Determination of the risk of obstructive sleep apnea syndrome in individuals aged 18 years and above

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SUMMARY

OBJECTIVE: This study aimed to increase awareness by determining the risk of obstructive sleep apnea syndrome in individuals aged 18 years and above.
METHODS: The study is a descriptive and cross-sectional study. A total of 633 individuals aged 18 years and above participated in the study. The data were collected online from individuals in the form of describing the demographic characteristics of individuals and with the Berlin survey. The IBM SPSS statistics 26.0 program was used in the analysis of the data.
RESULTS: In this study, 38.9% of individuals were found to be at high risk for obstructive sleep apnea syndrome. A significant relationship was found between the risk of obstructive sleep apnea syndrome and gender, age, body mass index, education level, chronic obstructive pulmonary disease, diabetes, hypertension, presence of cardiovascular diseases, and smoking (p<0.05).
CONCLUSION: The results of this study showed that male gender, increasing age, obesity, presence of chronic disease, and smoking increase the risk of obstructive sleep apnea syndrome. Defining the risk of obstructive sleep apnea syndrome, especially in risky groups, will be effective in planning health care, increasing the effectiveness of treatment, and improving the quality of life. It is recommended to include this diagnosis in health care protocols and to expand its use in order to plan and repeat trainings that will emphasize its importance.
KEYWORDS: Care. Obstructive sleep apnea syndrome. Prevalence.

INTRODUCTION

Sleep is a decrease in the sensitivity of individuals to the external environment and is a state of inactivity that can be quickly reversed[1]. Sleep, which covers one-third of human life, is one of the basic human needs. Sleep allows the body to rest and regenerate. A quality sleep is needed to be healthy and spend the day active[2]. Sleep problems, which can be seen in every society, cause individuals to be unable to focus, restlessness, psychological disorders, and problems in interpersonal communication, resulting in a decrease in their quality of life[3]. One of the sleep disorders affecting sleep is obstructive sleep apnea syndrome (OSAS).

Obstructive sleep apnea syndrome is a condition characterized by respiratory arrest due to upper airway obstruction during sleep and thus a decrease in oxygen saturation in the blood. Common symptoms of sleep apnea syndrome are snoring, apnea, and sleepiness during the day[4]. Risk factors of OSAS in studies include obesity, male gender, race, anatomical factors, pregnancy, middle and advanced age, thick neck circumference, genetic factors and diabetes, upper respiratory tract abnormalities, chronic obstructive pulmonary disease

(COPD), hypothyroidism, acromegaly, excessive androgen secretion, multiple sclerosis, and amyotrophic lateral sclerosis[5,6]. If OSAS is not treated, it is a cause of morbidity and mortality[5]. Epidemiological studies show that the frequency of OSAS is increasing (2–26%)[7]. When we look at the literature, there are studies that study the prevalence of OSAS in the general population[8-11], but new studies that will raise awareness are needed. This study aimed to increase awareness by determining the risk of OSAS in individuals aged 18 years and above.

METHODS

Study design
This is a descriptive and cross-sectional study.

Sample of the research
The sample of the study consisted of individuals aged 18 years and above in Turkey. A total of 633 individuals who voluntarily accepted to participate in the study were informed about the research and their rights, and their "informed consent" was

obtained before the research. All the rights of the participants were respected, and attention was paid to the principles of voluntariness and confidentiality.

Data collection method
Data were collected by an online survey method between 15 May and 15 June 2023.

Data collection
While collecting the data, a form describing the demographic characteristics of the individuals and the Berlin questionnaire were used.

Demographic characteristics identification form of individuals The data were created by scanning the literature, and it is an eight item form that includes questions about age, gender, educational status, height, weight, whether there is any additional disease (diabetes, hypertension, COPD, and cardiovascular diseases), smoking, and alcohol use.

Berlin survey
The Berlin questionnaire was created in 1996 at the "Sleep Conference in Primary Care" in Berlin, Germany. This questionnaire is used to determine the risk of OSAS[12], and it consists of 10 questions and 3 categories in total. Each category is evaluated on its own. If the answer to at least two questions in the first two categories is one point, that category is positive. In the third category, if the blood pressure question is answered yes or BMI is >30, this category is positive. OSAS risk is considered high if at least two of the three categories result in a positive result. If only one category is positive or no category is positive, the risk of OSAS is considered low. The validity and reliability study of the Berlin questionnaire was conducted by Acar et al., and the sensitivity of the questionnaire was 87.9%, its specificity was 15.6%, and its positive predictive value was 68.2%[13].

