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ENURESIS AND DYSFUNCTIONAL VOIDING IN PEDIATRIC ASTHMA AND/OR ALLERGIC RHINITIS PATIENTS

PEDİATRİK ASTIM VE/VEYA ALERJİK RİNİT HASTALARINDA ENÜREZİS VE DİSFONKSİYONEL İŞEME

OZLEM YUKSEL AKSOY[1] HATİCE EKE GÜNGÖR[2] DOĞUKAN SUSAM[3] FUNDA BASTUG[4]

[1]Ankara City Hospital, Department of Pediatric Nephrology, Ankara, Turkey
[2]Kayseri City Hospital, Department of Pediatric Allergy, Kayseri, Turkey
[3]Kayseri City Hospital, Department of Pediatrics, Kayseri, Turkey
[4]Kayseri City Hospital, Department of Pediatric Nephrology, Kayseri -Turkey

ÖZET

Giriş: İşeme bozuklukları çocukluk çağında en sık görülen sorunlardan biridir. İdrar kaçırma ve enürezisin obstrüktif uyku apnesi ve horlama gibi solunum yolu obstrüksiyonunun eşlik ettiği durumlarla ilişkili olduğu gösterilmiştir. Bu çalışmada, solunum yolu obstrüksiyonuna yol açabilen astım ve alerjik rinit tanılı hastalarda işeme bozuklukları sıklığının belirlenmesi amaçlandı.

Yöntemler: Astım ve/veya alerjik rinitli çocuklarda idrar kaçırma/enürezis varlığını değerlendirmek için Kayseri Şehir Hastanesi Çocuk Alerji polikliniğine başvuran 5 yaş üstü hastalara "İşeme Bozuklukları Semptom Skorlaması" formu kullanıldı. Form hastanın ebeveynleri tarafından dolduruldu. Çalışma Kayseri Şehir Hastanesi Etik Kurulu tarafından onaylandı.

Bulgular: 110 hastanın 71'i erkek, 39'u kadındı. Hastaların %53.6'sında astım, %28.2'sinde alerjik rinit, %18.2'sine astım + alerjik rinit tanıları mevcuttu. "İşeme Bozuklukları Semptom Skorlaması" formu ve anamnez eşliğinde alınan bilgilerle 110 hastanın 38'inde (%34.5) bir işeme bozukluğu olduğu gösterildi. Hastaların 14'ünde (%12.7) enürezis nokturna, 6 hastada (%5.5) enürezis diurna mevcuttu, 18 hastada (%16.4) işeme disfonksiyonu saptandı. İşeme bozukluğu olan toplam 38 hastanın 27'sinde astım, 4'ünde alerjik rinit, 7'sinde alerjik rinit + astım vardı. Atopi 38 hastanın %50'sinde saptandı.

Sonuç: Astım ve/veya alerjik rinit tanısı ile izlenen hastalarda işeme disfonksiyonu %34.5 oranında saptanmış olup, toplumdaki enürezis/inkontinans sıklığı ile karşılaştırıldığında oldukça yüksek olduğu görülmektedir. Astımlı ve alerjik rinitli hastalarda işeme bozukluklarının erken saptanması için farkındalık yaratmak önemlidir.

Anahtar Kelimeler: enürezis, astım, alerjik rinit, işeme bozuklukları

ABSTRACT

Introduction: Voiding disorders are one of the most common problems in childhood. It has been shown that urinary incontinence/enuresis is associated with conditions accompanied by airway obstruction such as obstructive sleep apnea and snoring. In this study, it was aimed to determine the frequency of voiding disorders in patients with asthma and allergic rhinitis which are associated with airway obstruction.

Methods: In order to evaluate the presence of urinary incontinence/enuresis in children with asthma and/or allergic rhinitis, the "Dysfunctional voiding and incontinence scoring system" form was used for patients over the age of 5 who applied to the Kayseri City Hospital Pediatric Allergy Polyclinic. The form was filled by the patient's parents. The study was approved by the Kayseri City Hospital Ethics Committee.

