Original Article

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Is there a Relationship Between Depression and Adenoid Volume in the Pediatric Population?

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Abstract

Objective: Adenoid tissue hypertrophy is a common problem in childhood. In addition, it can also cause obstructive sleep apnea syndrome (OSAS). The relationship between adenoid size and quality of life or psychological status has not been evaluated as an independent variable. Therefore, this study investigated the relationship between adenoid size, obstructive symptoms, and depression.

Methods: In total, 180 children were included and divided into two groups: 92 children with OSAS and 88 without OSAS. The adenoid size was assessed by calculating the adenoid nasopharynx ratio, which is the maximum adenoid size to a line drawn from the posterosuperior hard palate to the spheno-occipital synchondrosis. The Turkish version of the pediatric depression scale was used to evaluate depression symptoms. The results of two evaluations were statistically compared to assess any correlation.

Results: The mean age of the OSAS was 7.61 and the control group was 7.95 years. There were no statistical differences in sex and age between the groups. The adenoid nasopharynx ratio significantly differed $p<0.001$ ($p=0.001$) between the two groups, whereas the pediatric depression scale scores did not differ ($p=0.472$). There was no correlation between the adenoid nasopharynx ratio and depression.

Conclusion: The adenoid nasopharynx ratio is not a significant predictor of depression in children with OSAS.

Keywords: Sleep apnea, depression, adenoid hypertrophy, children

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INTRODUCTION

Adenoids are lymphoid tissues located in the posterosuperior nasopharynx. Adenoid tissue hypertrophy is a common problem in childhood that can cause symptoms of obstruction, including oral breathing, snoring, hyponasal speech, recurrent otitis media, and otitis media with effusion; growth retardation; and facial growth problems (1). Adenoid hypertrophy can also cause obstructive sleep apnea syndrome (OSAS), which may result in morning drowsiness, fatigue, and memory and concentration problems, there by decreasing the school and social performance of these children (2-4).

An association between depression and OSAS has been reported (5). Another study have claimed that the use of sleep medication, daytime sleepiness, and symptoms of initial insomnia are independently associated with depression, whereas the severity of OSAS is not (6). These studies were conducted in adults. Studies with children also support an association of depression with OSAS or symptoms of OSAS (7, 8).

In addition, the adenoid size and obstructive symptoms correlate with each other (4, 9, 10). However, the relationship between the adenoid size and quality of life or psychological status has not been evaluated as an independent variable. This study aimed to investigate the relationship

between the adenoid size and depression prevalence in the pediatric population.

METHODS

An approval from the International Review Board was obtained from the Okmeydani Training and Research Hospital Ethics Committee on 17.11.2015 and protocol number is 365. Informed consent was obtained from all participants. The study was conducted between September 1, 2015, and December 1, 2015 and enrolled 92 children with OSAS and 88 without OSAS. Children with septal deviation, conchal hypertrophy, grade ≥3 tonsillar hypertrophy according to the Brodsky grading system (11), body mass index for age percentile of >90 (2–20 years), cleft lip and palate, and lower airway pathology were excluded. OSAS was diagnosed based on the history which was description by parents of children. Children whose parents defined apnea attacks and had no neurological diagnosis were accepted as apneic.

The adenoid size was assessed by calculating the adenoid nasopharynx (A/N) ratio proposed by Fujioka et al. (12) using the maximum adenoid size to a line drawn from the posterosuperior hard palate to the spheno-occipital synchondrosis (Figure 1) (13). The Turkish version of the pediatric depression scale validated by Öy et al. (14) was used to evaluate depression symptoms. This scale comprises 27 questions to be answered based on the status in the previous 2 weeks. Each question is scored from 0 to 2, with 0 representing the lowest depressive status and 2 representing the maximum status. The maximum score is 54, and the cut-off score for depression is 19.

Statistical Analysis

The relationship between the A/N ratio and pediatric depression scale score was calculated. Statistical analysis was performed using the IBM Statistical Package for Social Sciences software version 22 (IBM SPSS Corp.; Armonk, NY, USA). The Shapiro–Wilks test was used to verify whether the data had a normal distribution. Student's *t*-test and Yates continuity correction test were used to compare data between the groups.