Data analysis
The IBM SPSS Statistics 26.0 program was used for statistical analysis in the study. While evaluating the study data, in addition to descriptive statistical methods (e.g., mean, standard deviation, frequency, and percent), the chi-squared test was used to evaluate the relationships between the variables. The results were evaluated at the 95% confidence interval and the significance level of $p < 0.05$.

Ethical approval
Written informed consent for inclusion in the study was obtained from all patients. The study approval was obtained from the local ethics committee (İstanbul Gelişim University Ethics Committee, date and number: 19.04.2023/2023-04-88). The study was conducted in accordance with the Declaration of Helsinki.

RESULTS
The demographic characteristics of the individuals participating in the study are shown in Table 1. It was determined that 65.2% of the participants were women, 51% were university graduates, and the average age was 37.80±12.00 years. While the mean body mass index (BMI) of the individuals was found to be 26.28±4.71, in a situation where whether they had an additional chronic disease or not, the ones with hypertension (8.7%) were determined with the highest rate. It was found that 32.5% of the participants were smokers and 14.8% used alcohol. As a result of the Berlin questionnaire applied to individuals, a high risk of OSAS was found in 246 (38.9%) of 633 individuals (Table 1).

Table 1. Demographic characteristics of individuals and frequency and severity of obstructive sleep apnea syndrome (n=633).

	n	%
Gender		
Male	220	34.8
Female	413	65.2
Age (mean)	37.80±12.00	
Body mass index (BMI) (mean)	26.28±4.71	
Educational status		
Literate	17	2.7
Primary school graduate	51	8.1
Secondary school graduate	41	6.5
High school graduate	201	31.8
Graduate	323	51.0
Diabetes	46	7.3
COPD	6	0.9
Cardiovascular disease	26	4.1
Hypertension	55	8.7
Smokers	206	32.5
Alcohol users	94	14.8
Category 1 (risk of sleep apnea)	166	26.2
Category 2 (risk of sleep apnea)	118	18.6
Category 3 (risk of sleep apnea)	174	27.5
High risk of sleep apnea	246	38.9

Descriptive statistical methods (mean, standard deviation, frequency, and percentage).

The relationship between the demographic characteristics of the participants and the risk of OSAS is shown in Table 2. A significant relationship was found between the individuals'

Table 2. The relationship between the demographic characteristics of individuals and the risk of obstructive sleep apnea syndrome (n=633).

	Low risk (n)	High risk (n)	Total (n)	p
Gender				
Male	108	112	220	**0.001**
Female	279	134	413	
Age (years)				
≥38	78	168	246	**0.001**
<38	228	159	387	
BMI				
≥30	143	103	246	**0.001**
<30	354	33	387	
Educational status				
Literate	12	5	17	
Primary school graduate	22	29	51	
Secondary school graduate	20	21	41	**0.021**
High school graduate	127	74	201	
Graduate	206	117	323	
Hypertension				
Yes	17	38	55	**0.001**
No	370	208	578	
Diabetes				
Yes	13	33	46	**0.001**
No	374	213	587	
Cardiovascular disease				
Yes	9	17	26	**0.005**
No	378	229	607	
COPD				
Yes	1	5	6	**0.025**
No	386	241	627	
Smoking				
Yes	113	93	206	**0.024**
No	274	153	427	
Alcohol use				
Yes	55	39	94	0.571
No	332	207	539	

Chi-squared test is used. Statistically significant values are indicated in bold.

gender, age, BMI, education status, hypertension, cardiovascular disease, diabetes, COPD, smoking status, and OSAS risk (p<0.05). Since the mean age was 37.80±12.00 years, the age of 38 years was considered as the limit. In Category 3 of the Berlin survey, BMI of 30 was considered as the limit, since those with BMI 30 and above are at high risk. The risk of OSAS increases as age and BMI increase. For primary school graduates, the risk of hypertension, diabetes, and cardiovascular diseases is higher, meanwhile, for people with COPD and smokers, the risk of OSAS is higher.

DISCUSSION

In this study, OSAS was found to be high risk in 38.9% of individuals aged 18 years and above (Table 1). A significant relationship was found between OSAS risk and gender (p<0.05). The risk of OSAS in men (50.9%) is higher than in women (32.4%) (Table 2). In the study carried out by Vasu et al., while the incidence of OSAS was between 2 and 26%, it was found to be higher in males (24%) than females (9%)[14]. Karadöl stated in his study that the incidence of OSAS is higher in men than in women[15]. In this study, the risk of OSAS, which is more common in men than in women, is similar to that reported in the literature. However, considering the incidence in the general population, it is observed that the risk of OSAS detected in this study is higher than the results reported in the literature. In this study, it is thought that the presence of chronic disease and high age, which affect the risk of OSAS, affect the results of the study, and hence the risk of OSAS is high in this study compared with the results reported in the literature.