Results: Of 110 patients, 71 were male and 39 were female. Asthma was the allergic diagnosis in 53.6% of the patients, whereas 28.2% had allergic rhinitis, 18.2% had asthma + allergic rhinitis. With the information obtained from the form and accompanied by anamnesis, it was shown that 38 (34.5%) of 110 patients had a type of voiding disorder; 14 (12.7%) patients had enuresis nocturna, and 6 patients (5.5%) had enuresis diurna, and voiding dysfunction was detected in 18 patients (16.4%). Of 38 patients with voiding disorder, 27 had asthma, 4 had allergic rhinitis, 7 had allergic rhinitis + asthma. Atopy was detected in 50% of 38 patients.

Conclusion: Voiding dysfunction was found at a rate of 34.5% in patients followed up with the diagnosis of asthma and/or allergic rhinitis, and it is seen to be quite high when compared to the frequency of enuresis/incontinence in the community. It is important to raise awareness for early detection of voiding disorders in patients with asthma and allergic rhinitis.

Keywords: enuresis, asthma, allergic rhinitis, voiding dysfunction

Corresponding Author: Ozlem Yuksel Aksoy
E-mail: ozlem_yurtsever@yahoo.com
ORCID: 0000-0001-7905-3524
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INTRODUCTION

Allergic diseases and urinary incontinence are frequent problems of childhood. The prevalence of asthma and allergic rhinitis is 8.3-18.3% and 20-40% respectively (1,2). Incontinence is defined by involuntarily urination. Dysfunctional voiding or voiding dysfunction can be briefly defined as having problems with storing the urine in the bladder or emptying the bladder or both. The frequency of monosymptomatic enuresis is found to be increased among pediatric patients with allergic diseases, and there are certain studies demonstrating the relationship between nocturnal enuresis and asthma (3,4).

Allergic rhinitis is a common inflammatory disease arising from an immunglobulin-E mediated reaction to environmental allergens. It is characterized by nasal itching, rinorrhea, nasal congestion and/or sneezing. It has several effects on sleep and life quality, memory, academic performance and productivity. Obstructive sleep apnea and snoring are found to be associated with urinary incontinence (5). In a few studies, it has also been documented that allergic diseases are also related with urinary incontinence, and the relationship between nocturnal enuresis and asthma has also been documented (1,4,6).

It is postulated that due to the affected quality of sleep, sleep respiratory diseases and asthma might be related with enuresis (6).

In this study, we aimed to evaluate the prevalence of urinary incontinence and dysfunctional voiding among pediatric asthma and/or allergic rhinitis patients via using the "Dysfunctional voiding and incontinence scoring system" designed by Akbal et al (7).

METHODS

We prospectively evaluated the patients which applied to the pediatric allergy outpatient clinics of Kayseri City Hospital between March 2021 and September 2021 with the diagnoses of asthma and/or allergic rhinitis. The "Dysfunctional voiding and incontinence scoring system" questionnaire was given to the patients who applied to the outpatient clinics of pediatric allergy department with the diagnoses of asthma and/or allergic rhinitis. Since enuresis is defined in children after the age of 5, patients older than 5 years of age were chosen as study group. The form was filled by the parents of the patients. Patients using anti-epileptic and anti-psychotic medication, the ones with neurogenic bladder and mental retardation were not included. Informed consent was obtained from the parents and the patients.

Laboratory data (blood urea nitrogen, serum creatinine, hemoglobin, mean platelet volume, and blood eosinophil percentages) obtained from the routine follow-up of the applications to the allergy department were recorded. Clinical data were recorded from the anamnesis in hospital system's medical database.

Patients were classified as primary/secondary enuresis nocturna, enuresis diurna and dysfunctional voiding according to their anamnesis and questionnaire responses. Patients with pronounced bladder symptoms were included in the dysfunctional voiding group.

The data is evaluated with IBM SPSS for Windows (SPSS version 17.0). Chi-square (χ^2) test was used for the analysis of the categorical data. Distribution of the data for normality was tested by Shapiro-Wilk test and homogeneity of group variances were tested by the Levene test. Student t test was performed for normally distributed data, and Mann-Whitney U test for non-normally distributed data. Frequencies and percentages were used as descriptive values in the categorical data. Arithmetical mean±standard deviation was used for the normally distributed data, and median and interquartile range (IQR) were used for the non-normally distributed data.

