

## Çocuklarda Obstrüktif Uyku Apne Sendromu Semptomları Ve İlişkili Faktörler

### Obstructive Sleep Apnea Syndrome: Symptoms And Associated Factors In Children

Seher SARIKAYA KARABUDAK<sup>1</sup>, Filiz ADANA<sup>2</sup>, Nurdan GEZER<sup>3</sup>, Safiye ÖZVURMAZ<sup>2</sup>

<sup>1</sup>Adnan Menderes Üniversitesi Hemşirelik Fakültesi, Çocuk Sağlığı ve Hastalıkları Hemşireliği Anabilim Dalı

<sup>2</sup>Adnan Menderes Üniversitesi Hemşirelik Fakültesi, Halk Sağlığı Hemşireliği Anabilim Dalı

<sup>3</sup>Adnan Menderes Üniversitesi Hemşirelik Fakültesi Cerrahi Hastalıkları Hemşireliği Anabilim Dalı

#### ÖZ

**Amaç:** Türkiye'de yaşayan çocuklarda obstrüktif uyku apne sendromu semptomlarını ve ilişkili faktörleri belirlemektir.

**Yöntem:** Bu kesitsel tanımlayıcı çalışma 2009 yılında, Aydın il merkezindeki üç sağlık ocağı bölgesinde, 114 çocukla (1-18 yaş) gerçekleştirildi. Veri toplamada Tanıtıcı Anket Formu, Modifiye Mallampati Skoru ve Modifiye Epworth Uykululuk Ölçeği kullanılmıştır. ,

**Bulgular:** Obstrüktif uyku apne sendromu semptomları sırasıyla; %36,8'inde uykusuzluk hissi, %26,3'ünde horlama, %22,8'inde sık uykudan uyanma, %21,1'i gündüz uyanık kalmada zorluk, %13,2'sinde sabah baş ağrısı, %11,4'ünde sık idrara çıkma ve %3,5'inde apne şeklinde saptanmıştır. Modifiye Mallampati Puanına göre çocukların %14,9'u Obstrüktif Uyku Apne Sendromu riski taşıyan grubu oluşturmaktadır. Çocukların %2,63'ünün gündüz aşırı uykululuk hali sorunu olduğu ve modifiye Epworth Uykululuk Ölçeği puanının erkek ve sigara içenlerde anlamlı olarak yüksek olduğu belirlenmiştir.

**Sonuç:** Çocukların yaklaşık %15'inin obstrüktif uyku apne sendromu riski taşıdığı ve en sık karşılaşılan semptomların sırasıyla; uykusuzluk hissi, horlama, gündüz uyanık kalmada zorluk çekme, uykudan sık uyanma, sabah baş ağrısı, apne ve gece sık idrara çıkma olduğu saptanmıştır. Çocukların %2,63'ünde gündüz aşırı uykululuk hali sorunu olduğu ve bu sorunun erkeklerde ve sigara içenlerde daha yüksek olduğu saptanmıştır.

**Anahtar Kelimeler:** Uyku, Apne, Sendrom, Çocuk

#### ABSTRACT

**Objective:** To determine the symptoms of obstructive sleep apnea syndrome and the associated factors in children living in Turkey.

**Methods:** This cross sectional descriptive study was conducted with 114 children (aged 1-18) in Aydın in 2009. Introductory Questionnaire Form, Modified Mallampati Score and modified Epworth Sleepiness Scale were used in the data collection process.

**Results:** The symptoms of Obstructive Sleep Apnea Syndrome were respectively determined as follows; having a sleepless mood in 36.8%, snoring in 26.3%, frequent awakenings from sleep in 22.8%, having a difficulty in keeping awake in the daytime in 21.1%, morning headaches in 13.2%, frequent urinations at night in 11.4% and apnea in 3.5%. According to the modified Mallampati Score, 14.9% of children comprise the group with a risk of obstructive sleep apnea syndrome. It was determined that 2.63% of children had the problem of excessive daytime sleepiness and the score of modified Epworth Sleepiness Scale was significantly higher in boys and smokers.

