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Does face mask affects sleep quality in patients with nasal septal deviation: evaluated by mini sleep questionnarie

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ABSTRACT

Objectives: The aim of this study was to investigate the effects of face mask usage on the sleep quality of patients with nasal septal deviation.

Material and Method: Thirty-four patients with unilateral nasal septum deviation (Group 1) and 27 healthy subjects without septum deviation (Group 2, control) were included in the study. Mask usage time per day (hours) in the last week, weight, length and BMI values, smoking, and alcohol habits were asked. In both groups, the sleep quality of the patients was evaluated by Mini Sleep Questionnaire (MSQ). Sleep delay (SD), sleep awakenings (SA), sleep medications (SM), daytime sleep (DS), morning fatigue (MF), habitual snoring (HS), morning awakening (MA), morning headache (MH), chronic fatigue (CF), and restless sleep (RS); and total MSQ items were evaluated.

Results: All subjects used surgical masks. In the nasal septal deviation group, the right-sided deviation was detected in 15 (44.1%) patients and left-sided deviation was detected in 19 (55.9%) patients. Deviation located was anterior deviation in 12 (35.3%) patients, posterior deviation in 13 (38.2%) patients and antero-posterior deviation in 9 (26.5%) patients. Sleep Medications (SM) and Morning Headache (MH) values of the deviation group (Group 1) were significantly lower than those in the control group ($p<0.05$). There was no difference between other MSQ items and total MSQ score of the septal deviation and control groups ($p>0.05$). In older patients with septal deviation, Sleep Awakenings (SA), Habitual Snoring (HS), Morning Awakening (MA), and Total MSQ scores increased ($p<0.05$)

Conclusion: Facial mask usage did not cause sleep disorders in patients with nasal septal deviation. However, aging may cause disturbed sleep quality.

Keywords: Facial mask, surgical mask, nasal septal deviation, mini sleep questionnaire (MSQ).

INTRODUCTION

Sleep is a physiological, psychological, and social need. The basic and indispensable daily life activity that affects the quality of life and is essential for the health of individuals. The importance of sleep applies to all ages. Sleep disorders are quite common in the population. In a study conducted in the USA, its prevalence was foundto be 30% on average (1).

The importance of sleep is an issue that has come to the fore in recent years. Sleep disorder is an important pathology that affects the quality of life, daily life, and the work-life all at once. While we have objective surveys to test sleep disorders (polysomnography etc.), subjective tests and questionnaires are also frequently used (1).

The Mini-Sleep Questionnaire (MSQ) is a subjective test developed by Zomer et al. (2) for screening sleep disturbances in large populations. Although the questionnaire is used in large populations, there have been examples of it used in limited populations (3). It is a test that is easy to use and evaluate and does not force the participating patients. It contains 10 questions and the answers are scored with 1, 4, 7, respectively, and statistical evaluation is made (2).

Nasal obstruction is a common condition in patients presenting to the ear-nose-throat clinics.

The most common cause of nasal obstruction is septum deviation. In studies conducted, it was stated that nasal deformities and the most common cause of septum deviation are seen with an average of 70% prevalence (3). Getting less sleep was reported in a third of adults. Sleep disorders may cause an increase in health problems of the persons (5). However, causes of nasal obstruction are the leading causes of sleep disorders (6-9).

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While surgical masks are common equipment used by healthcare professionals, they have turned into equipment commonly used by the entire population with the COVID-19 pandemic. At the beginning of the study, the effect of using a face mask on sleep quality was investigated in patients with and without nasal septal deviation, predicting that there may be decreases in sleep quality with nasal masks. Another hypothesis was that the negative effect of septal deviation on sleep could be further increased by facial mask.

MATERIALS AND METHOD

The study was carried out with the permission of Kırıkkale University Non-interventional Researches Ethics Committee (Date: 09.12.2022, Decision No: 2021.12.17). All steps were performed according to the rules outlined in the Declaration of Helsinki. Written consent was obtained from all subjects to participate in the study. Study data were collected between 10.12.2021 and 20.01.2022.

Subjects

Thirty-four patients (18 males and 16 females), applied to Kırıkkale University Medical Faculty, otorhinolaryngology policlinics and were diagnosed with unilateral nasal septum deviation were included as the study group (Group 1). The mean age of the patients in Group 1 was 32.23± 11.34 years (Ranging from 18 to 60 years). The flow diagram is shown in **Figure 1**.

