluids, saliva or aerosol during dental treatment procedures or contact with contaminated instruments and surfaces.[5] It is extremely important for patients in this group to know that there is a risk of COVID-19 transmission in dental clinics and that this infection is risky for those with chronic diseases. To our best knowledge, there is no study on dental examinations of risky chronic patients during the COVID-19 pandemic.

This study aimed to evaluate the frequency of dental examinations among risky chronic patients and patients over 65 years of age in the general population before and during the COVID-19 pandemic by considering gender.

MATERIAL AND METHODS

STUDY POPULATION

The files of patients aged over 14 years who referred to the Oral Diagnosis Clinic of Inonu University Faculty of Dentistry, Department of Oral and Maxillofacial Radiology (Malatya, Türkiye) were retrospectively evaluated in this study. The study was approved by the University's Health Sciences Non-Interventional Clinical Research Ethics Committee (date: Sept 21, 2021, no: 2021/2482). The study was carried out in accordance with the Helsinki Declaration principles.

In the pandemic, controlled shifts in public institutions in Turkey started on June 1, 2020.[6] From this time, dental examinations in the clinic started in a controlled manner according to the guidelines of the Ministry of Health. The patient information scanned since this date was recorded during pandemic period.[7] As the first COVID-19 vaccine was administered in Turkey on Jan 13, 2021. A 6-month period between June 01- December 31, 2020 was considered the during pandemic period.[8] Data of 7,074 patients from this period were evaluated. A 6-month period between Dec 31, 2019- June 01, 2020 was considered the before pandemic period. Data of 20,683 patients for this period were evaluated. All patient files who referred to the dental clinic for examination were evaluated in the study. Data of a total of 27,757 patients were analyzed.

Diabetes mellitus, hypertension, cardiovascular (DHC) diseases, chronic respiratory failure (CRF), chronic kidney failure and transplant (CKF-T) patients and cancer patients were included as risky chronic diseases for COVID-19. In addition, patients aged over 65 years and pregnant women were included in this group. Those with at least 2 or 3 of diseases DHC were evaluated as a separate group .The frequency of dental examinations among risky chronic patients was compared before and during the pandemic for those in the general population and patients over 65 years of age and according to gender.

STATISTICAL ANALYSIS

The SPSS 21.0 (IBM, Chicago, USA) program was used for statistical analysis of the data. Chi-square test and Fisher's exact tests were applied for comparison of before and during pandemic groups ($p<0.05$).

RESULTS

As seen in Table 1, a total of 11,668 (56.4%) female and 9,015 (43.6%) male patients had dental examination before the pandemic in the general population. A total of 3,963 (56%) female and 3,111 (44%) male

TABLE 1: Comparison of dental examinations according to gender before and during pandemic.

	Before pandemic n (%)	During pandemic n (%)	p value
Female	11,668 (56.4)	3,963 (56)	0.553
Male	9,015 (43.6)	3,111 (44)	
Total	20,683 (100)	7,074 (100)	27757

patients had dental examination during the pandemic period. For the general population, there was no statistically significant difference between the frequencies of dental examinations before and during the pandemic by gender ($p>0.05$).

Table 2 compared the frequency of dental examinations among patients with chronic risk for COVID-19 in the general population before and during the pandemic. The frequency of dental examinations decreased in patients with DHC diseases, CRF-T, DHC and aged over 65 years during the pandemic. However, a statistically significant difference was found only in patients with hypertension and DHC ($p<0.05$). There was no change in the frequency of dental examinations among cancer patients. Although the frequency of dental examinations among CRF-T patients and pregnant patients increased during the pandemic, no statistically significant difference was found between their rates before and during the pandemic ($p>0.05$).

