Ann Mil Health Sci Res. 2022 June; 20(2):e123881. doi: 10.5812/amh-123881.

Published online 2022 August 10. **Research Article**

Factors Affecting Urination Control in Children

Hamidreza Bakhtiari [1], Parsa Yousefichaijan [2], Hassan Taherahmadi [3], Mohamad Rafiei [4], Ali Arjmand [3], Saeed Karimi Matloub [2] and Masoud Rezagholizamenjany [1,*]

[1] School of Medicine, Arak University of Medical Sciences, Arak, Iran
[2] Students Research Committee, Qom University of Medical Sciences, Arak ,Iran
[3] Department of Pediatric, Arak University of Medical Sciences, Arak, Iran
[4] Department of Biostatistics, Arak University of Medical Sciences, Arak, Iran

[*] *Corresponding author*: School of Medicine, Arak University of Medical Sciences, Arak, Iran. Email: masoudrezagholi074@gmail.com

Received 2022 March 08; **Revised** 2022 July 23; **Accepted** 2022 July 29.

Abstract

Background: The time of urination control varies in chHildren with environmental, genetic, geographical, and other factors.
Objectives: We examined factors affecting urination control in children.
Methods: We enrolled children aged over five years at Amirkabir hospital and Imam Reza pediatric clinic, Arak, Iran. They were divided into two groups with and without urinary incontinence. Demographic, epidemiological, clinical, and urinary factors in children were gathered in questionnaires. Data were analyzed in the SPSS program by chi-square and *t*-test.
Results: The mean age was 6.45 ± 1.96 years. There were 436 (44.2%) males and 550 (55.8%) females. Anatomic and functional bladder disorders, UTIs, and organic disorders were the most common genetic factors, and toilet training neglect was the least common etiologic factor. Factors such as gender, living area, father, and mother education significantly differed between the two groups ($P < 0.05$).
Conclusions: Proper and timely urination regarding personal, familial, and environmental factors plays a vital role in urination control in children.

Keywords: Urination Control, Children, Urology

1. Background

As a general term, bladder dysfunctions that lead to voiding dysfunction describe abnormalities in filling and emptying the bladder (1). This is the most common urological condition constituting more than 40% of pediatric urology clinic visits, and is classified as diurnal and nocturnal enuresis (2). In addition, it is classified as primary enuresis, without achievement of dryness, and secondary enuresis, which is dry for at least six months (3). NE has a prevalence of 15% at five years of age, 7% at eight, and 1% at 15. An annual spontaneous remission rate of 15% has been reported (2, 4).

This condition is influenced by different internal and external factors (5). Factors that probably affect the development of urination control include cognitive and physical maturation, cultural norms, socioeconomic status, changes in social status, toilet training, and others (6). Toilet training has a more vital role than other factors (7). Prerequisites for achieving elimination in the toilet include the child's ability to recognize the urge for urination, to get to the toilet, to understand the sequence of tasks required, to avoid oppositional behavior, and to take pride in achievement (8). Factors that may induce urination dysfunction include the difference in developmental aspects, organic disorders, delayed bladder maturation, psychological distress, genetic factors, low bladder volume, deep sleep, and low level of vasopressin (4). Also, medical problems that may contribute to bedwetting include diabetes, UTIs, constipation, pinworms, kidney failure, seizures, and sleep problems (1, 8).

2. Objectives

As many factors may impact urination control in children, we can reduce these disorders with better control of urination in children by considering these factors. Therefore, this study aimed to evaluate factors that can influence urination control in children in pediatric clinics of Arak city.

3. Methods

3.1. Study Setting

This cross-sectional hospital-based study was conducted in Amirkabir hospital's pediatric clinic and Imam

Reza's pediatric clinic in Arak city in 2020.

3.2. Inclusion and Exclusion Criteria

Inclusion criteria included children in Amirkabir hospital pediatric clinic and Imam Reza pediatric clinic, 5 to 18 years of age, and consent to participate in the study. The exclusion criterion was a lack of consent to participate in the study.