Statistical significance was accepted as 0.05.

The study was conducted with the approval of the Ethical Committee of Kayseri City Hospital on 18.03.2021 with Project number 333.

RESULTS

The "Dysfunctional voiding and incontinence scoring system" questionnaire was applied to 110 patients followed by pediatric allergy department with the diagnoses of asthma and allergic rhinitis. Asthma was seen in 59 (53.6%), allergic rhinitis in 31 (28.2%) patients. Twenty patients (18.2%) were followed with the diagnoses of both asthma and rhinitis. The male/female ratio was 71/39 in all patients, and there was a male predominance in all subgroups according to allergic subdiagnoses. The laboratory test results (blood urea nitrogen, serum creatinine, hemoglobin, mean platelet volume, and blood eosinophil percentages) were similar between the three subgroups according to allergic diagnoses (Table 1).

With the help of a detailed history of incontinence and the "Dysfunctional voiding and incontinence scoring system" questionnaire, it was determined that 38 (34.5%) over 110 patients had voiding dysfunction and/or incontinence. Fourteen (12.7%) patients had enuresis nocturna, 6 patients (5.5%) had enuresis diurna, and 18 patients (16.4%) had dysfunctional voiding. Among 38 patients with either incontinence or voiding dysfunction, 27 had asthma, 4 had allergic rhinitis and 7 had both allergic rhinitis and asthma. Among 59 asthma-only patients 33 had atopia, and among 51 rhinitis (with or without asthma) 39 had atopia. Atopia was significantly more prominent in patients with allergic rhinitis ($p=0.024$). Among 38 patients with enuresis and/or incontinence nineteen patients (50%) had atopia. Among non-enuretic 72 patients, atopia was seen in 53 patients (74%). Atopia was more prominent in non-enuretic patients ($p=0.013$).

Table 1. Demographic and clinical data regarding allergic diagnoses subgroups

	Asthma n=59	Allergic Rhinitis n=31	A.Rhinitis & Asthma n=20	p value
Age (year)[a]	10.44	10.26	9.40	0.48
Male/Female	42/17	17/14	12/8	-
BUN (mg/dL)[a]	11.32	11.10	10.70	0.87
Serum Creatinine (mg/dL)[a]	0.50	0.49	0.47	0.69
Hemoglobin (g/dL)[a]	13.80	13.50	13.40	0.26
Hematocrit (%)[a]	40.30	39.80	39.60	0.50
MCV(fL)[a]	79.40	80.70	79.70	0.63
WBC(10^6/L)[a]	7847	7230	7739	0.45
Platelet count(10^9/L)[a]	323	296	323	0.09
MPV(fL)[a]	9.50	9.70	9.20	0.06
Eosinophil (%)[a]	4.60	4.10	4.40	0.23
E. nocturna[b]	9(15.3)	3(9.7)	2(10.0)	-
E. diurna[b]	5(8.5)	0(0.0)	1(5.0)	0.08
Dysfunctional voiding[b]	13(22.0)	1(3.2)	4(20.0)	-

[a]Values are given as mean±standard deviation.
[b]Values are given as n (%).

When the three allergic subdiagnosis groups were compared, enuresis nocturna, enuresis diurna, and dysfunctional voiding were more prevalent in the asthma group, but the difference was not significant (p=0.08).

When we redefined the groups as “asthma only” and “allergic rhinitis with or without asthma” and compared the data; of the 59 asthma patients, 27 had urinary incontinence issues. On the other hand, in the allergic rihinitis group, only 11 of 51 patients had enuresis and/or dysfunctional voiding problem. Urinary incontinence and dysfunctional voiding were more pronounced in asthmatic lone group compared to allergic rhinits with or without asthma (p=0.052).

Anti-allergic treatments differed significantly between the two groups (asthma vs allergic rhinitis with or without asthma) (p<0.001). In the asthma group, 31 patients received only inhaler, 21 patients received inhaler + oral therapy. Spray and oral anti-histamines are mainly used in the allergic rhintis group (Table 2). However, there is no significant difference between anti-allergic drugs and enuresis types (Table 3).