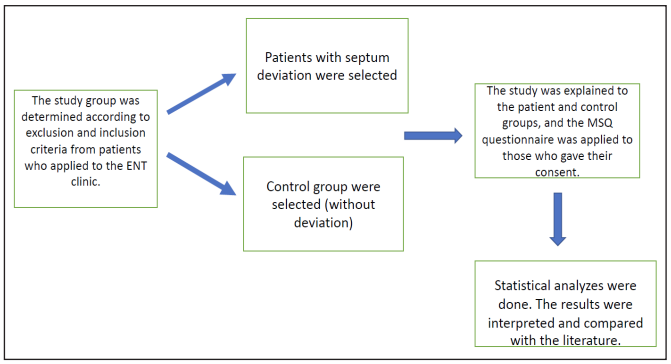

Figure 1. Flow diagram of study

Twenty-seven healthy subjects (11 males and 16 females) without septum deviation were included in the control group (Group 2). The mean age of the patients in Group 2 was 27.33±7.94 years (Ranging from 18 to 43 years).

Mask usage time per day (hours) in the last week was asked. All subjects in group 1 and 2, weight, length and BMI values, smoking, and alcohol habits were asked. All subjects used surgical masks.

Exclusion Criteria

Patients with chronic diseases, inferior turbinate hypertrophy, bilateral nasal septal deviation, nasal polyps, a nasal mass, psychiatric illness, chronic obstructive lung diseases were excluded from the study.

Inclusion Criteria

Patients with unilateral nasal septum deviation, routine use of nasal mask during the day, age of 18-65 years were included in study.

Patients who wanted to withdraw from the study and whose additional diseases were determined were excluded from the study, which created a difference in the number of patients between the groups.

Mini Sleep Questionnaire (MSQ)

A 10-point MSQ focused entirely on sleep quality. This questionnaire consisted of questions concerning actors disturbing or affecting sleep, with responses indicated on a frequency scale of 1-7 (1=never, 4 =sometimes, 7=always). Mean scores in normal sleepers across different age groups were 2.1-2.5 with a standard deviation of 1.3 or1.4. Items of the 10-point MSQ are:1) Sleep delay (SD), 2) sleep awakenings (SA), 3) sleep medications (SM), 4) daytime sleep (DS), 5) morning fatigue (MF), 6) habitual snoring (HS), 7) morning awakening (MA), 8) morning headache (MH), 9) chronic fatigue (CF), and 10) restless sleep (RS) (see **Appendix 1**) (1).

Appendix 1: Mini Sleep Questionnaire (MSQ)1		
Name - Surname:	**Telephone:**	**Date:**
1. Have you had difficulties in falling asleep? (SD: Sleep Delay)		
a) Never	b) Sometimes	c) Always
2. How often have you awakened at night? (SA: Sleep Awakenings)		
a) Never	b) Sometimes	c) Always
3. Do you use sleeping pills? (SM: Sleep Medications)		
a) Never	b) Sometimes	c) Always
4. Do you feel excessively sleepy during the daytime? (DS: Daytime Sleep)		
a) Never	b) Sometimes	c) Always
5. Do you wake up in the morning tired? (MF: Morning Fatique)		
a) Never	b) Sometimes	c) Always
6. Do you snore during sleep? (HS: Habitual Snoring)		
a) Never	b) Sometimes	c) Always
7. How often have you awakened too early in the morning without being able to fall asleep again? (MA: Morning Awakening)		
a) Never	b) Sometimes	c) Always
8. Do you wake up in the morning with headaches? (MH: Morning Headache)		
a) Never	b) Sometimes	c) Always
9. Do you constantly feel tired? (CF: Chronic Fatique)		
a) Never	b) Sometimes	c) Always
10. Do you have restlessness in sleep? (RS: Restless Sleep)		
a) Never	b) Sometimes	c) Always

Statistical Analysis

The data obtained in this study were analyzed with the SPSS v.20 program. Independent samples t-test, Mann

Whitney U test, Kruskal Wallis Variance analysis, Spearman's correlation rho efficient test and, Chi-square test were used. The results were interpreted at a significance level of 0.05. Power analysis was performed by G*Power 3.1.9.2 programme. Actual power was 0.80 (α error: 0.20, β error:0.80) (one tail) and calculated total sample size was 46 including 23 samples for Group 1 and 23 samples for Group 2. Actual power was 0.75 (α error: 0.25, β error:0.75) (two tails) and calculated total sample size was 54 including 27 samples for Group 1 and 27 samples for Group 2.

