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Anxiety Levels, Sleep Quality and Follow-up of Obstructive Sleep Apnoea Patients During the COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Obstrüktif Uyku Apne Hastalarının Anksiyete Düzeyleri, Uyku Kalitesi ve Takibi

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Abstract

Objective: Obesity, hypertension and diabetes, which increase the risk of developing severe Coronavirus disease-2019 (COVID-19) pneumonia, are also the most common comorbidities of obstructive sleep apnoea syndrome (OSAS). The in-hospital evaluation and testing of patients with OSAS were delayed due to the pandemic. We aimed to investigate the changes in Epworth sleepiness score (ESS), use of positive airway pressure (PAP) devices, sleep quality, weight change, COVID-19 related anxiety, anxiety at hospital admission, domestic contact and contraction of SARS-CoV-2 in OSA patients during the pandemic.

Materials and Methods: In our sleep centre, patients (n=202) who were diagnosed with sleep apnoea were called by telephone and a survey related to COVID-19, anxiety levels, PAP use, weight change, sleep quality and OSA was conducted during the pandemic.

Results: In the study, hypertension and diabetes were the most common comorbidities. Overall, some of the patients with OSA gained weight, stopped PAP treatment, and ESS scores increased compared to the pre-pandemic period. The anxiety of hospitalization due to COVID-19 was found to be higher than the anxiety for COVID-19. There was a positive correlation between the level of anxiety at admission to hospital due to the risk of COVID-19 and the ESS measured at diagnosis (r=0.203 p=0.004). Better sleep quality was seen in 77% of the participants during the pandemic.

Conclusion: OSA patients with high ESS at diagnosis, PAP uses, COVID-19 positive or with domestic contact should be monitored closely by telemedicine. In future research should examine sleep quality and the effects of working from home in OSAS individuals.

Keywords: COVID-19, sleep apnoea, anxiety levels, sleep quality, telemedicine

Öz

Amaç: Obezite, hipertansiyon ve diyabet, şiddetli Koronavirüs hastalığı-2019 (COVID-19) pnömonisi gelişme riskini artırdığı gibi, aynı zamanda obstrüktif uyku apne sendromunun da (OUAS) en sık görülen komorbidite nedenidir. OUAS'li hastaların hastane içi değerlendirme ve testleri pandemi nedeniyle ertelenmiştir. Biz bu çalışmada, pandemi sırasında OUAS'li hastaların Epworth uykululuk skoru (ESS), pozitif hava yolu basıncı (PAP) cihazlarının kullanımı, uyku kalitesi, kilo değişimi, COVID-19 ile ilgili kaygı, hastaneye başvuru sırasında kaygı, SARS-CoV-2 bulaşı ve ev içi temas değişikliklerini araştırmayı amaçladık.

Gereç ve Yöntem: Pandemi döneminde, uyku merkezimizde daha önce uyku apnesi tanısı alan hastalar (n=202) telefonla aranarak COVID-19, kaygı düzeyleri, PAP kullanımı, kilo değişimi, uyku kalitesi ve OUA ile ilgili anket yapıldı.

Bulgular: Hipertansiyon ve diyabet en sık görülen komorbiditeler olarak tespit edildi. Genel olarak, OUAS'li hastaların bir kısmı kilo almış, PAP tedavisini bırakmış ve pandemi öncesi döneme kıyasla ESS skorları artmıştı. COVID-19 nedeniyle hastaneye başvuru kaygısı, COVID-19 kaygısından daha yüksek bulundu. COVID-19 riski nedeniyle hastaneye başvuru sırasındaki kaygı düzeyi ile tanı anında ölçülen ESS arasında pozitif bir ilişki mevcuttu (r=0,203 p=0,004). Pandemi döneminde, katılımcıların %77'sinde daha iyi uyku kalitesi görüldü.

Sonuç: Tanı anında ESS'si yüksek olan, PAP kullanan, COVID-19 pozitif olan veya ev içi teması olan OSA hastaları teletıp ile yakından izlenmelidir. Gelecek araştırmalarda, OUAS olan bireylerde uyku kalitesi ve evden çalışmanın etkileri incelenmelidir.