**Conclusion:** It was determined that approximately 15% of children had the risk of Obstructive Sleep Apnea Syndrome and the most frequent symptoms were respectively as follows; having a sleepless mood, snoring, frequent awakenings from sleep, having

**Sorumlu Yazar:** Seher SARIKAYA KARABUDAK

Adnan Menderes Üniversitesi Hemşirelik Fakültesi, Çocuk Sağlığı ve Hastalıkları Hemşireliği Anabilim Dalı, Aydın, TÜRKİYE

sehersarikaya@hotmail.com

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a difficulty in keeping awake in the daytime, morning headaches, frequent urinations at night and apnea. It was also determined that excessive daytime sleepiness was observed in 2.63% of children and it was higher in boys and smokers.

**Keywords:** Sleep, Apnea, Syndrome, Child

## 1. INTRODUCTION

Sleep disorders are frequently faced in children but rarely diagnosed. Among the sleep disorders, the pathology which is seen most frequently and which affects children seriously is Obstructive Sleep Apnea Syndrome (OSAS) (1). Pediatric OSAS is defined by the American Academy of Pediatrics and the Thoracic Society as: ‘‘OSAS in children is the respiration disease during sleep which is divided with normal ventilation and normal sleep periods, characterized with elongated upper respiratory tract obstruction and / or complete obstruction with intervals’’ (2, 3). Despite the difficulties in diagnosing OSAS, it is stated that its frequency ranges between 1 - 6 % and it peaks at 2-8 ages (3, 4).

In diagnosing, although the American Academy of Pediatrics remarks that polysomnography is the golden standard in making especially advanced research in children who indicate OSAS symptoms, investigating the history and the physical examination findings and applying the developed questionnaires are frequently preferred in determining the children with risk. Mallampati Score and Epworth Sleepiness Scale are commonly used to identify OSAS from scanning tests (3, 5). OSAS symptoms can be divided into two as night and day symptoms. Night symptoms are snoring, apnea with witness, frequent awakenings from sleep, having nightmares, enuresis, perspiration and waking up in the morning without rest and its day symptoms are respiration through the mouth, sleepiness throughout the day, morning headaches, low school performance, behavioral disorders and growth and development delay. In the literature, it is reported that it affects the cognitive development negatively and increases risk taking behavior (6, 7, 8, 9). Sleep problems can also lead to hypertension, pulmonary hypertension, autonomous nervous system dysfunction and death in adulthood (2, 3, 8, 10, 11, 12, 13).

OSAS, which causes important problems in terms of children’s health, is an ever increasing problem which becomes a problem of public health (5, 9). Studies that can show prevalence in the community of OSAS that affects children’ life quality, growing and development, success in school are make possible to take precautions such as early diagnosis, care providing, and effective follow-up. Therefore, community and economic load of the disease could be reduced.

Children’s healthy growth and development is one of the basic goals of the healthcare professionals. Every kind of screening to enable early diagnosis is the first step to be taken in coming over this disease. This research enables the sleep disorders to be evaluated in the community. There are voluminous clinical trials available about OSAS that has important results (3, 6, 14, 15, 16, 17, 18, 19). There are also available studies to determine a population has OSAS symptoms and factors that can be related these symptoms in the community (12, 20, 21, 22, 23, 24). In these studies, data was collected via survey forms that filled at public places (school, hospital, etc.) generally. However, studies have not been available much that collect data via home visits, using both survey forms and physical examination methods like us (10, 25). There isn’t available another study that can represent the region that conducting study on as well. Therefore, this cross-sectional study was designed to determine the incidence of OSAS symptoms and factors that can be related to these symptoms.

## 2. MATERIALS AND METHODS

The research is cross-sectional descriptive study that was carried out in the region of 3 village clinics among the 9 village clinics in Aydın province center in 2009. The universe of the study includes 4274 children aged 1-18 that are located three primary health care centers' region of Aydın city center. This cross-sectional definitive study was conducted in the region of 3 village clinics among the 9 village clinics in Aydın province center in 2009

When the size of the sample which was determined with G-Power program was determined as 0.2 and its lapse level was determined as  $(\alpha)= 0.05$  and the force was taken as  $(1-\beta)= 0.80$ , the volume of the sample was determined as 150. However, 114 children and their mothers could be reached.

