DOI: http://doi.org/10.54617/adoklinikbilimler.1100280

Araştırma Makalesi

Perspective of Covid-19 Patients on the Relationship Between Oral Health and Covid-19: Responses During Covid-19 Home-Quarantine

Covid-19 Hastalarının Ağız Sağlığı ve Covid-19 Arasındaki İlişki Hakkındaki Görüşü: Covid-19 Ev Karantinası Esnasında Verilen Yanıtlar

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ÖZET

Amaç: Koronavirüs hastalığı-2019 (COVID-19) olan hastaların akut periodontal lezyonlar dahil olmak üzere çeşitli oral semptomları olduğu bildirilmektedir. Ancak literatürde COVID-19 hastalarının ağız sağlığına ilişkin görüşlerini bildiren sınırlı sayıda çalışma bulunmaktadır. Bu çalışma, evde karantinaya alınan COVID-19 hastalarının ağız sağlığı ve COVID-19 arasındaki olası ilişkiye ilişkin görüşlerini incelemeyi amaçlamaktadır.

Gereç ve Yöntemler: Ocak-Nisan 2021 tarihleri arasında evde karantinaya alınan COVID-19 tanılı 500 hasta ile filiasyon ekibi tarafından yüz yüze görüşme yapıldı. "COVID-19 ile ağız sağlığı arasında bir ilişki var mı?" sorusuna ait cevaplar yaş, cinsiyet ve eğitim düzeyine göre incelendi. Veriler ki-kare testleri kullanılarak istatistiksel olarak analiz edildi.

Bulgular: 500 hastanın (290 kadın, yaş: 38.2±12.7) 216'sı (%43.2) COVID-19 ile ağız sağlığı arasında ilişki olduğunu belirtti. Kadınların %50.7'si ve erkeklerin %32.9'u soruya "ilişki var" diye yanıt verdi ($p<0.05$). COVID-19 ile ağız sağlığı arasında ilişki olduğunu belirten hastaların %54.9'u Lisans/Yüksek Lisans mezunu iken, "ilişki yok" diyenlerin %66'sı ilkokul mezunu olduğu bulundu ($p<0.05$).

Sonuç: Evde karantinaya alınan COVID-19 hastaları arasında, özellikle kadınlar ve eğitim düzeyi yüksek olan hastalar, ağız sağlığı ile COVID-19 arasında bir ilişki olabileceğini bildirdi. Hem oral bakteri yükünü hem de potansiyel bakteriyel süper enfeksiyon riskini azaltmak için COVID-19 sırasında ağız hijyenini geliştirmenin ve sürdürmenin gerektiğine dair toplumun tüm kesimlerinin bilgilendirilmesi önem taşımaktadır.

Anahtar Kelimeler: Ağız hijyeni; Ağız sağlığı; COVID-19; Farkındalık; Karantina; Pandemi

ABSTRACT

Objective: Patients with coronavirus disease-2019 (COVID-19) have been reported to have a variety of oral symptoms, including acute periodontal lesions. However, there are a limited number of studies in the literature reporting the views of COVID-19 patients on oral health. The present study aims to examine the views of COVID-19 patients in-home quarantine regarding the possible relationship between oral health and COVID-19.

Material and Methods: A face-to-face interview was conducted by the filiation team with 500 patients with a diagnosis of COVID-19 in-home quarantine, visited between January and April 2021. The patients were asked the question, "Do you think there is a relationship between COVID-19 and oral health?" The answers were analyzed by age, gender, and education level. Data were statistically analyzed using chi-square tests.

Results: Of 500 patients (290 female, age, 38.2±12.7), 216 (43.2%) stated that there is a relationship between COVID-19 and oral health ($p<0.05$). 50.7% of the women and 32.9% of the men answered as "there is a relationship" ($p<0.05$). While 54.9% of the patients who stated that there was a relationship between COVID-19 and oral health were undergraduate/graduate graduates, 66% of the patients who said, "no relationship" were found to be primary school graduates ($p<0.05$).

Conclusions: Among COVID-19 patients in-home quarantine, especially women and patients with higher education levels reported that there may be a relationship between oral health and COVID-19. It is crucial to inform all segments of society about the necessity of improving and maintaining oral hygiene during COVID-19 to reduce both the oral bacterial load and the risk of potential bacterial super-infections.