3.3. Study Population

Sampling was done by the census method. In total, 1252 children (male or female aged over five years) were evaluated, but 82 children were excluded, and information of 1,170 children was recorded. Of these children, 184 were affected by urinary incontinence in the preliminary evaluation, and only UI etiologies were indicated.

3.4. Ethical Considerations

The authors have observed ethical issues (plagiarism, data fabrication, and double publication). In addition, the Ethics Committee of Arak University of Medical Sciences approved the study protocol, with ethical code IR.ARAKMU.REC. 23-166-93.

3.5. Statistical Analysis

Data description was done using mean and standard deviation for quantitative data and frequency and percentage for qualitative data. Data analysis was conducted by the chi-square test for qualitative variables in the SPSS program at a significance level of $P < 0.05$.

4. Results

The mean age of children was 6.45 ± 1.96 years. There were 436 (44.2) males and 550 (55.8) females. Based on Table 1, anatomic and functional bladder disorder, UTIs, and organic causes were the most common genetic factors, and the neglect of toilet training was the least common etiology factor. Based on Table 2, the association between demographic, epidemiologic, and clinical factors and the urination control time is assessed. Based on this table, some factors significantly affected urination control, including gender, living area, father and mother education, economic condition, consanguineous parents, toilet and nappies status, and growth status of children. Detailed information has been indicated in tables. Other factors in Table 2 that did not significantly differ between the two groups ($P > 0.05$) are parental status, maternal delivery age, birth weight, delivery type, gestational age, breastfeeding duration, and lactation type.

Table 1. Etiology of Urinary Incontinence in Children (n = 184)

Causes	No (%)
Vesicoureteral reflux	19 (10.3)
Sleep apnea	16 (8.7)
Vasopressin secretion disorder	8 (4.3)
Familial history	2 (1.1)
Psychological factors	14 (7.6)
UTIs	34 (18.5)
Neglect in toilet training	7 (3.8)
Anatomic and functional bladder disorder	52 (28.3)
Organic causes	32 (17.4)

5. Discussion

Based on the present study, proper and timely urination regarding personal, familial, and environmental factors plays a vital role in urination control in children. Also, factors such as gender, living area, father, and mother education significantly differed between the two groups. Firoozi et al., in a study about the resolution of enuresis after adenotonsillectomy, considered 86 children, 40 girls and 46 boys, who underwent adenotonsillectomy. Adenotonsillar was graded from 1 to 4, and enuresis was evaluated by questionnaires. They concluded that the obstruction of the upper airway system in children is associated with a high rate of NE (9). In the present study, apnea, as respiratory system dysfunction, was observed in 16 (8.7%) children, which was different from our study because of the difference in the evaluated cases in the two studies. Hägglöf et al. studied self-esteem before and after enuresis treatment in children. They considered children with enuresis and healthy children as the case and control groups. The children's evaluation was based on a self-answering questionnaire about psychometric properties within six months of follow-up. They concluded that lower socioeconomic children had lower self-esteem than higher socioeconomic groups, and girls had higher self-esteem than boys (10). Nevertheless, in the present study, many other related factors were evaluated, and most of these factors statistically correlate with the enuresis control time, which clarifies the reason for the difference in the two evaluations.

In addition, Yang et al., in a case-control study, evaluated children with and without habitual snoring as the case and control groups. They included 1,821 children and concluded that children with habitual snoring had PMNE more than children without snoring (7). However, the present study only evaluated sleep apnea regarding respiratory system dysfunction and found a statistically significant difference in it, which was different from the men-

tioned study, possibly because of the difference in evaluated cases. Duel et al. investigated the correlation between ADHD and urination control. They evaluated 23 boys and five girls as the case group and 10 boys and 12 girls as the control groups by 10 questionnaire sets. They concluded that healthy children had significantly lower rates of constipation, incontinence, infrequent voiding, urgency, dysuria, and NE than children with ADHD (11). However, we did not evaluate this condition in children. Kaerts et al. evaluated toilet training in healthy children. They evaluated 256 children by questionnaires distributed to the parents of healthy children aged 15 to 35 months. They concluded that the toilet training approach is fundamental (4), which aligns with the present study. The limitation of our study was the noncompliance of parents, who were convinced by explaining the importance of this issue. However, because few clinical studies have been carried out regarding the impact of different factors on urination control, further studies will be needed for the reception of this correlation. In addition, several studies in different geographical locations are required.