RESULTS

The mean age of the OSAS (43 girls and 49 boys) and control (46 girls and 42 boys) group participants was 7.61 [standard deviation (SD) 2.66] and 7.95 (SD 2.12) years, respectively. There were no statistical differences in sex and age between the groups (Table 1). Table 2 summarizes the A/N ratio and pediatric depression scale results. The A/N ratio significantly differed (p=0.001) between the two groups, whereas the pediatric depression scale scores did not (p=0.472). There was no correlation between the A/N ratio and depression (Table 2).

DISCUSSION

The prevalence of sleep apnea in the pediatric population is 1%–5%, and adenoid and tonsillar hypertrophy are the main risk factors (15). The complications and clinical findings of OSAS are different in the pediatric population. Daytime sleepiness and falling asleep are not common in children, but aggression and concentration problems are common. Because of their concentration is effected so their success in school and social problems are also affected (16).

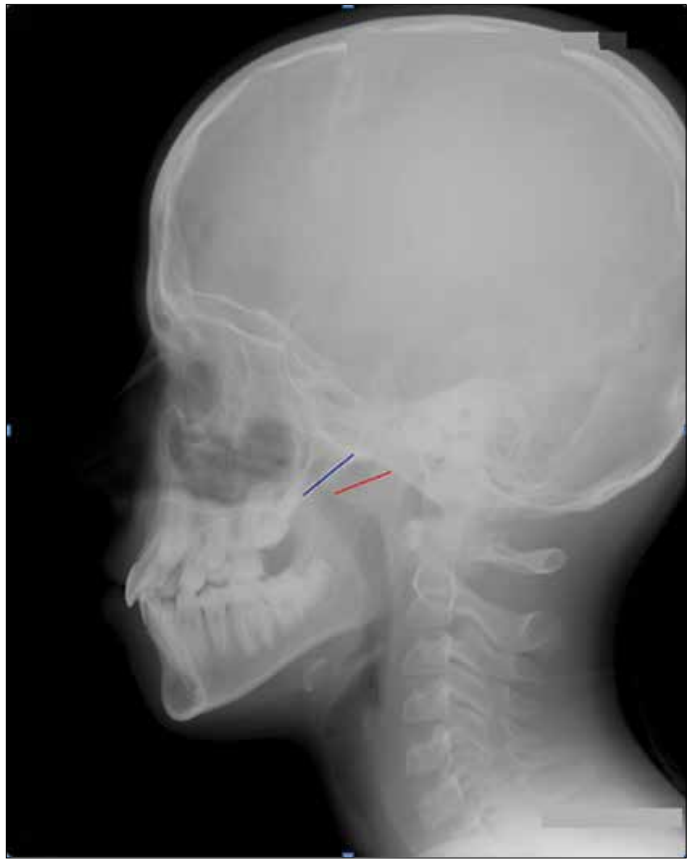

Figure 1. Calculation method of A/N ratio

Table 1. Demographic data of the groups

	OSAS (n=92)	Control (n=88)	p
Age, years	7.61±2.73	7.95±2.13	0.639
Sex			
Male	49 (53.2%)	42 (47.8%)	0.178
Female	43 (46.8%)	46 (52.2%)	
p>0.05. Student's t-test for age and Continuity (Yates) correction for sex. OSAS: obstructive sleep apnea syndrome			

Table 2. Comparison of A/N ratio and pediatric depression scale

	OSAS (n=92) Mean±SD	Control (n=88) Mean±SD	p
A/N ratio	0.74±0.10	0.50±0.17	0.001*
Pediatric depression scale	8.39±4.29	7.45±4.37	0.472
*p<0.01. Student's t-test. A/N ratio: adenoid/nasopharynx ratio; SD: standard deviation			

There is a relationship between the adenoid size and obstruction symptoms (17). Compared with endoscopic evaluation, plain X-rays are an inexpensive and easy-to-use method for assessing the adenoid size in children. The A/N ratio is a reliable, effective, and widely used method for evaluating the ade-

noid size (18, 19). It is the highest at the age of 4–5 years, although the adenoid tissue reaches its maximum size at 7–10 years, but facial growth is greater and prevents further obstruction (12).

