Araştırma Makalesi / Research Article

Evaluation of the relationship between upper airway obstruction and primary nocturnal enuresis

Üst solunum yolu obstrüktif patolojiler ile primer nokturnal enürezis **arasındaki ilişkinin değerlendirilmesi**

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Abstract

Background: The aim of this study was to determine the relationship between primary nocturnal enuresis (PNE) and upper airway obstructive pathologies such as allergic rhinitis (AR), nasal septum deviation (NSD), adenoid hypertrophy (AD) and tonsillar hypertrophy (TH).
Methods: The study included 78 volunteer PNE patients (42 males, 36 females; mean age: 7.2 ± 1.6 years, range: 5.4 to 11.6 years) who applied to Pediatrics and Urology outpatient clinics of a second-stage hospital between June 1, 2018 and September 1, 2018. The control group included 72 volunteer children (34 males, 38 females; mean age: 7.6 ± 1.4 years, range: 5.1 to 12.7 years) who were admitted to the inpatient outpatient clinics of the same hospital and had no PNE complaint. All participants included in the study were applied routine physical examination, flexible fiberoptic nasopharyngoscopy and score for allergic rhinitis (SFAR) questionnaire. Brodsky scale and fiberendoscopic findings were used to classify tonsil and adenoid dimensions respectively.
Results: There was no significant difference between PNE (+) and PNE (-) groups in terms of age and gender (respectively p = 0.203 and p = 0.819). Although AR and NSD were similar in both groups, the ratio of AH and TH was statistically significantly higher in the PNE (+) group (p = 0.016 and p = 0.05, respectively).
Conclusion: Adenotonsillar hypertrophy must be considered in children with primary nocturnal enuresis.

Keywords: Adenoid hypertrophy, Tonsillar hypertrophy, Primary nocturnal enuresis, Allergic rhinitis.

Öz.

Amaç: Bu çalışmada alerjik rinit (AR), nazal septum deviasyonu (NSD), adenoid hipertrofisi (AH) ve tonsiller hipertrofi (TH) gibi üst solunum yolu obstrüktif patolojiler ile primer nokturnal enurezis (PNE) arasındaki ilişkinin ortaya konulması amaçlandı.
Materyal ve Metot: Çalışmaya 1 Haziran 2018- 1 Eylül 2018 tarihleri arasında ikinci basamak bir hastanenin Pediatri ve Üroloji polikliniklerine başvuran ve gönüllü olan 78 PNE hastası (42 erkek, 36 kız; ort. yaş: 7.2±1.6, dağılım: 5.4 - 11.6 yıl) dahil edildi. Kontrol grubuna ise aynı hastanenin sağlam çocuk polikliniklerine başvuran ve PNE şikayeti olmayan 5 yaş üstü 72 gönüllü çocuk (34 erkek, 38 kız; ort. yaş: 7.6±1.4 yıl, dağılım: 5.1 - 12.7 yıl) dahil edildi. Çalışmaya alınan tüm katılımcılara rutin fizik muayene, fleksibl fiberoptik nazofarengoskopi ve alerjik rinit için skor (Score for allergic rhinitis; SFAR) anketi uygulandı. Tonsil ve adenoid boyutlarını sınıflandırmak için sırasıyla Brodsky skalası ve fiberendoskopik bulgular kullanıldı.
Bulgular: Yaş ve cinsiyet açısından PNE (+) grup ile PNE (-) grup arasında anlamlı bir fark yoktu (sırasıyla p= 0.203 ve p= 0.819). Alerjik rinit ve NSD her iki grupta benzer olmasına karşın AH ve TH oranı PNE (+) grupta istatistiksel olarak anlamlı bir şekilde daha fazla idi (sırasıyla p=0.016 ve p= 0.05).
Sonuç: Primer nokturnal enürezisli çocuklarda adenotonsiller hipertrofi mutlaka akla getirilmelidir.

Anahtar Kelimeler: Adenoid hipertrofisi, Tonsiller hipertrofi, Primer nokturnal enürezis, Alerjik rinit.

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Introduction

Primary nocturnal enuresis (PNE) is defined as night bedwetting of children over five without an organic pathology (1). Primary nocturnal enuresis is very common in the public. As a matter of fact, it has been reported in the studies that the prevalence of PNE has ranged from 8.2% to 37% worldwide (2,3). Primary nocturnal enuresis causes loss of self-confidence in children and psychological problems in families. In addition, it has been reported that if not treated, it causes many psychiatric disorders such as depression and psychosomatic disorder in adulthood (4). However, the etiology of PNE has not been clarified yet. In addition to genetic predisposition, maturation delay, psychological causes, and sleep disorders, nasal obstruction is thought to play a role in the etiology of PNE in recent years. The role of upper airway obstructive pathologies such as adenoid hypertrophy (AH), tonsillar hypertrophy (TH), allergic rhinitis (AR) and nasal septum deviation (NSD) in the etiology of PNE is still controversial. While some studies on this subject suggest that upper airway obstruction plays a role in the etiology of PNE, it is reported that it has no effect in some studies (5-7).