Anahtar Kelimeler: COVID-19, uyku apnesi, kaygı düzeyleri, uyku kalitesi, teletıp

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Introduction

Severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) infection was declared as a global health emergency by the World Health Organization (WHO) on 30th January, 2020 (1). In Turkey, the first official case of novel Coronavirus disease-2019 (COVID-19) was announced on 11th March, 2020, and on the same date, the WHO declared COVID-19 as a global pandemic (2). From that data onwards, governments all over the world have aimed to protect high-risk groups and slow the spread of the disease by taking various preventive measures. After all private and public hospitals had been declared as pandemic hospitals, non-emergency examinations, medical procedures and operations were postponed in Turkey. As in the US and most European countries, sleep tests, and positive airway pressure (PAP) devices titration tests, which have a high risk of virus aerosol infection, were postponed. Furthermore, scheduled follow-up appointments were also stopped unless urgent (3,4). Following the declaration of the pandemic, sleep tests at the sleep laboratory were postponed until "normalization", titration procedures with PAP devices were not performed, and patient follow-ups were carried out remotely by telephone.

The American Academy of Sleep Medicine (AASM) has made a number of recommendations for sleep laboratories, aimed at preventing patients and personnel from becoming infected with SARS-CoV-2. It is known that patients can be contagious even if they are asymptomatic. According to the existing recommendations, it is recommended that in-house sleep medicine services are reduced, and that medical care is provided via telecommunication using telephones, and telemedicine solutions (3,4). Prior to the pandemic, laboratory-based polysomnography was performed in 92.5% of sleep centres in Europe, whereas during the pandemic period, only 20% has been performed in the sleep laboratory, and the rate of PAP titrations carried out in the laboratory has declined from 90% to 17.5% (5).

The most frequent disorders accompanying obstructive sleep apnoea (OSAS) are hypertension, cardiovascular diseases, diabetes, and obesity (6). Globally, especially among patients with comorbidities, coronavirus pneumonia causes significant morbidity and mortality due to acute respiratory distress syndrome (ARDS). Comorbidities identified in OSAS are the same diseases that increase morbidity and mortality of COVID-19. There are studies which show that OSA is a risk factor for hospitalization due to COVID-19 and for the advance of respiratory failure (7). Therefore, patients with sleep apnoea syndrome can have a greater cause for concern for COVID-19 disease than the general population.

This study was planned in order to determine the rate of COVID-19, the state of domestic contact with COVID-19 positive patients, use of PAP devices, change in weight, COVID-19-related anxiety, the need for hospital admission, and anxiety at admission to healthcare institutions in individuals with sleep apnoea syndrome during the COVID-19 pandemic.

Materials and Methods

Research type: This is a cross-sectional study.

A list was made of patients who had had polysomnography and who were registered at the Sleep Laboratory of the Pulmonary Diseases Department at Gaziantep University from September, 2018 up to the present day. Patients were contacted by telephone during the pandemic and volunteers willing to take part in the study were asked the questions in Table 1. The questions in the survey are intended to reveal weight changes, changes in Epworth sleepiness scale (ESS) scores, use of PAP devices, COVID-19 PCR positivity, contact with polymerase chain reaction (PCR)-positive COVID-19 patients at home, anxiety due to the risk of COVID-19 infection, and the effect of this anxiety on application to hospital during the pandemic period. Patients who could not be contacted by telephone or who were not willing to participate were not included in the study. Telephone calls were made sequentially and on two different days for patients who could not be reached. The survey questions were asked after the patients' routine follow-up questions, and no changes were made to their follow-up. The ESS was made by asking questions by the phone.

Demographic information in the files of all patients contacted by telephone was confirmed. The patient's age, gender, body mass index (BMI), apnoea hypopnea index (AHI), comorbidities, ESS score before and after PAP therapy, and PAP device satisfaction score were recorded retrospectively from the patient's file. COVID 19 was defined as having a positive SARS-CoV-2 PCR test result.

Permission for this research was obtained with no. 2020/351 from the Ethics Committee of Gaziantep University and from the Ethics Committee of the Health Ministry of the Turkish Republic.