A certain number of streets (61 streets) was selected via simple random sampling from locations (616 streets) affiliated to primary health care centers.

Face-to-face survey interviews were carried out with children and their mothers via visiting all houses on the selected streets.

### Data Collection

As preliminary preparation, a training lasting 12 hours was given by the researchers about sleep apnea and the application of the scales and the questionnaires before starting the study, for the pollster group (4 people) of the study.

Introductory Questionnaire Form with 22 items, Modified Mallampati Score in the evaluation of upper respiratory tract and oral way, and Modified Epworth Sleepiness Scale in the investigation of excessive daytime sleepiness were used in the study. Information was received from school kids and adolescents via face-to-face survey interviews as for, questions were asked to mothers of young children. The questions about behaviours of children in the duration of sleep were asked to the mothers. Afterwards, measurements of length and weight and evaluation of upper respiratory tract with Modified Mallampati Score were carried out with every child. Children identified as on risk were directed to a clinic of ear, nose and throat/ child surgery for assessment that were grade 3-4 of Modified Mallampati Score, had total scores over 10 of Modified Epworth Sleepiness Scale, and in the consideration of OSAS.

### Introductory Questionnaire Form

It is a questionnaire form for the child and the family and it consists of 22 questions, developed by the researchers in order to obtain the socio-demographic data and the data about the health situation. Survey questions were prepared with receiving expert opinion (2 associate professors and 2 assistant professors) and literature search. The persons mentioned as an expert have at least doctorate degree and studied at least for 15 years.

### Modified Mallampati Score

This score developed by American Society of Anesthesiologists (ASA) in order to determine the patients with difficult intubation risk in anaesthesia and modified for using in the clinic examination of the OSAS patients from the common point of the narrowness of the upper respiratory tract.

It was made sure of that children are sitting, open their mouths fully, and tongue out. Oropharyngeal region is examined with a light source as in the Mallampati's description and ranks below:

Grade 1: Can be seen uvula, soft palate, tonsillar bed, inferior and posterior plica easily;

Grade 2: Can be seen uvula and soft palate;

Grade 3: Can be seen soft palate and uvula base;

Grade 4: Uvula is completely covered by tongue root, cannot be seen pharynx wall.

According to the standard scoring between 1-4, the patients with grades 3-4 were considered as the patients with OSAS risk (26).

### **Modified Epworth Sleepiness Scale**

It was developed by Johns in 1991 and it was adopted to Turkish and its validity and reliability test was made by Ağargün et al (Cronbach's alfa= 0.80) (27).

Modified form of Epworth Sleepiness Scale for children was used in child population (14, 28, 29).

The scale is a practical scale which is easy to apply and evaluate and which is used commonly. It questions the individual's general sleepiness level during the day. It intends to evaluate the chance of falling asleep or snooze in eight different daily life situations.

Each item in the scale are rated as never = 0, rarely = 1, frequently = 2 and always = 3. If the total score taken for each situation in the scale is over 10 the existence of excessive sleepiness during the day is mentioned (14, 27, 28, 29).

### **Statistical analysis**

The analysis of the research data was made at the computer environment using SPSS 15.0 statistics package software. Descriptive statistics, Mann Whitney U and t test were used in the statistical analysis.

### **Ethical considerations**

Written consent were taken from Aydın Provincial Directorate of Health and the families of all children.

## **3. RESULTS**

61 children (53.5%) participated in the study are boys and the average age is  $13.66 \pm 4.19$ . Four children are married (3.5%) and 55.3% of the children are primary school students, 42.1% of the children are high school students.

According to the body mass index, 45.7% of the children were determined as normal, 9.6% of the children were determined as overweight and 15.8% of the children were determined as obese (Table I).

When the health characteristics were analysed, it was determined that 3.5% of the children had apnea, 8.8% had adipsophoresis during sleep, 22.8% of the children had frequent awaking from sleep, 21.1% of the children had difficulty in keeping awake in the daytime, 13.2% of the children had morning headaches, 6.1% of the children had zonesthesia during the night and 11.4% of the children had frequent urinations at night (Table II).