In our presented study, we aimed to determine the relationship between PNE and pathologies causing upper airway obstruction such as AH, TH, AR and NSD.

Materials and Methods

A total of 150 volunteer children (72 females, 78 males, mean age: 7.6 ± 1.8 years) included in the study who were admitted to the paediatrics and urology outpatient clinics of a second-stage hospital between June 1, 2018 and September 1, 2018. All patients underwent history and detailed physical examination, as well as anterior rhinoscopic, flexible fiberoptic nasopharyngoscopic examinations.

Diagnosis of AR

The patients were diagnosed with AR with the help of 'score for allergic rhinitis (SFAR)' questionnaire. When the cut-off score of SFAR was set to ≥7 in the diagnosis of AR, it was reported that the sensitivity of the test was 74% and specificity was 83% (8). Also in the validation study carried out in Turkey by Cingi et al (9) the α-Chronbach reliability value of the SFAR questionnaire was reported as 0.69 and it was stated that the questionnaire was an effective, reliable and appropriate method for the Turkish population. Therefore, the diagnosis of AR can be made with SFAR questionnaire at high accuracy rate in centres where specific laboratory tests are not available. In our study, SFAR questionnaire was applied to all participants and scoring was recorded. Allergic rhinitis diagnosis in patients was clarified through AR consistent findings of anterior rhinoscopy and nasal endoscopic (concha hypertrophy, pale mucosa and serous discharge) and SFAR score value was ≥7. The SFAR questionnaire and scoring method used in our study are shown in Table 1.

Diagnosis of AH and TH

While tonsillar size was evaluated during the oropharynx examination, the classification defined by Brodsky et al. (10) was accepted as reference. According to this classification;

If tonsil is not observed in the airway, the size of tonsils was assessed as 0, tonsils with airway obstruction of less than 25% as +1, tonsils with airway obstruction between 25-50% as +2, tonsils with airway obstruction between 50-75% as +3, tonsils with a rate of 75% airway obstruction were assessed as +4 hypertrophic.

Obstructive adenoid hypertrophy was defined as the closure of more than 50% of the airway in flexible endoscopic nasopharyngoscopy.

Diagnosis of PNE

In the diagnosis of PNE, American Psychiatric Association Diagnostic and Statistical Manual for Mental Disorders; DSM-IV diagnostic criteria were used (11). These criteria are:

1- Repetitive urinary incontinence in bed or clothes.

2- Repetition of this behaviour at least two times a week and last for at least three months

3- Chronologically age five and above

4- This behaviour is not due to the direct physiological effect of a substance (eg, Diuretic) or general medical condition (eg, Diabetes, spina bifida and aseizure disorder).

Exclusion criteria

Children with inverted papilloma and sinonasopharyngeal malignancy, having any congenital anomaly, mental retardation, chronic systemic diseases, central nervous system pathology and neurogenic bladder, cystitis, hypospadias and epispadias were excluded from the study.

Pathologies leading to acute upper airway obstruction, such as sinusitis, acute upper respiratory tract infections were excluded from the study.

Patients were grouped as PNE (+) and PNE (-) respectively according to whether there was PNE or not. These groups were compared statistically in terms of AR, NSD, AH and TH.

This study was initiated after the approval of the ethics committee (Date: 03.05.2018 Decision: 0533). Informed consent form was obtained from all volunteers. The study was conducted in accordance with the Declaration of Helsinki.

Statistical analysis

SPSS 21.0 version (IBM, NY, US) was used for all statistical analyses. The Chi-Square test was used to determine whether there was any difference in gender distribution of the groups. The Kolmogorov-Smirnov test was used to determine whether the parameters show normal distribution or not. Intergroup comparisons; Student's t-test was used for variables with normal distribution and Mann-Whitney U-

test was used for non-normal distribution or sequential variables. Results; in gender and adenoid vegetation expressed as %, in parametric scattered values as mean ± SD, in nonparametric values as median (minimum, maximum). *P* value ≤ 0.05 was considered statistically significant.

Table 1. Score for alergic rhinitis (SFAR).