Table 1. Questions asked via telemedicine

1. Epworth sleepiness scale score during the pandemic
2. Has your weight changed during the pandemic? (Y/N) If yes, 1- weight loss, 2- weight same, 3- weight gain
3. Have you had PCR-positive COVID-19 disease? (Y/N)
4. Have you had contact with a PCR-positive COVID-19 patient at home? (Y/N)
5. Have you needed to apply to hospital in connection with your sleep disorder during the pandemic? (Y/N)
6. Do you experience anxiety towards applying to hospital due to the risk of COVID-19 infection? (score 1-10, 1-no anxiety at all, 10-the most severe feeling of anxiety)
7. Are you anxious about COVID-19 disease due to sleep apnea during the pandemic? (score 1-10, 1-no anxiety at all, 10-the most severe feeling of anxiety)
8. Have you used PAP device during the pandemic? (Y/N)
9. Is your use of the PAP device different from normal during the pandemic? (0- no use, 1- same use, 2- more use)
10. Has your sleep quality changed during the pandemic? (0- worse, 1- same, 2- better)

COVID-19: Coronavirus disease-2019, PCR: Polymerase chain reaction, PAP: Positive airway pressure

Statistical Analysis

To evaluate the data obtained in the study, suitability of the scalar variables for normal distribution was tested with Kolmogorov-Smirnov analysis. In paired correlation analyses of the scalar variables, Pearson's correlation test was used for those that conformed to normal distribution, while Spearman's analysis was used for data that did not conform. Chi-square analysis was made for analysing the relationships between categorical variables, while for comparison of scalar data for the subgroups of the categorical variables, the student t-test and Mann-Whitney U test were used for comparisons of two subgroups, and the One-Way ANOVA test and Tukey analysis were used for comparisons between three or more subgroups. For comparison of recurring scalar data, the general linear model for repeated measures was utilized. A value of $p<0.05$ was accepted as statistically significant with a 95% confidence interval.

Results

Among 535 patients at the sleep laboratory who had had polysomnography tests, a total of 202 patients agreed to take part in the study. Of these patients, 75% were male, and patients' mean age was 48±12 (Table 2). 62.9% patients had comorbidities, hypertension (27%) and type 2 diabetes (26%) were the most frequently seen comorbidities (Table 3). Among the patients who took part in the study, 98% had been diagnosed with OSAS, of whom 60% were severe cases, while 2.5% had been diagnosed with simple snoring (Table 2). Among patients diagnosed with OSAS, 26% used a CPAP device, while 18% used a BiPAP device and the remaining patients did not use a PAP device. When the benefit scale (0-5) for using PAP was examined, 63% of the patients using a device considered the device to be fully beneficial (5 points). While 50% of patients had not experienced weight changes during the pandemic, 12% patients had lost weight, while 38% patients had gained weight. In the patient group with COVID-19 PCR positivity, 6 (55%) had lost weight (Table 3).

COVID-19 was detected in 11 (5.4%) patients during the pandemic. Twelve (6%) patients were COVID-19 PCR negative but had domestic contact with PCR-positive COVID-19 cases (Table 3). When scoring between 1-10 was made in measurement of COVID-19-related anxiety due to OSAS, the mean score was 4.05 (±3.6). Among scores for anxiety, 104 (52%) patients gave 1 point, 37 (18%) patients gave 10 points, and 82 patients gave 5 or more points. In the question related to scoring of anxiety towards applying to hospital due to the risk of COVID-19 infection, when scoring was made between 1-10, the mean score was 6 (±4) (Table 2). For anxiety towards

Table 2. Descriptive statistics

n=202	Mean (SD)	Range
Age	48.1 (12.1)	18-86
BMI	33.2 (6.8)	21-62
AHI	46.6 (34)	2.1-145.1
Non-OSAS	5 (2.5%)	202
Mild-OSAS	35 (17.3%)	
Moderate-OSAS	42 (20.8%)	
Severe-OSAS	120 (59.4%)	
ESS at diagnosis	10 (5.6)	0-24
ESS in non-pandemic	8.1 (6.3)	0-24
ESS during pandemic	8.4 (6.4)	0-24
Anxiety attending hospital visit due to COVID-19	6.3 (3.8)	1-10
COVID-19 anxiety due to OSAS	4 (3.6)	1-10

SD: Standard deviation, COVID-19: Coronavirus disease-2019, BMI: Body mass index, AHI: Apnoea hypopnea index, ESS: Epworth sleepiness scale, OSAS: Obstructive sleep apnoea