Table 2. Anti-allergic treatments among asthma and allergic rhinitis groups.

	Asthma n=59	Allergic rhinitis (with or without asthma) n=51	Total n=110	p value
Spray only	0(0.0)	12(10.9)	12(10.9)	**<0.001**
Inhaler only	31(28.2)	2(1.8)	33(30.0)	
Oral antihistaminic	0(0.0)	16(14.5)	16 (14.5)	
Leukotrien antagonists	3(2.7)	4(3.6)	7(6.4)	
Oral steroid	4(3.6)	4(3.6)	8(7.3)	
Inhaler+oral treatment	21(19.1)	5(4.5)	26(23.6)	
Inhaler+spray	0(0.0)	8(7.3)	8(7.3)	

Values are given as n (%).

Constipation was observed in 9 of 59 patients in the asthma only group, while constipation was observed in 8 of 51 patients with allergic rhinitis (with or without asthma) group. There was no significant difference in constipation between the allergic subgroups. The answers given to the quality of life question of the questionnaire did not differ between allergic diagnoses subgroups.

Table 3. Anti-allergic treatments among enuresis groups.

	Types of enuresis					
Types of treatment	**Enuresis nocturna n=14**	**Enuresis diurnal n=6**	**Dysfunctional voiding n=18**	**No enuresis/ incontinence n=72**	**Total n=110**	**p value**
Spray only	1	0	1	10	12	**0.378**
Inhaler only	5	3	9	16	33	
Oral antihistaminic	2	0	0	14	16	
Leukotrien antagonists	0	0	1	6	7	
Oral steroid	0	0	1	7	8	
Inhaler+oral treatment	5	3	4	14	26	
Inhaler+spray	1	0	2	5	8	

DISCUSSION

It is a known fact that there is a connection between airway obstruction and enuresis. The association between nocturnal enuresis and upper airway obstruction due to allergic rhinitis or obstructive sleep apnea has already been documented (1-7). We designed our study to reveal the relationship between incontinence/enuresis and allergic diseases such as asthma and/or allergic rhinitis.

In this prospective study, among 38 (34.5%) patients with voiding dysfunction and incontinence, 27 of them were followed with the diagnosis of asthma. In a recent study, allergic diseases were found in 34% of enuretic children. Allergic diseases are found to be more common in especially children with monosymptomatic enuresis nocturna (1).

In our study, among 59 patients with asthma, 9 had enuresis nocturna and 13 had voiding dysfunction. When the three allergic subdiagnoses groups were compared, enuresis nocturna, enuresis diurna and dysfunctional voiding were more prevalent in asthma group. Similarly, when the patients were divided into two as “asthmatic only” and “allergic rhinitis with or without asthma”, enuresis is more prevalent in asthmatic only group.

It is speculated that negative intrathoracic pressure in children with upper airway obstruction causes atrial distension in the heart wall, leading to brain natriuretic peptide release, resulting in increased water and sodium excretion. Vasopressin release is inhibited by the renin-angiotensin-aldosterone system (7,9,10).

Children with apnea are at increased risk of enuresis (7,11). In the enuretic patients, symptoms of upper respiratory tract obstruction are reported between 30.7% and 65.6% (7, 11-13). The prevalence of enuresis in patients with obstructive sleep apnea ranges from 22% to 42% (7, 14-17).

In sleep respiratory disorders such as snoring and obstructive sleep apnea the awakening stimulus is decreased, and this can lead to bedwetting. Due to the obstruction of the upper airways there is microrecurrent awakenings which lead to an increase in the threshold of awakenings and stimulation due to the filling or contractions of detrusor (7,18). After surgery regarding obstruction in the upper airways, patients who cannot awaken to void, start to awaken (7,19).

It is postulated that in enuretic patients, brain natriuretic peptide is also increased, and in patients with sleep respiratory disorders there are even higher brain natriuretic peptide levels (7,20).