Several studies have examined depression and the determinants of depression in children with OSAS (5, 7, 20-23). Yılmaz et al. (7) have reported that depressive symptoms are more common in children with OSAS. Depression is also claimed to be the most common mood disorder in patients with OSAS (24). Decreased oxygen saturation is considered responsible for depression. Micro-awakenings cause daytime fatigue and sleepiness, which results in depressive symptoms (25). It has been postulated that hormonal changes are responsible for depression in OSAS (26). Obesity is more common in patients with OSAS and is an independent risk factor for depression (5). In addition, low serotonin levels in patients with OSAS may be responsible for depression (27).

In this study, the mean depression score was below the cut-off for depression in the OSAS group. Unlike previous studies, the depression status of our study group was not different from that of controls, although the A/N ratio was significantly higher. This could be because our study participants did not have tonsillar hypertrophy, whereas the published studies included children with both adenoid and tonsillar hypertrophy (20-23). The main limitation of our study was that we could not diagnose OSAS with polysomnography. Another limitation was that the severity of OSAS was not investigated. The difference between our results and results in the literature can be related to the severity of OSAS. Because we excluded patients with tonsillary hypertrophy, our patients might have a milder disease than those of the previous studies. Although there is not enough evidence in children, the oropharyngeal region is the most important area in the development of OSAS in adults (28). Andrew et al. (29) performed tonsillectomies on adult patients with OSAS and concluded that tonsillar hypertrophy is a major determinant of OSAS.

We found no relationship between depression and the A/N ratio. Although the A/N ratio was higher in the OSAS group, the pediatric depression scale scores did not differ between the two groups.

CONCLUSION

The A/N ratio is not an independent predictor of depression in children with OSAS. So; adenoid hypertrophy has not been identified as a factor directly related to depression in children.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Okmeydani Training and Research Hospital.

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

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REFERENCES

1. Ozbay I, Ozturk A, Kucur C, Erdogan O, Oghan F. Effects of Obstructive Sleep Apnea in Children as a Result of Adenoid and/or Adenotonsillar Hypertrophy on Maternal Psychologic Status. J Craniofac Surg 2015; 26: 2364-7. [CrossRef]
2. Zojaji R, Mirzadeh M, Mazloum Farsi Baf M, Khorashadizadeh M, Sabeti HR. The Effect of Adenotonsillectomy on Children's Quality of life. Iran J Otorhinolaryngol 2014; 26: 199-205.
3. Esposito M, Gallai B, Roccella M, Marotta R, Lavano F, Lavano SM, et al. Anxiety and depression levels in prepubertal obese children: a case-control study. Neuropsychiatr Dis Treat 2014; 10: 1897-902.
4. Kang KT, Chou CH, Weng WC, Lee PL, Hsu WC. Associations between adenotonsillar hypertrophy, age, and obesity in children with obstructive sleep apnea. PLoS One 2013; 8: e78666. [CrossRef]
5. BaHammam AS, Kendzerska T, Gupta R, Ramasubramanian C, Neubauer DN, Narasimhan M, et al. Comorbid depression in obstructive sleep apnea: an under-recognized association. Sleep Breath 2016; 20: 447-56. [CrossRef]
6. Björnsdóttir E, Benediktsdóttir B, Pack AI, Arnardottir ES, Kuna ST, Gíslason T, et al. The Prevalence of Depression among Untreated Obstructive Sleep Apnea Patients Using a Standardized Psychiatric Interview. J Clin Sleep Med 2016; 12: 105-12. [CrossRef]
7. Yilmaz E, Sedky K, Bennett DS. The relationship between depressive symptoms and obstructive sleep apnea in pediatric populations: a meta-analysis. J Clin Sleep Med 2013; 9: 1213-20. [CrossRef]
8. Carotenuto M, Esposito M, Parisi L. Depressive symptoms and childhood sleep apnea syndrome. Neuropsychiatr Dis Treat 2012; 8: 369-73. [CrossRef]
9. Tagaya M, Nakata S, Yasuma F, Miyazaki S, Sasaki F, Morinaga M, et al. Relationship between adenoid size and severity of obstructive sleep apnea in preschool children. Int J Pediatr Otorhinolaryngol 2012; 76: 1827-30. [CrossRef]
10. Ping-Ying Chiang R, Lin CM, Powell N, Chiang YC, Tsai YJ. Systematic analysis of cephalometry in obstructive sleep apnea in Asian children. Laryngoscope 2012; 122: 1867-72. [CrossRef]
11. Brodsky L. Modern assesment of tonsil and adenoids. Pediatr Clin North Am 1989; 36: 1551-69. [CrossRef]
12. Fujioka M, Young LW, Girdany BR. Radiographic evaluation of adenoidal size in children: adenoidal-nasopharyngeal ratio. AJR Am J Roentgenol 1979; 133: 401-4. [CrossRef]
13. Salturk Z, Yucesan S, Atar Y, Bal M, Uçar K. Concordance of Lateral Radiological Measurements and Quality of Life in Adenoid Hypertrophy. J Clin Anal Med 2014; 5: 110-2. [CrossRef]
14. Öy B. Çocuklar için depresyon ölçeği: Geçerlilik ve güvenirlik çalışması, Türk Psikiyatri Dergisi 1992; 2: 132-6.
15. Marcus CL, Brooks LJ, Draper KA. Diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics 2012; 130: 714 -55. [CrossRef]
16. Marcus CL, Brooks LJ, Draper KA, Gozal D, Halbower AC, Jones J, et al. American Academy of P. Diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics 2012; 130: 576-84. [CrossRef]
17. Cengel S, Akyol MU. The role of topical nasal steroids in the treatment of children with otitis media with effusion and/or adenoid hypertrophy. Int J Pediatr Otorhinolaryngol 2006; 70: 639-45. [CrossRef]
18. Caylakli F, Hizal E, Yilmaz I, Yilmazer C. Correlation between adenoid–nasopharynx ratio and endoscopic examination of adenoid