Table 3. Questionnaire results and comorbidities

Participants (n=202)		n (%)
Sex	Male	152 (75.2%)
Marital status	Married	178 (88.1%)
Co-morbidity		127 (62.9%)
Co-morbidities	Hypertension	55 (27.2%)
	DM	53 (26.2%)
	Coronary artery disease	18 (8.9%)
	Heart failure	5 (2.5%)
	Asthma	32 (15.8%)
	COPD	7 (3.5%)
	Hypothyroidism	7 (3.5%)
	Hypercholesterolemia	6 (3%)
	Psychiatric disorder	4 (2%)
PAP device benefit	Use of pap before pandemic	89 (44.1%)
	0	1 (1.1%)
	1	9 (10.1%)
	2	1 (1.1%)
	3	9 (10.1%)
	4	13 (14.6%)
	5	56 (62.9%)
COVID-19 status	COVID-19 positive	11 (5.4%)
	Domestic COVID-19 contact	12 (5.9%)
Use of PAP devices in pandemic	No-use	136 (67.3%)
	Same-use	66 (32.7%)
	More-use	0
Sleep quality in pandemic	Worse	8 (4%)
	Same	39 (19.3%)
	Better	155 (76.7%)
Hospital visit for sleep disorders during pandemic	No	167 (82.7%)
	Yes	35 (17.3%)
Categoric weight change	Weight loses	24 (11.9%)
	Weight unchanged	101 (50%)
	Weight gain	77 (38.1%)

DM: Diabetes mellitus, COVID-19: Coronavirus disease-2019, PAP: Positive airway pressure, COPD: Chronic obstructive pulmonary disease

applying to hospital due to the risk of COVID-19 infection, 57 (28%) patients gave 1 point, while 81 (40%) patients gave 10 points. There were 141 (70%) patients giving a score of 5 or more (Table 3). In the Spearman correlation analysis, a positive correlation was found between anxiety towards applying to hospital due to the risk of COVID-19 infection and COVID-19-related anxiety due to OSAS (r=0.374, p<0.001), while no correlation was found between AHI, BMI, age and weight change (Table 4). During the pandemic period, 35 (17%) patients had felt the need to apply to hospital due to their sleep disorder, but only 30 (15%) patients had applied to hospital. In the Spearman correlation analysis, a positive correlation was found between ESS at diagnosis scores measured and anxiety towards applying to hospital due to the risk of COVID-19 infection (r=0.203, p=0.004), while a correlation was not found for age, AHI or BMI with this anxiety level (Table 4).

Participants' mean ESS scores were determined as 10 (±5.6) at the diagnosis stage, 8.1 (±6.2) prior to the pandemic following diagnosis, and 8.4 (±6.3) during the pandemic (Table 2). Although ESS scores were determined to be high in both the contact group and non-contact group during the pandemic, when the changes in scores were compared by measurement with the general linear model for repeated measures, an increase in ESS scores of those having domestic contact with COVID-19 was determined, and this was found to be significantly higher than in those without contact (Wilks' lambda test: p=0.035), while there was no correlation for COVID-19 positivity.

While 44% of all cases used a PAP device prior to the pandemic, 28% of PAP users abandoned device treatment during the pandemic. Nineteen (29%) of the patients who ceased to use a PAP device during the pandemic had comorbidities, and when the chi-square test was examined, association with diabetes was significant (p=0.05). Among patients who used PAP, 17 (26%) patients with severe OSAS and 6 patients with moderate OSAS (29%) ceased to use a PAP device during the pandemic. Among these patients, in scores for seeing the benefit of PAP (0-5 points), it was seen that 10 (82%) patients gave 5 points for full satisfaction. Among patients who abandoned use of a PAP device during the pandemic, 3 had COVID-19 PCR positivity, while 2 had domestic contact with COVID-19.

Regarding the question of comparing sleep quality during the pandemic to the pre-pandemic, 19% of the respondents reported the same, 4% worse, and 77% better. When ANOVA subgroup analysis was made, levels of COVID-19-related anxiety due to OSAS were significantly higher in those with poor sleep quality than in those with good sleep quality (Tukey, p=0.024). On the other hand, no relationship was found for sleep quality with age, gender, AHI, BMI or ESS scores during the pandemic. In the chi-square analysis, the rate of patients with good sleep quality who had contact with COVID-19 at home (56%) was significantly lower than that of patients with good sleep quality in the non-contact group (78%) (p=0.002), and COVID-19 positivity was also significantly higher in the group whose sleep quality was poor or remained the same (p=0.01).