The prevalence of enuresis in children is reported as 7.2-8% (18). We found an 18% prevalence of enuresis among our cohort. In our study, we found an increase in the prevalence of enuresis in children with allergic rhinitis and/or asthma.

When we added dysfunctional voiding symptoms such as frequency, voiding delay, staccato voiding, voiding difficulty (hesitancy and straining) to incontinence and enuresis, we found an increase in the prevalence of incontinence and voiding dysfunction (34.5%) in allergic rhinitis and/or asthma patients.

Durmuş et al. (1) found an increase in the prevalence of enuresis in pediatric allergic diseases in their prospective studies; enuresis and atopy were higher in the pediatric allergic diseases group (40% and 26%, respectively).

We found an interestingly low rate of enuresis and voiding problems in patients with atopy. Although there was no significant difference in terms of medications between patients with and without atopy in our study ($p>0.05$), patients with atopy were more prone to have oral steroid and antihistamine treatment. That patients with atopy may have more stringent treatment options and due to the treatment of primary allergic disorders and relief of chronic hypoxia and congestion; urinary incontinence and enuresis might be found less frequently in atopic patients in our study.

Lai et al. (21) concluded that patients with asthma, atopic dermatitis, and attention deficit/hyperactivity disorder comorbidities are at higher risk of nocturnal enuresis, and children with allergic rhinitis have a higher incidence and subsequent risk of nocturnal enuresis. Liu et al. (22) also showed a significant relationship between allergic rhinitis and sleep, in terms of sleep quality and duration; they concluded that allergic rhinitis was also associated with higher risks of nocturnal dysfunctions such as insomnia, nocturnal enuresis, obstructive sleep apnea, and snoring.

This study draws attention to the increased prevalence of enuresis/incontinence and dysfunctional voiding in asthmatic and allergic patients. The limitations of the study are that the nature of the study is based on a questionnaire and anamnesis, and we could not develop the with additional tests such as uroflowmetry or ultrasound.

CONCLUSION

Voiding disorders such as enuresis and dysfunctional voiding are common in patients with asthma and allergic rhinitis. The clinicians must be aware of urinary symptoms during the follow-up of such patients for early detection and proper treatment.

Further studies are needed to document the relationship between allergic diseases and enuresis. It is important to question the respiratory symptoms while evaluating an enuretic child.

Ethics Committee Approval: The study was conducted with the approval of the Ethical Committee of Kayseri City Hospital on 18.03.2021 with Project number 333.

Informed Consent: Informed consent was obtained from all parents of children.

Authorship Contributions: OYA, HEG, DS, FB were involved in the collection of the data and the clinical follow-up of the patients. OYA and HEG are involved in the design and conception of the study. OYA is the major contributor in writing the manuscript. All authors read and approved the final manuscript.

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Appendix: Dysfunctional Voiding And Incontinence Symptoms Score Questionnaire

1.Does your child wet during the day?	No 0	Sometimes 1	1-2 times/day 3	Always 5
2. How wet is your child during the day?	Damp underwear 1	Damp pants only 3	Pants soaking wet 5	
3. Does your child wet during the night?	No 0	1–2 Nights/ week 1	3–5 Nights/ week 3	6-7 Nights/ week 5
4. How wet is your child during the night?	Damp bed sheet only 1	Bed sheets soaking wet 4		
5. How many times does your child void?	Less than7/day 0	7 Or more than7/day 1		
6. My child strains during voiding.	Yes 0	No 4		
7. My child feels pain during voiding.	Yes 0	No 1		
8. My child voids intermittently.	Yes 0	No 2		
9. My child needs to go back voiding soonafter finishes his/her pee.	Yes 0	No 2		
10. My child has a suddenfeeling of having to urinate immediately.	Yes 0	No 1		
11. My child holds by crossing his/her legs.	Yes 0	No 2		
12. My child wets onthe way to the toilet.	Yes 0	No 2		
13. My child misses his/her bowel movement every day.	Yes 0	No 1		
QUALITY OF LIFE If your child experiences symptoms mentioned above, does it affect his/ her family, social or school life	No 0	Sometimes 1	Yes affects 2	Seriously affects 3