The dispersion of the Mallampati Score of the children in this study is as follows: While 50% of the children were determined as Grade 1, 35.1% of the children were determined as

Grade 2 and 11.4 % of the children were determined as Grade 3 and 3.5 % of the children were determined as Grade 4.

**Table 1.** . Sociodemographic Characteristics of the Children

Sociodemographic characteristic		X±SS	
<b>Age</b>		13.66±4.19 (1-18)	
		<b>n</b>	<b>%</b>
<b>Sex</b>	Male	61	53.5
	Female	53	46.5
<b>Marital Status</b>	Single	110	96.5
	Married	4	3.5
<b>Education Level</b>	Not going to school	2	1.8
	Primary school	64	56.1
	High school	48	42.1
<b>BMI Percentile Dispersion</b>	Thin (5th Percentile and below)	33	28.9
	Normal (15th-75th Percentile)	52	45.7
	Overweight (85th-95th Percentile)	11	9.6
	Obese (95th Percentile and over)	18	15.8
<b>TOTAL</b>		114	100

**Table 2.** Characteristics About the Health of the Children

Health Characteristics		<b>n</b>	<b>%</b>
<b>Allergy Situation</b>	Yes	21	18.4
	No	93	81.6
<b>Surgical Operations</b>	Yes	16	14.0
	No	98	86.0
<b>Chronic Disease</b>	Yes	4	3.5
	No	110	96.5
<b>Continuous use of medicines</b>	Yes	4	3.5
	No	110	96.5
<b>Smoking</b>	Yes	8	7.0
	No	106	93.0
<b>Drinking Alcohol</b>	Yes	4	3.5
	No	110	96.5
<b>Use of Medicines</b>	Yes	4	3.5
	No	110	96.5
<b>Health Problems in the Family</b>	Yes	45	39.5
	No	69	60.5
<b>Diagnosis of Apnea</b>	Yes	4	3.5
	No	110	96.5
<b>Snoring</b>	Yes	30	26.3
	No	84	73.7
<b>Adiaphoresis During Sleep</b>	Yes	10	8.8
	No	104	91.2
<b>Frequent Awakings at Night</b>	Yes	26	22.8
	No	88	77.2
<b>Difficulty in Keeping Awake During the Daytime</b>	Yes	24	21.1
	No	90	78.9
<b>Morning Headaches</b>	Yes	15	13.2
	No	99	86.8
<b>Feeling of Suffocation at Night</b>	Yes	7	6.1
	No	107	93.9

<b>Feeling as if never slept at night</b>	Yes	42	36.8
	No	72	63.2
<b>Frequent Urinatings at Night</b>	Yes	13	11.4
	No	101	88.6
<b>TOTAL</b>		114	100

In this situation, 17 children (14.9 %) are in Grade 3 + 4 and they are the group with OSAS risk (Table III). Correlations between the Mallampati Score and the sociodemographic and health variables were searched and no correlation was determined ( $p>0.05$ ).

**Table 3.** Mallampati Score in Children

<b>Mallampati Score</b>	<b>n</b>	<b>%</b>
<b>Grade 1</b>	57	50.0
<b>Grade 2</b>	40	35.1
<b>Grade 3</b>	13	11.4
<b>Grade 4</b>	4	3.5
<b>TOTAL</b>	114	100

Mean score of Modified Epworth Sleepiness Scale for children is  $3.61\pm 2.79$ . Only 2.63% of children had scores over 10 from Modified Epworth Sleepiness Scale. Any correlation between the Epworth Sleepiness Scale score and the sociodemographic and health variables was searched and it was found that the Epworth Sleepiness Scale scores of the boys ( $3.91\pm 3.14$ ) were higher than the girls' scores ( $3.28\pm 2.30$ ) significantly. The Epworth Sleepiness scale scores of the children who smoking ( $7.25\pm 2.60$ ) were higher than the scores of the children who did not smoking ( $U= 118.000$ ,  $p=0.001$ ).

The Epworth Sleepiness Scale scores of the children who were in the group with the high OSAS risk and who were evaluated as Grade 3/4 in Mallampati Scoring ( $5.05\pm 3.34$ ) were found significantly higher than the scores of the children in Grade 1 / 2. ( $3.36\pm 2.62$ ) ( $U= 566.000$ ,  $p=0.038$ ) (Table IV). The impact of the other sociodemographic and health variables of the children on the Epworth Sleepiness Scale score could not be found ( $p>0.05$ ).