Discussion

OSAS has many potential consequences including cardiovascular, endocrinologic and metabolic effects that requires follow-up. In this study, 127 (63%) patients had comorbidities, and the most frequently detected comorbidities entering the risky disease group for COVID-19. In COVID-19 infection, people with comorbidities are identified in the risk group for hospitalization, admission to intensive care, and mortality. The fact that the disorders most frequently accompanying OSAS are hypertension, cardiovascular diseases, diabetes and obesity, and that these are also a risk factor for COVID-19 disease has made monitoring of the OSAS patient group more important during the pandemic (8,9). Comorbidities in which COVID-19 pneumonia is severe are similar to comorbidities of OSA patients is the reason why patients with OSA are included in the risk group. Also, in a study conducted in the US with healthcare system data, all-cause mortality rates in COVID-19 patients with sleep apnoea were higher than in the control group (10).

Participants' mean BMI was 33 and they were included in the risk group for COVID-19. While there was no weight change in 50% of patients, 77 (38%) patients gained weight during the pandemic. In a study that included patients with COVID-19 disease, obesity was identified as a risk factor for the risk of connection to invasive mechanical ventilation, independently of diabetes, hypertension and age (11). The fact that obesity is identified as an independent risk factor for the risk of invasive mechanical ventilation makes the decrease in physical activity and increase in weight due to the restrictions in the pandemic period even more important. Weight gain is a factor increasing

Table 4. Correlations of anxiety about hospital admission due to COVID-19

Correlations

		Hospital admission anxiety due to COVID-19	COVID-19 anxiety due to OSAS	Weight change in the pandemic	Epworth in diagnosis	Epworth in pre-pandemic	Epworth in pandemic	AHI	BMI	Age
Hospital admission anxiety due to COVID-19	Correlation coefficient	1.000	0.374**	0.100	0.203**	0.194**	0.183**	0.093	0.051	0.115
	Sig. (2-tailed)		0.000	0.159	0.004	0.006	0.009	0.187	0.473	0.104

COVID-19: Coronavirus disease-2019, **Correlation is significant at the 0.01 level (2-tailed), *Correlation is significant at the 0.05 level (2-tailed), BMI: Body mass index, AHI: Apnoea hypopnea index

mortality and morbidity for both OSAS and COVID-19, and it also increases the risk for existing cardiovascular diseases and diabetes.

The number of patients reporting regular use of a PAP device decreased from 89 (44%) to 25 (12%) during the pandemic. Although 59% patients had severe OSAS and 20.8% had moderate OSAS, while 44% of all cases regularly used a PAP device before the pandemic, the rate of use decreased during the pandemic. COVID-19 positive patients and those in contact with the disease at home who ceased to use a PAP device may have interrupted their treatment because use of PAP increases the risk of infection. Since PAP use creates a situation in which the risk of COVID-19 virus aerosol infection is high, the isolation of PCR-positive COVID-19 patients or those in contact with the disease who use PAP is appropriate. It is recommended that patients using PAP during the COVID-19 pandemic stay alone in the room, and that the room is regularly ventilated (12). Six of the patients who discontinued PAP treatment needed hospital admission due to sleep apnoea. This shows that device use may be suspended due to disruption in OSAS follow-ups during the pandemic.

It is not surprising that anxiety levels increased in OSAS patients, who are in the risk group for COVID-19. A positive correlation was found between COVID-19-related anxiety due to OSAS and anxiety towards applying to hospital due to risk of COVID-19 infection ($r=0.374$ $p<0.001$), and this high level of anxiety may have resulted in delay in applying to hospital. A positive correlation was also found between ESS at diagnosis scores measured and anxiety towards applying to hospital due to risk of COVID-19 infection ($r=0.203$ $p=0.004$). During the pandemic, for patients with high ESS scores measured during diagnosis, with a priority arrangement, hospital follow-ups can be made at more frequent intervals via telemedicine. In the pandemic period, there is a need for technological infrastructure and health systems that will enable patients who are unable to come to hospital to apply remotely. Anxiety towards applying to hospital may increase mortality and morbidity of diseases other than COVID-19 during the pandemic. Alternative methods are needed for situations that make it difficult to apply to the hospital, such as a pandemic. For health services in sleep centres in the future, home follow-up and treatment systems should be developed, such as measurement of ESS scores with video telephone calls, use of masks, checking apnoea scores with remote connection of PAP devices, and smartphone sleep applications. In Turkey, a legal infrastructure and rules of medical ethics must be created for telemedicine systems. For telemedicine in our country, there is a need to revise the infrastructures related to appointments, fees, registration, reporting and responsibility in healthcare systems.