Keywords: Awareness; COVID-19; Oral health; Oral hygiene; Pandemics; Quarantine

Makale gönderiliş tarihi: 08.04.2022; Yayına kabul tarihi: 23.05.2022

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INTRODUCTION

The Coronavirus disease-2019 (COVID-19) pandemic, caused by the SARS-CoV-2 virus, in Turkey started with the identification of the first positive case on March 11, 2020.[1] COVID-19 patients have been reported to have a wide variety of oral symptoms, including acute periodontal lesions. There also have been cases with severe bad breath, gingival edema, necrotic interdental papillae and spontaneous gingival bleeding, as well as necrotizing gingival inflammation.[2]

Today, periodontal disease and dental caries are the leading public health problems in many countries of the world.[3] In addition to the knowledge of microbial dental plaque as the primary factor in the etiology of oral diseases, epidemiological studies have concluded that individuals' habits, systemic diseases, socioeconomic and demographic conditions are etiological factors that can change the oral health condition of individuals.[4] Periodontal disease is an inflammatory gingival disease and its symptoms can deteriorate due to COVID-19, and is more prevalent among individuals with various metabolic/systemic diseases such as obesity, diabetes mellitus, and cardiovascular diseases. Various cytokines and oxidative stress, known to contribute to the development of periodontal disease and other metabolic/systemic diseases, might be also at higher level in COVID-19 patients.[5] Inflammatory changes occurring in this most vulnerable population increase the risk of morbidity and mortality rate.[6] Therefore, periodontal health/disease may be a factor influencing the severity of COVID-19.[7] On the other hand, the management of oral hygiene can be an important step towards reducing the severity of COVID-19.

COVID-19 threatens both the physical and psychological health of individuals, and soon after its emergence, it has changed our lives with irreversible consequences. In addition to physical changes, oral hygiene habits have also changed in patients in-home quarantine.[8] Moreover, studies have shown that poor oral hygiene is a risk factor for COVID-19.[7, 9]

Previous studies examining community opinion on the relationship between oral health and COVID-19 have generally been conducted on the general population, online or by phone during nationwide lockdowns, rather than with patients in-home quarantine.[10] The validity of information regarding COVID-19 diagnosis in online/phone survey analyzes based on individuals' self-reports may be controversial in terms of reliability. Face-to-face interviews might increase the reliability of the survey study. In our best knowledge, there is no study that was conducted with COVID-19 patients in-home quarantine and evaluated their opinions on the possible relationship between oral health and COVID-19. In present study, in cases where it is assumed that there is a relationship between oral/periodontal diseases and COVID-19, the results of the face-to-face survey analysis, which helps to establish evidence about the oral hygiene knowledge of the patients, and the opinions of the authors, are reported. Based on the hypothesis that COVID-19 patients can observe a change in their oral health or deterioration in their current symptoms, our study aims to examine the opinion of COVID-19 patients regarding a possible relationship between oral health and COVID-19, in addition to raising subject awareness and contributing to an increased public awareness.

MATERIAL AND METHODS

The protocol of the study was approved by Gazi University Ethics Commission (Ref No:117002, Date:10.11.2020), COVID-19 Scientific Research Platform of the Ministry of Health of the Republic of Turkey and Ankara Public Health Directorate. The study was performed in accordance with the Principles of the Declaration of Helsinki.

The five hundred (n=500) volunteers with mean±SD age of 38.2±12.7 years enrolled in the capital city of Turkey, Ankara, during the follow-up diagnosed with COVID-19 between 13th January and 12th April 2021. The inclusion criteria were home-quarantined volunteered adults, age >18 years, and rhino-pharyngeal swab positive for SARS-CoV-2 infection.

Officially, on March 11, 2020, the COVID-19 pandemic started in Turkey.[11] The vaccination process started on January 14, 2021, primarily for healthcare professionals, then individuals over 65 years of age and individuals with chronic diseases. The Presidency of the Republic of Turkey announced the commencement of controlled normalization on March 1, 2021.

The present study was carried out using simple random sampling method. The sample size was determined by using the G-power package program with a 95% confidence interval, an effect size of 0.15, and 1-β=0.90 with 469 individuals, based on the study of.[12] Due to the possibility of drop-outs, the number of patients was determined as 500.

The data were collected via face-to-face interviews by COVID-19 filiation (contact tracing) team member (FTM). FTM visit the COVID-19 positive patients at home, follow up the contacts, provide medicine for the positive case, and explain the responsibilities of the patients regarding home-quarantine. During the filiation, after recording the demographic information (age, gender, and education levels) the following questions were asked to the volunteers, "Do you think there is a relationship between COVID-19 and oral health?"

The data were analyzed using SPSS 21 software package. Chi-square analysis was performed to examine the relationship between categorical variables. The mean between the groups was analyzed with the t-test. The significance level was set at p<0.05.

RESULTS

The answers given by 500 patients (290 female) to the question "Do you think there is a relationship between COVID-19 and oral health?" were analyzed according to the age, gender, and education level of the individuals (Table 1).