**Table 4.** Comparison of the Related Variables and the Epworth Sleepiness Scale in Children

		<b>X±SS</b>			
<b>Epworth Sleepiness Scale Score</b>		<b>3.61±2.79</b>			
<b>Variable</b>		<b>n</b>	<b>X±SS</b>	<b>t / U</b>	<b>p</b>
<b>Sex</b>	Male	61	$3.91\pm 3.14$	8.39	0.004
	Female	53	$3.28\pm 2.30$		
<b>Smoking</b>	Yes	8	$7.25\pm 2.60$	118.000	0.001
	No	106	$3.33\pm 2.61$		
<b>Mallampati Score</b>	Grade 1/2	97	$3.36\pm 2.62$	566.000	0.038
	Grade 3/4	17	$5.05\pm 3.34$		

#### 4. DISCUSSION

There are many studies available on snoring which is one of the important symptoms of OSAS. Different age groups' results in different regions were determined as 7.24% (18), 18.9% (6), 20.5% (19), 32.4% (12) from certain studies that conducted in Turkey. In the study conducted with 170 children between 6-8 ages in Japan, the snoring rate was determined as 12.9 % (22). Children aged 3-11 were evaluated in a study conducted in south Italy and found that 57.1% of diagnosed with OSAS and 22.6% non-OSAS are snoring (16). Another study carried out with

school kids aged 5-12, snoring rate was again found 15.5% from PSG assessment (17). It has been shown that higher rates recorded on snoring in studies carried out with mothers' statements, and lower rates observed which investigated more detail with clinical consideration and index. The evaluations making with advanced tests in sleep laboratory are the ideal ones, of course.

In our study, when the factors which could be associated to snoring (Table I-II) were evaluated, while no correlation to any factor like sex, weight, chronic illness, allergy, tonsil size etc. could be found, a correlation between allergic rhinitis (10, 20, 21), tonsil size (10, 18, 24), waist circumference, nasal abnormalities (e.g., chronic sinusitis/rhinitis) and minority (17) and no correlation between obesity (20, 30) and sex (21) was indicated. However, studies are available that found relation with obesity (3, 17, 18, 24, 31). It is specified that OSAS risk is increased in adolescent age group of children with obesity rather and not being an important factor for younger children (19). It is explained that snoring is more commonly seen in men (12, 16, 24).

In our study, apnea prevalence was found 3.5 %. Despite this finding of ours is similar to the study by Söğüt, Altın, Uzun, Uğur, Tomaç, Acun et al (2005), it was found lower (6,7 %) than the scores of the results found by Yılmaz, Dinç, Söğüt, Aktulun, Arslan, Kocacan et al (2010). It was found higher (0.36 %) than the results found by Çelik, Işık, Ural, Arslan, Bahadır and İmamoğlu et al (2010). Brunetti, Rana, Lospalluti, Pietrafesa, Francavilla, Fanelli et. al found apnea prevalence in OSAS group 21.4% and as for non-OSAS group 0.9% in the study with 3-11 age group of children in south Italy (16). Although apnea was expressed as one of the problems very frequently faced in newborns and babies in the medical literature, a rational difference was found in our study perhaps because the age range (1-18) was wide and different.

When the sleep problems except snoring and apnea were analysed; in the study conducted by Aslan, Yetkin, Albayrak, Gülcat, Maral, Aycan et al (2005) (n=1034), although it represented adults, children between 15-18 ages were also included in the study. In this study, adiphoresis during sleep was reported as 7.9 % (25). This problem was determined 8.8 % with similar rates in our study.

In a study conducted with 170 children between 6-8 ages in Japan, it is remarked that the problem of frequent awakings from sleep is at the rate of 12.9 % (22). Brunetti, Rana, Lospalluti, Pietrafesa, Francavilla, Fanelli et. al stated that the rate of troubled sleep condition is 15.0% in non-OSAS general population (16). It is determined much more rate in our study as 22.8%.