Table 3 compares the frequencies of dental examinations among patients at chronic risk for COVID-19 in the general population before and during the pandemic by gender. The frequency of dental examinations during the pandemic statistically significantly decreased in female patients with DHC ($p<0.05$). Although the frequency of dental examinations decreased in female patients with CRF-T and aged over 65 years during after the pandemic, no statistical difference was found between their rates before and during the pandemic ($p>0.05$). There was no change in the frequency of dental examinations among female patients with cancer and CRF-T. In addition, the frequency of dental visits during the pandemic statistically significantly decreased in male patients with at least two or three of diabetes mellitus, hypertension and cardiovascular ($p<0.05$). The frequency of dental visits statistically significantly increased in male patients with cardiovascular diseases during the pandemic ($p<0.05$). Although the frequency of dental examinations increased during the pandemic in male patients with diabetes mellitus and CRF and aged over 65 years, no statistically significant difference was found between their rates before and during the pandemic ($p>0.05$). There was no change in the frequencies of dental examinations among male patients with hypertension, cancer and CRF-T.

Table 4 compares the frequencies of dental examinations among patients at chronic risk for COVID-19 and over the age of 65 according to gender. There was a decrease in the frequency of dental examinations among patients over 65 years of age for all diseases except cardiovascular diseases. The frequency of dental examinations statistically significantly decreased in patients DHC ($p<0.05$). The increase in the frequency of dental examinations among patients with cardiovascular disease was not statistically significant ($p>0.05$). For patients with diabetes mellitus, hypertension, CRF-T and cancer, no statistically significant difference was found between the frequencies of dental visits among before and during pandemic periods in both genders.

TABLE 2: Comparison of risky chronic patients' dental examination frequencies before and during the pandemic in general population.

	Before pandemic n (%)	During pandemic n (%)	p value
Diabetes mellitus	254 (1.2)	76 (1.1)	0.303
Hypertension	367 (1.8)	99 (1.4)	**0.034**
Cardiovascular diseases	238 (1.2)	80 (1.1)	0.893
CRF*	175 (0.8)	50 (0.7)	0.259
CKF-T**	31 (0.1)	11 (0.2)	0.916
Cancer	73 (0.4)	25 (0.4)	0.996
DHC***	301 (1.5)	61 (0.9)	**0.000**
Over 65 age	825 (4)	255 (3.6)	0.149
Pregnancy	69 (0.6)	34 (0.9)	0.073

*Chronic respiratory failure; **Chronic kidney failure and transplant patients; ***Those who have at least 2 or 3 (diabetes, hypertension, cardiovascular diseases); CRF: Chronic respiratory failure; CKF-T: Chronic kidney failure and transplant; DHC: Diabetes mellitus, hypertension, cardiovascular diseases.

TABLE 3: Comparison of risky chronic patients' dental examination frequencies according to gender before and during the pandemic in general population.

	Gender		p (%)	p value
Diabetes mellitus	Female	BP	170 (1.5)	**0.013**
		AP	37 (0.9)	
	Male	BP	84 (0.9)	0.122
		AP	39 (1.3)	
Hypertension	Female	BP	276 (2.4)	**0.012**
		AP	67 (1.7)	
	Male	BP	91 (1)	0.927
		AP	32 (1)	
Cardiovascular diseases	Female	BP	157 (1.3)	**0.016**
		AP	34 (0.9)	
	Male	BP	81 (0.9)	**0.006**
		AP	46 (1.5)	
Chronic respiratory failure	Female	BP	137 (1.2)	0.266
		AP	38 (1)	
	Male	BP	38 (0.4)	0.834
		AP	12 (0.5)	
Chronic kidney failure and transplant patients	Female	BP	14 (0.1)	0.923
		AP	5 (0.1)	
	Male	BP	17 (0.2)	0.962
		AP	6 (0.2)	
Cancer	Female	BP	44 (0.4)	0.99
		AP	15 (0.4)	
	Male	BP	29 (0.3)	0.998
		AP	10 (0.3)	
DHC*	Female	BP	196 (1.7)	**0.003**
		AP	40 (1)	
	Male	BP	105 (1.2)	**0.020**
		AP	21 (0.7)	
Over 65	Female	BP	450 (54.5)	0.659
		AP	135 (52.9)	
	Male	BP	375 (45.5)	0.653
		AP	120 (47.1)	

*Those who have at least 2 or 3 (diabetes, hypertension, cardiovascular diseases); BP: Before pandemic; DP: During pandemi; DHC: Diabetes mellitus, hypertension, cardiovascular diseases.