Table 1. Demographics of 500 participants

Variables		n	%
Age (years)	18-24	74	14.8
	25-29	73	14.6
	30-34	77	15.4
	35-39	58	11.6
	40-44	55	11.0
	45-49	60	12.0
	50-54	44	8.8
	55-59	32	6.4
	60+	27	5.4
	Total	500	100.0
Gender	Male	210	42.0
	Female	290	58.0
	Total	500	100.0
Education levels	Primary school	194	38.8
	High school	164	32.8
	Bachelor's/Master's	142	28.4
	Total	500	100.0

Out of a total of 500 patients, 216 (43.2%) answered "yes", while 284 (56.8%) answered "no". In terms of genders, it is seen that women answered "yes" at a high rate, which was statistically significant (p<0.05). In total, 147 (50.7%) of 290 female patients and 69 (32.9%) of 210 male patients answered "yes" (Table 2).

Table 2: Comparison of the responses to the question by gender

Variables		Do you think there is a relationship between COVID-19 and oral health?						Chi-Square Analysis	
		Yes		No		Total			
		n	%	n	%	n	%	Chi-Square	p
Gender	Male	69	32.9	141	67.1	210	100.0	15.7	0.0001
	Female	147	50.7	143	49.3	290	100.0		
	Total	216	43.2	284	56.8	500	100.0		

In terms of education level, it was found that 54.9% of the patients who answered "yes" were Bachelor's/Master's graduates, 43.9% were high school graduates, and 34.0% were primary school graduates. The relationship between high education level and responding "yes" to the question was found to be significant (p<0.05) (Table 3).

Table 3. Comparison of the responses to the question by education

Variables		Do you think there is a relationship between COVID-19 and oral health?						Chi-Square Analysis	
		Yes		No		Total			
		n	%	n	%	n	%	Chi-Square	p
Education level	Primary school	66	34.0	128	66.0	194	100.0	14.6	0.001
	High school	72	43.9	92	56.1	164	100.0		
	Bachelor's/ Master's	78	54.9	64	45.1	142	100.0		
	Total	216	43.2	284	56.8	500	100.0		

In terms of age, the rate of those responding "yes" was found to be 37% in patients over 60 years of age, while this rate was 51.7% in the 35-39 age group. Nonetheless, no statistically significant relationship was found between age and responses (p>0.05) (Table 4).

Table 4. Comparison of the responses to the question by age

Variables		Do you think there is a relationship between COVID-19 and oral health?						Chi-Square Analysis	
		Yes		No		Total			
		n	%	n	%	n	%	Chi-Square	p
Age groups (years)	18-24	29	39.2	45	60.8	74	100.0	5.9	0.657
	25-29	36	49.3	37	50.7	73	100.0		
	30-34	34	44.2	43	55.8	77	100.0		
	35-39	30	51.7	28	48.3	58	100.0		
	40-44	24	43.6	31	56.4	55	100.0		
	45-49	22	36.7	38	63.3	60	100.0		
	50-54	20	45.5	24	54.5	44	100.0		
	55-59	11	34.4	21	65.6	32	100.0		
	60 +	10	37.0	17	63.0	27	100.0		
	Total	216	43.2	284	56.8	500	100.0		

DISCUSSION

With the prediction that there may be various emotional and behavioral changes in COVID-19 patients, the present study holds significance in terms of demonstrating the opinions of the society of the relationship between COVID-19 and oral hygiene and raising awareness that COVID-19 may cause the deterioration of oral diseases.

Ankara, capital city of Turkey, has a heterogeneous population structure due to both being the second most populated city and the increasing immigration. Conducting the study in Ankara ensured that the participants constitute a suitable sample in terms of quantitative and qualitative aspects, because while the number of cases increases throughout the country during the COVID-19 pandemic. On the other hand, simple random sampling, in which each sample unit has an equal chance of being selected, is the appropriate sampling method for this study due to being one of the best methods for the population representation.

One of the most effective methods of minimizing or stopping the spread of infectious diseases is to trace the chain of contact and/or locate the source of the disease. The FTMs operate according to three algorithms in the COVID-19 pandemic: the adult treatment algorithm, the COVID-19 home monitoring algorithm, and the COVID-19 inpatient. FTMs implementing contact tracing and digital contact tracing models are employed in many countries.[13] The present study was conducted by the FTM through face-to-face interviews with patients who are in-home quarantine due to COVID-19 diagnosis. Thus, in our study, data were collected by face-to-face rather than a web-based online survey/ telephone, thus preventing self-report bias.