5.1. Conclusions

Anatomic and functional bladder disorder, UTIs, and organic causes are the most common genetic factors, and toilet training neglect was the least common etiology factor. Also, factors such as gender, living area, father, and mother education significantly differed between the two groups. Proper and timely urination plays a vital role in children.

Acknowledgments

This work was performed in partial fulfillment of the requirements for Dr. Hamidreza Bakhtiari in the School of Medicine, Arak University of Medical Sciences, Arak, Iran.

Footnotes

Authors' Contribution: P. Y. C. and H. R. B. participated in the study concept, design, and data acquisition. M. R. Z. participated in designing the survey and performed parts of the statistical analysis. H. T. and M. R. re-evaluated the clinical data, revised the manuscript, performed the statistical analysis, and revised the manuscript. A. A. collected the clinical data, interpreted them, and revised the manuscript. S. K. M. re-analyzed the clinical and statistical data and revised the manuscript. All authors read and approved the final manuscript.

Conflict of Interests: Arak University of Medical Sciences supported our study. We do not have any financial interests. The authors of this article are not a member of the Editorial Board of this journal.

Data Reproducibility: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: The authors have observed ethical issues (plagiarism, data fabrication, double publication). In addition, the Ethics Committee of Arak University of Medical Sciences approved the study protocol, with ethical code IR.ARAKMU.REC. 23-166-93 (link: vdresearch.arakmu.ac.ir/webdocument/load.action? webdocument_code=5000&masterCode=7001066).

Funding/Support: Arak University of Medical Sciences funded our study.

Informed Consent: The informed consent form is uploaded in the supplementary files during submission.

References

1. Siroosbakht S, Rezakhaniha B. Is Renal Bladder Ultrasound Necessary in Monosymptomatic Primary Nocturnal Enuresis? A Case Control Study. *J Compr Ped*. 2018;**9**(4). e69006. doi: 10.5812/compreped.69006.
2. Rezagholizamenjany M, Yousefichaijan P. An overview on peritoneal dialysis. *Ann Res Dial*. 2016;**1**(1).
3. Yousefichaijan P, Rezagholizamenjany M, Rafiei F, Taherahmadi H, Rafiei M. The Relationship between Blood Biomarkers Level and the Prognosis of Nephrotic Syndrome in the Children. *Int J Pediatr*. 2016;**4**(9):3489–97. doi: 10.22038/IJP.2016.7302.
4. Kaerts N, Vermandel A, Van Hal G, Wyndaele JJ. Toilet training in healthy children: results of a questionnaire study involving parents who make use of day-care at least once a week. *Neurourol Urodyn*. 2014;**33**(3):316–23. doi: 10.1002/nau.22392. [PubMed: 23495098].
5. Mahjani B, Koskela LR, Mahjani CG, Janecka M, Batuure A, Hultman CM, et al. Systematic review and meta-analysis: relationships between attention-deficit/hyperactivity disorder and urinary symptoms in children. *Eur Child Adolesc Psychiatry*. 2022;**31**(4):663–70. doi: 10.1007/s00787-021-01736-3. [PubMed: 33635440].
6. Mohkam M. Voiding dysfunction in children with chronic functional constipation. *Iran J Kidney Dis*. 2013;**7**(5):336–8. [PubMed: 24072141].
7. Yang TK, Guo YJ, Chen SC, Chang HC, Yang HJ, Huang KH. Correlation between symptoms of voiding dysfunction and attention deficit disorder with hyperactivity in children with lower urinary tract symptoms. *J Urol*. 2012;**187**(2):656–61. doi: 10.1016/j.juro.2011.10.016. [PubMed: 22177910].
8. Wolfe-Christensen C, Guy WC, Mancini M, Kovacevic LG, Lakshmanan Y. Evidence of Need to Use Self-Report Measures of Psychosocial Functioning in Older Children and Adolescents with Voiding Dysfunction. *J Urol*. 2016;**195**(5):1570–4. doi: 10.1016/j.juro.2015.11.045. [PubMed: 26626220].
9. Firoozi H, Seidan Anbi S, Mousavi J, Farshidi F, Rezai MS. [Prevalence of Urinary Tract Infection in Neonates with Hyperbilirubinemia]. *J Mazandaran Univ Med Sci*. 2019;**28**(169):91–7. Persian.
10. Hägglöf B, Andrén O, Bergström E, Marklund L, Wendelius M. Self-esteem before and after treatment in children with nocturnal enuresis and urinary incontinence. *Scand J Urol Nephrol Suppl*. 1997;**183**:79–82. [PubMed: 9165615].
11. Duel BP, Steinberg-Epstein R, Hill M, Lerner M. A survey of voiding dysfunction in children with attention deficit-hyperactivity disorder. *J Urol*. 2003;**170**(4 Pt 2):1521–4. doi: 10.1097/01.ju.0000091219.46560.7b. [PubMed: 14501650].