When patients' mean ESS scores at diagnosis, following diagnosis before the pandemic, and during the pandemic were examined, ESS scores in those having contact with COVID-19 during the pandemic increased, and were significantly higher than those who did not have contact. OSAS patients who have contact with COVID-19 during the pandemic should be monitored at home, and these people who have an increased risk of hypoxemia during sleep, must be encouraged to use a PAP device. In follow-ups via telemedicine, training for the use of a PAP device and recommendations for reducing infection can be given to patients or in cases of contact. In sleep centres in Europe, while 82.5% of PAP treatment follow-ups were performed in laboratories, this rate fell to 7.5% during the pandemic, whereas the rate of remote monitoring methods via telephone calls increased to 75% and the rate of telemonitoring rose to 57.5% (5). The development of remote monitoring systems alongside laboratory-based follow-up by sleep centres can be a method of reducing mortality and morbidity related to OSAS. As in Europe, the cheapest and most frequently used method of remote monitoring in Turkey is the telephone call. Hospital systems that do registration for telephone calls and internet-based video calls are required.

Interestingly, during the pandemic 19% participants reported that their sleep quality was the same, and 77% responded that it was better. During the pandemic, sleep disorders were seen more frequently among healthcare staff in the population, aged under 35 and the group focusing on the pandemic for at least 3 hours per day (13). The mean age of participants in this study was older than 35, and none of them were healthcare personnel. Many staff were obliged to continue their work from home during the quarantine period, and worked with flexible hours. Sleep patterns of people who were not required to work in the mornings may have changed. In a study, during the quarantine period, clinically significant improvement in one in four patients with insomnia was determined, while it was seen that 20% of those who slept well before the pandemic experienced worse sleep during the pandemic (14). In this study, COVID-19-related anxiety levels due to OSAS were significantly higher in those with poor sleep quality than in the group with good sleep quality, and existing anxiety had a negative effect on sleep quality. It has been shown that sleep patterns such as decrease in night sleep, increase in daytime napping and sleeping in the late hours have changed with the lockdown of the pandemic period. It was observed that those with short sleep duration were accompanied by depressive symptoms (15). In our study, sleep quality decreased in patients in domestic contact with COVID-19 and in those with COVID-19 positivity during the pandemic. The fact that a section of the group with worse sleep quality during the pandemic had a significantly high level of anxiety related to COVID-19 can be explained with COVID-19 contact at home ($p<0.001$). In this study, sleep quality was affected by COVID-19 contact at home and levels of anxiety related to COVID-19.

Study Limitations

The limitations of the study are that less than half of patients registered at the sleep laboratory could be contacted by telephone, and that weight changes, periods of PAP device use, or COVID-19 PCR tests could not be confirmed. There may also have been patients whose PCR test for COVID-19 was negative but who were diagnosed clinically and radiologically. A question related to negative PCR COVID-19 disease was not asked in the study.

Conclusion

In the future, there will be an important need for remote diagnosis, monitoring and treatment of patients with OSAS for reasons such as other pandemics, climate conditions that make it difficult for us to leave the home due to global warming, changing living conditions, and increase in the geriatric population. Since OSA patients are included in the risk group for mortality and morbidity during the COVID-19 pandemic, we recommend that priority is given to monitoring of patients with high ESS and those who are COVID-19 positive and come into contact with the disease at home, and that primarily, patients' monitoring is continued with methods such as telemedicine without the need to come to hospital.

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Ethics

Ethics Committee Approval: Permission for this research was obtained with no. 2020/351 from the Ethics Committee of Gaziantep University and from the Ethics Committee of the Health Ministry of the Turkish Republic.
Informed Consent: Informed consent was obtained.
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Authorship Contributions

Concept: F.F., Design: F.F., N.B., Data Collection or Processing: N.B., Writing: F.F.
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