Oral health, which is associated with many systemic diseases, is an integral part of general health.[14, 15] Poor oral health not only causes caries and gingival diseases, but also impacts systemic health in a negative manner. A proper understanding of this bi-directional relationship improves both oral and systemic health. Today, oral health is accepted as an indicator of quality of life as well as individual and social health.[16] Being aware of individual routines, such as maintaining optimal oral hygiene, is essential. Due to the close relationship between oral and general health, oral hygiene practices become even more important in cases where the risk of contact COVID-19 is high.[17]

Periodontal disease is an inflammatory disease with multifactorial etiology that affects the supporting tissues around the teeth. COVID-19 shares some common risk factors with periodontal disease, including age, gender, diabetes and hypertension.[8] It is suggested that the link between the oral microbiome and COVID-19 complications should be investigated for achieving a better understanding of the consequences of COVID-19.[7] The SARS-CoV-2 and the microbiota of the oral cavity play a crucial role in the inflammatory response and cytokine storm. Therefore, there might be a link between poor oral health and complications of COVID-19. Oral health promotion during COVID-19 is recommended to reduce both the oral bacterial load and the risk of a potential bacterial superinfection. Poor oral hygiene is considered a risk for post-viral complications, particularly in patients exposed to altered biofilms due to diabetes, hypertension or cardiovascular diseases.[9] Hence, raising awareness about poor oral health, which is one of the risk factors, is important to prevent the severity of COVID-19. Accordingly, our study aims to investigate the opinions of patients diagnosed with COVID-19 on a possible relationship between COVID-19 and oral health.

Men can be more prone to severe forms of periodontal disease than women.[18-20] While there may be alterations in the immune responses; behavioral and environmental factors may also play a key role

in explaining gender differences.[19] Similarly, it has been suggested that COVID-19 tends to be more severe in men than women.[20] Consistent with the study of Hemalatha et al. (2020), the present study demonstrates that women are more conscious than men in terms of awareness regarding the systemic relationship between oral health and COVID-19.[21] Similarly, the findings of a study with Japanese young adults showed that women had a higher level of periodontal awareness.[22] Conversely, Penmetsa et al. (2018) demonstrated no clear relationship between periodontal knowledge and gender. The fact that women have a higher awareness of the possibility of an association between COVID-19 and oral health in COVID-19 patients may indicate that women improve their knowledge and behavior level to promote oral health. Several studies were reported that highly educated participants were more conscious about periodontal health awareness.[21, 23] Unsurprisingly, in present study as the level of education increases, the level of awareness increases as well.

Aging is considered as a process that causes degenerative changes at the cellular level and, in some cases, leads to a variety of autoimmune, infectious or inflammatory diseases, including periodontal disease.[24] People over the age of 65 are seen as the highest risk group for severe COVID-19. This is mainly because of the presence of multi-morbidity, which is a common factor in this group, which allows rapid attack of the virus and increases mortality.[25] Another critical factor in terms of disease severity in this group is the immune response, which is not as strong as in younger people.[24] Therefore, it is clear that aging is a decisive risk factor for linking oral diseases to severe COVID-19, as they share associated risk factors that can lead to complications.[7] Among the patients in the present study, 51.7% of the individuals in the 35-39 age range gave the highest response to the existence of this relationship, while this rate was found to be 37% for those over the age of 60. In a study, the awareness of the relationship between periodontal disease and systemic health was highest in the 35-50 age group, as well.[21] Although not statistically significant, the opinion that there may be a relationship between COVID-19 and oral health was expressed mostly by middle-aged individuals, in line with the findings in the literature on awareness of the relationship between periodontal disease and systemic health.

The results of the present study may contribute significantly to an area with limited research. The possibility of oral hygiene habits being neglected due to COVID-19 may pose a threat to the deterioration of the oral health of the population. This study provides important implications in terms of oral health knowledge of individuals. In addition, there is a need for up-to-date studies on this issue in other countries as well, considering possible intercultural variances and time-dependent differences.

There are several limitations to the present study. The first limitation is that due to the cross-sectional design of the study, it was not possible to demonstrate causation. Longitudinal studies on this subject need to be conducted to obtain further results. The second limitation is that the study data was collected in a particular city. Therefore, the study cannot be generalized to the whole population. It is possible to expand the study by conducting a randomized nationwide survey with more detailed questions regarding awareness.

CONCLUSION

The present study, which examines the opinion of the relationship between the oral health and COVID-19, was conducted by directly interviewing COVID-19 positive patients in home-quarantine. This study design collects more reliable answers by eliminating factors such as experiences being forgotten or de-prioritized over time. Considering the shared common risk factors, COVID-19 might be expected to progress positively in cases where oral health is upright. Women are more knowledgeable regarding the relationship between COVID-19 and oral health, and the level of knowledge was also in line with the level of education. Elderly individuals should be informed about poor oral health, which may play a role in the worsening of many infections, including SARS-CoV-2.

Conflict of Interest
No conflict of interest was declared by the authors

Financial Disclosure
The study was not financially supported by any person/organization.

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