Evaluation of the relationship between primary nocturnal enuresis and nasopharyngeal pathologies' study survey form					
1-	Was there any complaint in the last 1 year besides flu and colds?	Nasal congestion		Yes (...)	No (...)
		Sneeze		Yes (...)	No (...)
		Runny nose		Yes (...)	No (...)
* For each symptom 1 points. Total 3 points.					Point:
2-	In the last year, these complaints were accompanied by itching?			Yes (...)	No (...)
* If the answer is yes 2 points.					Point:
3-	In which months have these nasal complaints been seen in the last year?	December (...)	March (...)	June (...)	September (...)
		January (...)	April (...)	July (...)	October(...)
		February (...)	May (...)	August (...)	November (...)
* 1 point for perineal, 1 point for pollen season.					Point:
4-	What factors increase your nose problems?	House dust mites (...)		Pollen (...)	Animals(Cats, dogs) (...)
* 1 point for pollen and house dust mites, additional 1 point for animals.					Point:
5-	Do you have any allergies for you?			Yes (...)	No (...)
* If the answer is yes 2 points.					Point:
6-	Has allergy testing been done before? (Prick test, IgE?)			Yes (...)	No (...)
7-	If the answer to question 6 is yes; were these tests positive?			Yes (...)	No (...)
* If the answer is yes 2 points.					Point:
8-	Have you ever been diagnosed with allergies by a doctor?			Yes (...)	No (...)
* If the answer is yes 1 point.					Point:
9-	Does anyone in the family have allergic disease?	Mother (...)		Father (...)	Siblings (...)
* If the answer is yes 2 points.					Point:
10-	Gender?			Female(...)	Male (...)
11-	Age?			(.....) Years	

Results

A total of 150 children (78 children with PNE complaints and 72 without PNE) were evaluated in our study. While the mean age of the PNE (+) group was 7.2 ± 1.6 years (range: 5.4 to 11.6 years), the mean age of the PNE (-) group was 7.6 ± 1.4 (range: 5.1 to 12.7 years). While PNE (+) group had 46.2% (n = 36) female gender, PNE (-) group had 52.8% (n = 38) female gender. There was no significant difference between PNE (+) group and PNE (-) group in terms of age and gender (respectively p = 0.203 and p = 0.819) (Table 2).

While the rate of AR was 28.2% (n = 22) in the PNE (+) group, it was 38.9% (n = 28) in the PNE (-) group. While the rate of NSD was 23.1% (n = 18) in the PNE (+) group, it was 11.1% (n = 8) in the PNE (-) group. There was no statistically significant difference between the two groups in terms of AR and NSD (respectively p= 0.327 and p=0.171) (Table 3).

While the rate of adenoid hypertrophy was 71.8% (n = 56) in the PNE (+) group, it was 44.4% (n = 32) in the PNE (-) group. The rate of adenoid hypertrophy was significantly higher in the PNE (+) group compared to the PNE (-) group (p=0.016) (Table 3).

While the rate of tonsillar hypertrophy in stage 0,1,2,3 and 4 in the PNE (+) group were respectively %10.3 (n=8), %33.3 (n=26), 30.8 (24), %7.7 (n=6) and %17.9 (n=14), they were respectively %27.8 (n=20), %36.1 (n=26), %16.7 (n=12), %11.1 (n=8) and %8.3 (n=6) in PNE (-) group. The rate of tonsillar hypertrophy was significantly higher in the PNE (+) group compared to the PNE (-) group (p=0.05) (Table 3).

The TH distributions of the PNE (+) and PNE (-) groups are shown in Figure 1.

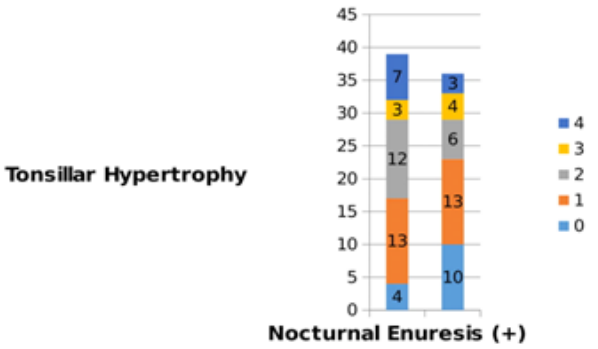

Figure 1: Distribution chart of patients with tonsillar hypertrophy.

Discussion

Primary nocturnal enuresis is defined as night bedwetting of children of five years and older without other urinary tract pathologies such as cystitis, urethritis, and bladder dysfunction with the condition of being at least two times a week for three months (1). Genetic predisposition is the most important reason in the etiology of PNE. Family history wasn't questioned in our study. This is one of the limitations of our study. Another limitation in our study is that PNE has not been evaluated after treatment of upper airway obstruction. However, it is known that there is a close relationship between PNE and upper airway obstructions. Nevertheless, in the literature, conflicting results have been reported among studies investigating the relationship between upper airway obstructive pathologies and PNE.