RESULTS

In the nasal septal deviation group, there were 18 males (52.9%) and 16 females (47.1%). In the control group, there were 11 males (40.7%) and 16 females (59.3%) (p=0.343, $\chi 2$=0.898). There were no significant differences between the ages of the groups (p>0.05) (Table 1). Mean body mass index (BMI) values of groups 1 and 2 were 24.57±4.04 kg/m2 and 24.29±4.14 kg/m2 respectively (p>0.05) (**Table 1**). Brinkmann Index values of the groups 1 and 2 were 2.50±5.36 and 1.03±2.80 respectively (p>0.05) (Table 1). Alcohol consumption was detected only in one participant in the control group. Mean mask usage time was 4.82±3.70 hours/day in the Septal deviation group and 6.03±3.33 hours/day in the control group (p>0.05) (**Table 1**).

In septal deviation group, deviation located was anterior deviation in 12 (35.3%) patients, posterior deviation in 13 (38.2%) patients and antero-posterior deviation in 9 (26.5%) patients. Right-sided deviation was detected in 15 (44.1%) patients and left-sided deviation was detected in 19 (55.9%) patients.

MSQ items and the total MSQ score of the septal deviation and control groups were presented in Table 1. Sleep Medications (SM) values of the deviation group (Group 1) (Mean rank= 28.50) were significantly lower than those in the control group (Group 2) (Mean rank= 34.15) (p<0.05). Morning Headache (MH) values of the deviation group (Group 1) (Mean rank= 27.60) were significantly lower than those in the control group (Group 2) (Mean rank= 35.28) (p<0.05). The other 8 MSQ items [Sleep Delay (SD), Sleep Awakenings (SA), Daytime Sleep (DS), Morning Fatigue (MF), Habitual Snoring (HS), Morning Awakening (MA), Chronic Fatigue (CF), Restless Sleep (RS)] and total MSQ scores were not different between the septal deviation and control groups (p>0.05) (**Table 1**).

In the septal deviation group, deviation location and MSQ items were shown in Table 2. There were no significant differences between MSQ items and total MSQ scores between the anterior, posterior and antero-posterior septal deviation groups (p>0.05) (**Table 2**).

Correlation Test Results in Septal Deviation Group

There were no significant correlations between MSQ items and total MSQ score; and facial mask usage time (hours), BMI, Brinkmann Index, Deviation side (right or left), or gender (p>0.05) (**Table 3**).

In older patients with septal deviation, Sleep Awakenings (SA), Habitual Snoring (HS), Morning Awakening (MA), and Total MSQ scores increased (p<0.05) (**Table 3**).

Table 1. MSQ items in the nasal septal deviation and control groups

	Group 1 (Nasal septal deviation) (n=34)			Group 2 (Control) (n=27)			P
	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.	
Age*	32.23	28.50	11.34	27.59	26.00	7.57	0.073
BMI	24.57	23.80	4.04	24.29	23.78	4.14	0.788
Brinkmann index	2.50	0.00	5.36	1.03	0.00	2.80	0.341
Mask usage time (hours/ day)	4.82	3.00	3.70	6.03	6.00	3.33	0.139
MSQ items¶							
SD**	4.26	4.00	1.86	3.66	4.00	1.92	0.221
SA**	4.17	4.00	1.94	4.22	4.00	1.84	0.934
SM**	1.00	1.00	0.00	1.88	1.00	2.00	0.009
DS**	4.08	4.00	1.56	3.44	4.00	1.67	0.124
MF**	4.08	4.00	1.37	4.33	4.00	1.92	0.526
HS**	3.11	4.00	2.02	3.33	4.00	1.92	0.629
MA**	3.38	4.00	2.05	3.44	4.00	2.04	0.898
MH**	2.85	4.00	1.47	3.77	4.00	1.84	0.049
CF**	3.91	4.00	1.56	4.22	4.00	1.64	0.449
RS**	3.29	4.00	1.96	3.22	4.00	1.57	0.987
Total score*	33.70	32.50	9.01	34.88	37.00	10.71	0.641

*p value shows the results of Independent samples t-test, **p value shows the results of Mann Whitney U test, ¶SD: Sleep Delay, SA: Sleep Awakenings, SM: Sleep Medications, DS: Daytime Sleep, MF: Morning Fatigue, HS: Habitual Snoring, MA: Morning Awakening, MH: Morning Headache, CF: Chronic Fatigue, RS: Restless Sleep.