In this study, a significant relationship was found between OSAS risk and age (p<0.05). In the age comparison taken by calculating the mean age of the individuals participating in the study (37.80±12.00 years), the risk of OSAS was found to be higher in individuals aged 38 years and above (Table 2). Leppänen et al., and Senaratna et al., found OSAS to be 10 and 17% in the ages of 30–49 and 50–70 years in men, respectively, while it was 3% between the ages of 30 and 49 years and 9% between the ages of 50 and 70 years in women[16,17]. The results of this study are also similar to the results of the literature. With aging, irreversible physical changes occur in the systems of the organism. With aging, sleep problems can be experienced due to the increase in exposure to the environment, movement restrictions, and the increase in chronic diseases.

A BMI of 30 and above is observed as a high risk in OSAS. In this study, a significant relationship was found between OSAS risk and BMI (p<0.05). Individuals with BMI ≥30 are

at higher risk for OSAS than those with BMI <30 (Table 2). Ataç et al., found that the risk of OSAS increases with obesity[18]. In the study conducted by Dacal Quintas et al., a higher risk of OSAS was observed in obese patients than in normal-weight patients[19]. The results of this study and the literature are similar to the fact that obese individuals have a higher risk of OSAS than normal-weight individuals. In the study conducted by Schwartz et al., a relationship was determined between central obesity and the width of the neck diameter and OSAS. The increased fat thickness around the neck in obesity causes an increase in airway obstruction and exacerbates obstructive apneas[20].

In the study, a significant relationship was found between the risk of OSAS and the presence of COPD, hypertension, cardiovascular diseases, and diabetes (p<0.05). Looking at the literature, in the study conducted by Karakoç et al., the risk of OSAS increased as the incidence of heart diseases, diabetes, COPD, and hypertension increased[21], and in the study conducted by Salepci et al., the frequency of asthma was found to be more common in patients with OSAS than in the normal population[22]. In the study conducted by Bayram et al., the frequency of hypertension in OSAS patients was higher than that in the normal population[23]. The results of the study and the literature show that the presence of COPD, hypertension, diabetes, and cardiovascular diseases further increases the risk of OSAS.

As a result of the study, a significant relationship was found between OSAS risk and smoking status (p<0.05). Smoking increases chronic diseases such as cardiovascular diseases and COPD. As a result of a study in the literature, it was stated that the presence of cardiovascular diseases and COPD increases the risk of OSAS[16,17]. Although smoking did not primarily increase the risk of OSAS, it may have increased this risk secondarily.

CONCLUSION

As a result, the risk of OSAS was found to be 38.9% in individuals aged 18 years and above. Sleep patterns and quality greatly affect the life quality of individuals. Therefore, the definition of OSAS in health care becomes an important issue. The results of the literature and the study show that the risk of OSAS is found to be high in male gender, increasing age, smoking, obesity, COPD, cardiovascular diseases, diabetes, and hypertension. The definition of OSAS risk, especially in risky groups, will be effective in planning health care, increasing the effectiveness of treatment, and improving the quality of life. It is recommended to include this diagnosis in health care protocols and to expand its use, in order to plan and repeat trainings that will emphasize its importance.

ETHICS APPROVAL

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AUTHORS' CONTRIBUTIONS

NK: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **MK:** Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

REFERENCES

1. Ogilvie RP, Patel SR. The epidemiology of sleep and obesity. Sleep Health. 2017;3(5):383-8. https://doi.org/10.1016/j.sleh.2017.07.013

2. Jawabri KH, Raja A. Physiology, sleep patterns 2023 May 1. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2023. PMID: 31869144

3. BaHammam A, AlFaris E, Shaikh S, Bin Saeed A. Prevalence of sleep problems and habits in a sample of Saudi primary school children. Ann Saudi Med. 2006;26(1):7-13. https://doi.org/10.5144/0256-4947.2006.7

4. Bin YS, Cistulli PA, Ford JB. Population-based study of sleep apnea in pregnancy and maternal and infant outcomes. J Clin Sleep Med. 2016;12(6):871-7. https://doi.org/10.5664/jcsm.5890

5. Türk Toraks Derneği. Obstrüktif uyku apne sendromu tani ve tedavi uzlaşi raporu. Türk Toraks Dergisi. 2012;13(1):9-12.