Table 2: Characteristic of study population.

	Total (n=150)	PNE (+) (n=78)	PNE (-) (n=72)	*p*
Patients (n)	150	52 (78)	48 (72)	
Gender				0.819
Female	49.3 (74)	46.2 (36)	52.8 (38)	
Male	50.7 (76)	53.8 (42)	47.2(34)	
Age	7.4±1.5	7.2±1.6	7.6±1.4	0.203

All variables are shown as n (%) or mean ± SD for median and non-normal distribution.
PNE: Primary nocturnal enuresis

Adenotonsillar hypertrophy, AR and NSD are among the pathologies that lead to upper airway obstruction in childhood. Adenotonsillar hypertrophy (ATH) is seen as the most common cause. Aydın S et al. (5) reported in a study

they carried on 1132 children aged between five and fourteen years that there was no significant relationship between AV and PNE. In contrast to this study, Balaban M et al. (6) reported in a study of 143 children in total that, ATH was observed more common in children with PNE complaints. In our study, AH and TH ratio were found significantly higher in children with PNE.

Primary nocturnal enuresis is also closely associated with sleep disorders. As a matter of fact, it is known that children with PNE have difficulty in waking up for toilet (12). Balaban M et al. (6) reported in their study that sleep is deeper in children with PNE. Nevertheless, ATH also causes a decrease in sleep quality by leading upper airway resistance and sleep apnea in children (13). Moreover, it is known that in children with ATH, respiratory distress is increased without apnea / hypopnea attacks and REM sleep is frequently interrupted by hypoxia also there is extra energy loss and respiratory acidosis due to increased work load during breathing at night in the upper airway resistance syndrome (14). As a result, ATH may have led to a decline in children's sleep quality and difficulty in waking up for the toilet, resulting in PNE. As a matter of fact, sleep disorders are improved by treatment of ATH in children with PNE complaints and correspondingly the declining PNE complaints have been reported in many publications. Kovacevic et al. (15) reported that in 46 PNE patients with adenotonsillectomy indication, 43.5% post-operative ratio of PNE complaints have also passed. Weider DJ et al. (16) reported that PNE complaints improved by 75% after surgical correction of upper airway obstruction in 115 patients with PNE. All this information supports the conclusion obtained in our study that ATH plays role in the etiology of PNE.

Table 3. Comparison of upper airway pathologies

	Toplam	Primary Nocturnal Enuresis, %(n)		*P*
		(+)	(-)	
AR				0.327
AR +	33.3 (50)	28.2 (22)	38.9 (28)	
AR -	66.7 (100)	71.8 (56)	61.1 (44)	
NSD				0.171
NSD +	17.3 (26)	23.1 (18)	11.1 (8)	
NSD -	82.7 (124)	76.9 (60)	88.9 (64)	
AV				0.016*
<%50 hypertrophy	41.3 (62)	28.2 (22)	55.6 (40)	
>%50 hypertrophy	58.7 (88)	71.8 (56)	44.4 (32)	
TH				0.05*
0	18.7 (28)	10.3 (8)	27.8 (20)	
1	34.7 (52)	33.3 (26)	36.1 (26)	
2	24 (36)	30.8 (24)	16.7 (12)	
3	9.3 (14)	7.7 (6)	11.1 (8)	
4	13.3 (20)	17.9 (14)	8.3 (6)	

All variables were categorically and n (%) for ordinal data or median (mean ± SD) for non-parametric distribution.

AR: Allergic rhinitis, NSD: Nasal septal deviation, AV: Adenoid vegetation, TH: Tonsillar hypertrophy

However, AR causes nasal obstruction by causing intranasal congestion and concha hypertrophy in children. Nevertheless, there are conflicting results among studies investigating the relationship between AR and PNE. Karakas HB et al. (7) compared 112 children with PNE in terms of upper airway pathologies with control group 113 and reported that AR was equal in both groups. In contrast to this study, Tsai JD et al. (17) reported that AR increases the frequency of PNE in a study on 8616 children by using TNHIRD (Taiwan National Health Insurance Research) data between 2007-2012. However, in our presented study, it was observed that AR did not change the PNE frequency. This result may be related to the intermittent progression of AR and not to cause a continuous nasal obstruction.

Again Karakas HB et al. (7) in their study in 2017 reported that there was no significant relationship between NSD and PNE in children. Similarly, in our study, no significant correlation was found between NSD and PNE frequency.

Conclusion

There is no significant relationship was found between AR and NSD with PNE. However, ATH has been found to be a factor that increases the risk of PNE in children. The presence of underlying ATH must be considered in children with PNE. We think that the studies to be conducted on the larger patient population will enlighten us more.

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