In the study conducted by Çelik, Işık, Ural, Arslan, Bahadır and İmamoğlu, while having a sleepy mood during the day is seen in 0.49 % of the children (20), in another study it is seen in 42 % of the children (21). Daily sleepness in Italian children is explained as 1.8% but, who need afternoon rest are 11.6% (16). This rate is indicated to be 21.8 % in Japanese children (22). Similarly, having a difficulty in keeping awake in the daytime has been determined as 21.1%.

In the study conducted by Yılmaz, Dinç, Söğüt, Aktulun, Arslan, Kocacan et al, while the problem of waking up without rest in children is 14 % (10), it is 3 % in the study conducted by Fidan, Ünlü, Sezer and Kara et al and it is 55.3 % (22) in the study conducted by Kitamura, Miyazaki, Kadotani, Suzuki, Kanemura, Komada et al. The most faced problem in our study has been found as the feeling as if never slept at night in 36.8 % of the children.

While it is expressed that 4 % of the children had morning headaches (12), this rate is much more in our study (13.2 %).

The different results found in the researches may be because of the differences in the searching methods, sample age group and numbers and the methods for questioning the symptoms.

It is indicated in the medical literature that there is a significant correlation between the tonsil size and OSAS symptoms (1, 2, 3, 10, 18, 24, 30). Kitamura, Miyazaki, Kadotani, Suzuki, Kanemura, Komada et al. determined the rate of tonsillar hypertrophy in children as 14.8% (22). Children rates who have large tonsils, adenoid tonsils and tightness in respiratory tract were found similarly 14.9% in our study. (Grade3+4, Tablo3). Yılmaz, Dinç, Söğüt, Aktulun, Arslan, Kocacan et al remark that snoring increases 22,5 times in children with tonsil size Grade 4 (10). There is no variability significantly different from descriptive characteristics such as tonsil size with sociodemographic and health relations in our study statistically. Being small number of children (n=17) with large tonsils may have affected stastically significant results.

Although excessive daytime sleepiness (EDS), is not always a certain sign of OSAS, it is one of the most commonly problems seen in OSAS (3, 23). Also in our study, it is seen that the excessive sleepy mode of the children in the group with high OSAS risk during the day is higher than the children with low OSAS risk (Table IV). In a similar way, children have excessive daytime sleepiness are higher than non-experienced ones on respiratory problems (3, 14, 25). The factors about EDS were determined as sex and smoking. According to the study, boys had more problems of EDS than girls and smoking children had more sleepiness during the daytime (1, 16). However, in another study, it was determined that only over-weight caused complaints about sleepiness during the day and there was no correlation between the characteristics of age, sex, illness situation, smoking and the complaints about sleepiness during the day in the adolescents (25). It is determined that obesity affects daytime sleepiness complaints in the preadolescent term (15). In a way supporting our results about smoking, it is remarked that the children who smoke have more sleep problems in the studies conducted with adolescents (23, 32).

Although diagnostic processes like consulting with doctors and polysomnography, the golden diagnosis standard must be done, determining the risky groups in order to enable the early diagnosis of the illnesses is among the most important responsibilities of healthcare professionals. Every kind of scanning test that make possible early diagnosis is first step to take to cope with diseases. Studies that can show prevalence in the community of OSAS that affects children' life quality, growing and development, success in school are make possible to take precautions such as early diagnosis, care providing, and effective follow-up. Therefore, community and economic load of the disease could be reduced. In this context, our study has an important contribution to the literature.

#### **Limitation of the study:**

Not to be able to diagnose OSAS definitely with the diffuseness of the symptoms analysed in the research, only to be able to make an estimate about the diffuseness is the important limitation of this study.

Not to reach enough sample amounts can end up as a limitation.

#### **5. CONCLUSION**

It was determined that approximately 15 % of the children were in the risk group in terms of tonsil size and OSAS. The most commonly seen symptoms of OSAS are; respectively



to feel as if never slept at night, snoring, frequent awakings, difficulty in keeping awake during the daytime, morning headaches, frequent urinatings at night, adiphoresis during the sleep, feeling of suffocation at night and apnea.

It was determined that EDS was observed in the 2.63 % of the children and it was higher in boys and smokers.

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