6. Peppard PE, Young T, Barnet JH, Palta M, Hagen EW, Hla KM. Increased prevalence of sleep-disordered breathing in adults. Am J Epidemiol. 2013;177(9):1006-14. https://doi.org/10.1093/aje/kws342

7. Iturriaga R, Moya EA, Rio R. Inflammation and oxidative stress during intermittent hypoxia: the impact on chemoreception. Exp Physiol. 2015;100(2):149-55. https://doi.org/10.1113/expphysiol.2014.079525

8. Zhou J, Camacho M, Tang X, Kushida CA. A review of neurocognitive function and obstructive sleep apnea with or without daytime sleepiness. Sleep Med. 2016;23:99-108. https://doi.org/10.1016/j.sleep.2016.02.008

9. Stradling JR. Sleep-related breathing disorders. 1. Obstructive sleep apnoea: definitions, epidemiology, and natural history. Thorax. 1995;50(6):683-9. https://doi.org/10.1136/thx.50.6.683

10. Sforza E, Hupin D, Pichot V, Barthélémy JC, Roche F. A 7-year follow-up study of obstructive sleep apnoea in healthy elderly: the

PROOF cohort study. Respirology. 2017;22(5):1007-14. https://doi.org/10.1111/resp.13013

11. Franklin KA, Lindberg E. Obstructive sleep apnea is a common disorder in the population-a review on the epidemiology of sleep apnea. J Thorac Dis. 2015;7(8):1311-22. https://doi.org/10.3978/j.issn.2072-1439.2015.06.11

12. Sharma SK, Vasudev C, Sinha S, Banga A, Pandey RM, Handa KK. Validation of the modified Berlin questionnaire to identify patients at risk for the obstructive sleep apnoea syndrome. Indian J Med Res. 2006;124(3):281-90. PMID: 17085831

13. Acar VH, Kaya Genç F, Erdem M, Ceyhan A, Özgen F. Berlin formu, obstrüktif uyku apnesi tarama testi olarak kullanilabilir mi? Anestezi Dergisi. 2013;21(2):99-105.

14. Vasu TS, Grewal R, Doghramji K. Obstructive sleep apnea syndrome and perioperative complications: a systematic review of the literature. J Clin Sleep Med. 2012;8(2):199-207. https://doi.org/10.5664/jcsm.1784

15. Karadöl İ. Obstrüktif uyku apnesi tespitinde polisomnografiye alternatif yeni yöntemler. Kahramanmaraş Sütçü İmam Üniversitesi Mühendislik Bilimleri Dergisi. 2023;26(1):295-307.

16. Leppänen T, Töyräs J, Mervaala E, Penzel T, Kulkas A. Severity of individual obstruction events increases with age in patients with obstructive sleep apnea. Sleep Med. 2017;37:32-7. https://doi.org/10.1016/j.sleep.2017.06.004

17. Senaratna CV, Perret JL, Lodge CJ, Lowe AJ, Campbell BE, Matheson MC, et al. Prevalence of obstructive sleep apnea in the general population: a systematic review. Sleep Med Rev. 2017;34:70-81. https://doi.org/10.1016/j.smrv.2016.07.002

18. Ataç E, Yıldırım G, Kumral TL, Berkiten G, Saltürk Z, Uyar Y. Obstrüktif uyku apne sendromu ve obezite. Okmeydanı Tıp Dergisi. 2014;30(1):19-23.

19. Dacal Quintas R, Tumbeiro Novoa M, Alves Pérez MT, Santalla Martínez ML, Acuña Fernández A, Marcos Velázquez P. Obstructive sleep apnea in normal weight patients: characteristics and comparison with overweight and obese patients. Arch Bronconeumol. 2013;49(12):513-7. https://doi.org/10.1016/j.arbres.2013.05.005

20. Schwartz AR, Patil SP, Laffan AM, Polotsky V, Schneider H, Smith PL. Obesity and obstructive sleep apnea: pathogenic mechanisms and therapeutic approaches. Proc Am Thorac Soc. 2008;5(2):185-92. https://doi.org/10.1513/pats.200708-137MG

21. Karakoç Ö, Akçam T, Gerek M, Birkent H. Obstrüktif uyku apnesi ve kronik hastalıklar. KBB-Forum. 2008;7:15-20.

22. Salepci BM, Fidan A, Kıral N, Torun Parmaksız E, Saraç G, Şener Cömert S, et al. Obstrüktif uyku apne sendromlu hastalarda KOAH ile astım sıklığı ve bu hastalıkların obstrüktif uyku apne sendromunun şiddeti ile uyku kalitesine etkisi. Solunum Dergisi. 2012;14(3):141-7.

23. Bayram NA, Çiftçi B, Güven SF, Bayram H, Diker E. [Relationship between the severity of obstructive sleep apnea and hypertension]. Anadolu Kardiyol Derg. 2007;7(4):378-82. PMID: 18065332