Table 2. In septal deviation group, deviation location and MSQ items

MSQ items¶	Group 1 (Anteriordeviation) (n=12)			Group 2 (Posteriordeviation) (n=13)			Group 3 (Antero-posteriordeviation) (n=9)			P*
	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.	
SD	4.00	4.00	1.27	4.46	4.00	2.06	4.33	4.00	2.34	0.782
SA	3.75	4.00	2.37	4.23	4.00	1.92	4.66	4.00	1.32	0.591
SM	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.000
DS	4.25	4.00	1.54	4.00	4.00	1.22	4.00	4.00	2.12	0.906
MF	4.25	4.00	0.86	3.76	4.00	1.48	4.33	4.00	1.80	0.566
HS	2.50	2.50	1.56	3.53	4.00	2.40	3.33	4.00	2.00	0.490
MA	2.75	2.50	2.00	3.30	4.00	2.17	4.33	4.00	1.80	0.197
MH	3.00	4.00	1.47	2.38	1.00	1.55	3.33	4.00	1.32	0.306
CF	4.25	4.00	1.54	3.53	4.00	1.66	4.00	4.00	1.50	0.512
RS	3.25	4.00	1.86	3.07	1.00	2.56	3.66	4.00	1.00	0.607
Total score	31.66	31.00	7.52	33.30	34.00	11.23	37.00	37.00	7.03	0.351

¶SD: Sleep Delay, SA: Sleep Awakenings, SM: Sleep Medications, DS: Daytime Sleep, MF: Morning Fatigue, HS: Habitual Snoring, MA: Morning Awakening, MH: Morning Headache, CF: Chronic Fatigue, RS: Restless Sleep. *p value shows the results of Kruskal Wallis Variance analysis

Table 3. Correlation test results in nasal septal deviation group*

		MSQ Items										Total MSQ Score
		SD	SA	SM**	DS	MF	HS	MA	MH	CF	RS	
Facial mask usage time (hours)	r	0.107	-0.074		-0.041	-0.027	-0.157	-0.180	0.044	0.091	0.019	-0.138
	p	0.548	0.678		0.818	0.879	0.376	0.308	0.806	0.608	0.917	0.438
Body mass index	r	0.012	0.237		-0.295	-0.150	0.136	0.114	0.083	0.181	-0.006	-0.015
	p	0.948	0.178		0.091	0.397	0.442	0.522	0.640	0.306	0.973	0.933
Brinkmann index	r	0.156	0.084		0.255	0.141	0.260	-0.112	0.133	0.190	0.226	0.110
	P	0.379	0.637		0.146	0.426	0.137	0.527	0.454	0.281	0.199	0.535
Deviation side (Code 1: Right sided SD, Code 0: Left sided SD)	r	0.077	-0.164		-0.051	0.334	-0.100	-0.156	-0.154	0.051	0.047	-0.055
	p	0.666	0.353		0.776	0.054	0.575	0.379	0.384	0.776	0.792	0.759
Age	r	0.107	0.404		-0.084	0.114	0.533	0.458	0.009	0.106	0.325	0.409
	p	0.547	0.018		0.638	0.521	0.001	0.006	0.959	0.550	0.060	0.016
Gender (Code 1: Male, Code 2: Female)	r	0.156	-0.082		0.291	0.072	-0.132	-0.059	0.014	0.050	-0.053	0.070
	p	0.378	0.646		0.095	0.684	0.456	0.739	0.936	0.777	0.764	0.696

*p value shows the results of Spearman's correlation rho efficient test, **All subjects in group 1 had 1.00 points for this item

DISCUSSION

Nasal obstruction is common in the population at a rate of 70-80% and septum deviation was detected incidentally as 40% in tomography scans (4). Many studies have shown that septum deviation has a negative effect on the quality of life and sleep quality (6-9). It is seen that the complaints of nasal obstruction increase with the use of masks in patients who apply to otolaryngology clinics (10).