hypertrophy: a blind, prospective clinical study. Int J Pediatr Otorhinolaryngol 2009; 73: 1532-5. [CrossRef]
19. Kolo ES, Ahmed AO, Kazeem MJ, Nwaorgu OG. Plain radiographic evaluation of children with obstructive adenoids . Eur J Radiol 2011; 79: 38-41. [CrossRef]
20. Mitchell RB, Kelly J. Behavioral changes in children with mild sleep-disordered breathing or obstructive sleep apnea after adenotonsillectomy. Laryngoscope 2007; 117: 1685-8. [CrossRef]
21. Galland BC, Dawes PJ, Tripp EG, Taylor BJ. Changes in behavior and attentional capacity after adenotonsillectomy. Pediatr Res 2006; 59: 711-6. [CrossRef]
22. Mitchell RB, Boss EF. Pediatric obstructive sleep apnea in obese and normalweight children: impact of adenotonsillectomy on quality-of-life and behavior. Dev Neuropsychol 2009; 34: 650-61. [CrossRef]
23. Mitchell RB, Kelly J, Call E, Yao N. Long-term changes in quality of life after surgery for pediatric obstructive sleep apnea. Arch Otolaryngol Head Neck Surg 2004; 130: 409-12. [CrossRef]
24. Baran AS, Richert AC. Obstructive sleep apnea and depression. CNS Spectr 2003; 8: 128-34. [CrossRef]
25. Mitchell RB, Kelly J. Behavior, neurocognition and quality-of-life in children with sleep-dizordered breathing. Int J Pediatr Otorhinolaryngol 2006; 70: 395-406. [CrossRef]
26. Nakra N Bhargava S, Dzuira J, Caprio S, Bazzy-Asaad A. Sleep-disordered breathing in children with metabolic syndrome: the role of leptin and sympathetic nervous system activity and the effect of continuous positive airway pressure. Pediatrics 2008; 122: 634-42. [CrossRef]
27. Schroder CM, O'Hara R. Depression and obstructive sleep apnea (OSA). Ann Gen Psychiatry 2005; 4: 13. [CrossRef]
28. Certal V, Catumbela E, Winck JC, Azevedo I, Teixeira-Pinto A, Costa-Pereira A. Clinical assessment of pediatric obstructive sleep apnea: a systematic review and meta-analysis. Laryngoscope 2012; 122: 2105-14. [CrossRef]
29. Senchak AJ, McKinlay AJ, Acevedo J, Swain B, Tiu MC, Chen BS, et al. The effect of tonsillectomy alone in adult obstructive sleep apnea. Otolaryngol Head Neck Surg 2015; 152: 969-73. [CrossRef]