While there was a statistically significant increase in the frequency of dental examinations among male patients with cardiovascular disease ($p<0.05$), there was no significant change in females ($p>0.05$). For patients with DHC, there was a decrease in the frequency of dental examinations during the pandemic in both genders, while the statistical difference was found only in males ($p<0.05$).

DISCUSSION

The COVID-19 pandemic has affected the entire world, causing 150 million cases and more than 3.2 million deaths as of May 2021.[9] According to the World Health Organization, COVID-19-related mortality rates range between 3% and 5%. States and regional medical and dental authorities have prepared

TABLE 4: Comparison of risky chronic patients' dental examination frequencies before and during the pandemic in over 65 population.

	n (%)	p value	Gender	p (%)		p value
Diabetes mellitus	BP 27 (3.3)	0.915	Female	BP	13(2.9)	1
				DP	4 (3)	
	DP 8 (3.2)		Male	BP	14 (3.7)	1
				DP	4 (3.3)	
Hypertension	BP 97 (11.8)	0.163	Female	BP	64 (14.2)	0.106
				DP	12 (8.9)	
	DP 21 (8.2)		Male	BP	33 (8)	0.656
				DP	9 (7.5)	
Cardiyovascular disease	BP 25 (3)	0.482	Female	BP	15 (3.3)	0.384
				DP	2 (1.5)	
	DP 10 (3.9)		Male	BP	10 (2.7)	**0.042**
				DP	8 (6.7)	
Chronic respiratory failure	BP 27 (3.3)	0.280	Female	BP	18 (4)	0.435
				DP	3 (2.2)	
	DP 5 (2)		Male	BP	9 (2.4)	1
				DP	2 (1.7)	
Chronic kidney failure and transplant patients	BP 7 (0.8)	0.208	Female	BP	1 (0.2)	1
				DP	0 (0)	
	DP 0 (0)		Male	BP	6 (1.6)	0.344
				DP	0 (0)	
Cancer	BP 17 (2.1)	0.274	Female	BP	10 (2.2)	0.471
				DP	1 (0.7)	
	DP 2 (0.8)		Male	BP	7 (1.9)	0.686
				DP	1 (0.8)	
DHC*	BP 108 (13.1)	0.009	Female	BP	62 (13.8)	0.134
				DP	12 (8.9)	
	DP 18 (7.1)		Male	BP	46 (12.3)	**0.024**
				DP	6 (5)	

*Those who have at least 2 or 3 (diabetes, hypertension, cardiovascular diseases); BP: Before pandemic; DP: During pandemi; DHC: Diabetes mellitus, hypertension, cardiovascular diseases.

various protocols and guidelines for re-adjustment of dental treatments and opening dental clinics, focusing on aerosol reduction and other preventive measures.[10] As access to routine dental examinations has decreased in countries due to temporary quarantine measures during the pandemic, dental services are not significantly affected by COVID-19. The reported rates of COVID 19 for dentists do not differ significantly within countries compared to those for the general population.[11] The underlying risk conditions in COVID-19 patients are hypertension (15%-69%), diabetes mellitus (8%-40%), cardiovascular diseases (4%-61%), chronic lung disease (1%-33%), and chronic kidney disease (1%-48%). Each of these risky conditions has been associated with in-hospital mortality rates ranging from 1%-56%.[12] In general, the mortality rate of elderly patients over 65 years of age with COVID-19 is reported to be higher (65%) than patients under 65 years of age (42%). Some studies have shown that elderly individuals with risky chronic diseases have higher rates of hospitalization and mortality than those without these chronic conditions.[13,14] Population-based studies have reported that mortality rates due to COVID-19 are higher in cancer patients.[15,16] Healthy pregnant women are more likely to get COVID-19 due to their immune response.[17] Therefore, our study compared the frequencies of dental visits among patients with