In the present study, we investigated the effects of face mask usage on the sleep quality of patients with nasal septal deviation. Sleep quality was evaluated by MSQ (2).

Our results showed that Sleep Medications (SM) and Morning Headache (MH) values of the deviation group (Group 1) were significantly lower than those in the control group. There was no differences between other MSQ items and the total MSQ score of the septal deviation and control groups. We thought that surgical mask usage in the nasal septal deviation patients did not disturb sleep quality evaluated by MSQ.

In the nasal septal deviation group, the right-sided deviation was detected in 15 (44.1%) patients and left-sided deviation was detected in 19 (55.9%) patients. Deviation located was anterior deviation in 12 (35.3%) patients, posterior deviation in 13 (38.2%) patients and antero-posterior deviation in 9 (26.5%) patients. There were no significant differences between MSQ items and total MSQ scores between the anterior, posterior and antero-posterior septal deviation groups. We considered that deviation location did not affect the sleep quality of patients who used facial masks.

Correlation tests showed that there were no significant correlations between MSQ items and total MSQ score; facial mask usage time (hours), BMI, Brinkmann Index, Deviation side (right or left), or gender. However, in older patients with septal deviation, Sleep Awakenings (SA), Habitual Snoring (HS),, Morning Awakening (MA), and Total MSQ scores increased. It can be said that aging disturbed sleep quality of the septal deviation patients. Similarly, in the literature, it was reported that deviation of the septum and use of masks further affect sleep quality with increasing age (11).

In studies conducted in the literature, it was observed that the frequency of nasal blockage, mucosal crusting, nasal resistance, and nasal congestion increased with the rise in the duration of mask use (10). However, there are also studies showing that the use of masks can only increase nasal resistance and that compensatory mechanisms are activated and nasal flow is corrected (12).

According to the results of our study, daily mask usage did not cause any abnormalities in the MSQ scores of the group with septal deviation even though the fact that there are many types of these surgical masks and some masks do not have sufficient filtration features. As our nasal septal deviation patients' surgical mask usage did not disturb sleep quality, we thought that their surgical masks may have optimal filtration quality and did not increase nasal blockage and congestion.

In the literature (13,14), in the comparison of N95 masks and surgical masks; nasal blockage, mucociliary disorders, and postnasal discharge scores were observed more frequently in the use of N95 masks. In our study, we may not have seen these effects more clearly, since there were no patients using N95 masks routinely.

Obstructive sleep apnea (OSA) is one of the most common sleep disorders (15,16). Septum deviation is an anatomical disorder that contributes significantly to OSA. Since aging is a risk factor for the development of OSA (10), its prevalence is expected to increase with increasing life expectancy. OSA patients were not directly targeted in our study, but it should be noted that some of the nasal septal deviation patients are candidates for OSA patients in the future.

The fact that sleep medication scores are lower in patients with facial mask and septal deviation group is considered a paradox. However, it is known that these patients have lower sleep quality (17,18). In addition, since the need for sleep and daytime sleep is higher in this population, the transition to sleep is faster (19). Therefore, it was thought that they might need sleep medication less than the normal population. The use of drugs is not recommended in patients with obstructive sleep disorders, it has been observed that the use of hypnotic drugs-sleep medicaitons does not increase sleep quality and does not increase compliance with the use of positive pressure masks (20).

Limitations

The number of samples in our study can be considered as a limitation. However, the continuation of the pandemic and the fact that patients do not want to spend much time in hospitals and polyclinics limited the number of samples. Moreover, patients using N95 and other similar masks, which were used more at the beginning of the pandemic but whose use is gradually decreasing, could not be found and a comparison between the masks could not be made.

CONCLUSION

Facial mask usage did not cause sleep disorders in patients with nasal septal deviation. However, aging may cause disturbed sleep quality especially for the items of increased Sleep Awakenings (SA), Habitual Snoring (HS), Morning Awakening (MA), and Total MSQ scores in MSQ evaluation.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Kırıkkale University Non-interventional Researches Ethics Committee (Date: 09.12.2022, Decision No: 2021.12.17).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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