hypertension, diabetes mellitus, cardiovascular diseases, CRF and transplant patients, chronic respiratory diseases, those over 65 years of age and pregnant patients before and during the pandemic. As some patients had more than 1 chronic condition, those with diabetes mellitus, hypertension and cardiovascular diseases at the same time were considered as a separate group (DHC). One study has reported that participants do not want to have dental examination until an effective drug or vaccine for COVID-19 disease is found due to the fear of being infected during dental treatment.[18] Our study evaluated the period between the controlled start of dental treatments and the start of vaccination and found no significant change in the frequency of dental examinations during the pandemic for those with only one risky chronic disease, pregnant women, and patients over the age of 65 years, except for those with hypertension in the general population. However, there was a significant decrease in the frequency of dental examinations during the pandemic only in DHC group.

Although there was a decrease in the overall number of patients' dental examinations due to controlled patient appointments during the pandemic, no significant change was observed in the frequency of dental examinations by gender during the pandemic compared to the before pandemic period. In the general population, in women and men, patients over 65 years of age and men over 65 years of age, there was a significant decrease in the frequency of dental examinations during the pandemic for patients with DHC. For the general population, there was no significant decrease in the frequency of dental examinations during the pandemic among male patients and patients over 65 years of age for all diseases (except DHC), and even a proportional increase was observed in some diseases. This made us think that men with risky chronic diseases were less sensitive to COVID-19 infection when referring to the dental clinic. One study reported that the number of hospitalization and mortality rates in the pandemic were higher in males than in females.[19] Another study has determined that people avoid dental treatment due to the risk of infection and the fear of COVID-19 in the community. The study also found that the fear of infection was higher in women.[18] Another study on COVID-19 reported that the pandemic created a great psychological effect in women by increasing negative emotions such as anxiety, stress, and depression.[20]

For the general population, the frequency of dental examinations among CRF-T patients and cancer patients was the lowest in both periods compared to those with other diseases. The frequency of dental examinations among these patients was similar for both genders in both periods. This may be because these patients only applied to the dentist in emergencies before and during the pandemic.

CONCLUSION

In the pandemic, patients with DHC were more anxious when referring to the dentist. Male patients with risky chronic health conditions (except DHC) did not feel anxious about COVID-19 infection when they referred to the dentist during the pandemic.

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: *Numan Dedeoğlu, Oğuzhan Altun, Şuayip Burak Duman, Büşra Arıkan, Gözde Eşer, Duygu Çelik Özen;* ***Design:*** *Numan Dedeoğlu, Oğuzhan Altun, Şuayip Burak Duman, Büşra Arıkan, Gözde Eşer, Duygu Çelik Özen;* ***Control/Supervision:*** *Numan Dedeoğlu, Oğuzhan Altun;* ***Data Collection and/or Processing:*** *Numan Dedeoğlu, Oğuzhan Altun, Şuayip Burak Duman, Büşra Arıkan, Gözde Eşer, Duygu Çelik Özen;* ***Analysis and/or Interpretation:*** *Numan Dedeoğlu, Oğuzhan Altun, Şuayip Burak Duman, Büşra Arıkan, Gözde Eşer, Duygu Çelik Özen;* ***Literature Review:*** *Numan Dedeoğlu, Şuayip Burak Duman, Büşra Arıkan, Gözde Eşer, Duygu Çelik Özen;* ***Writing the Article:*** *Numan Dedeoğlu, Şuayip Burak Duman, Gözde Eşer, Duygu Çelik Özen;* ***Critical Review:*** *Oğuzhan Altun;* ***References and Fundings:*** *Oğuzhan Altun.*

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