Table 2. Demographic, Epidemiologic, and Clinical Factors Related to Urination Control Time (n = 986)

Variables	Time of Urination Control				P Value
	< 3	3 - 4	> 4	Total	
Gender					0.0001
Male	30 (33.3)	178 (32.4)	228 (65.6)	436 (44.2)	
Female	60 (66.7)	270 (67.6)	120 (34.4)	550 (55.8)	
Living area					0.0001
Urban	90 (100)	430 (78.5)	110 (31.6)	630 (63.9)	
Rural	0 (0)	118 (21.5)	238 (68.4)	356 (36.1)	
Father education					0.0001
Under diploma	10 (11.1)	78 (14.2)	208 (59.7)	296 (30)	
Diploma	20 (22.2)	163 (31.1)	57 (16.1)	240 (24.3)	
Associate's degree	10 (11.1)	157 (27.1)	33 (9.7)	200 (20.3)	
Bachelor's degree	36 (39.4)	25 (4.5)	39 (43.2)	100 (10.1)	
Master's degree or higher	14 (16.1)	125 (22.8)	11 (12.3)	150 (15.3)	
Mother education					0.0001
Under diploma	0 (0)	98 (17.8)	83 (23.8)	181 (18.4)	
Diploma	0 (0)	200 (36.7)	210 (61.1)	410 (41.6)	
Associate's degree	0 (0)	150 (27.1)	55 (15)	205 (20.8)	
Bachelor's degree	30 (33.3)	97 (18.2)	0 (0)	127 (12.9)	
Master's degree or higher	60 (66.6)	3 (0.2)	0 (0)	63 (6.3)	
Economic condition					0.0001
Low	0 (0)	80 (14.5)	132 (37.9)	212 (21.5)	
Moderate	40 (44.4)	418 (76.2)	216 (62)	674 (68.4)	
High	50 (55.5)	50 (9.1)	0 (0)	100 (10.1)	
Parental status					0.2
Death of parents	0 (0)	30 (5.4)	19 (5.4)	49 (50)	
Separation	20 (22.2)	60 (10.9)	8 (2.2)	88 (8.9)	
Consanguineous parents					0.0001
Yes	3 (3.3)	3 (0.5)	28 (8)	34 (13.6)	
No	87 (96.7)	545 (99.5)	320 (92)	952 (86.4)	
Maternal delivery age					0.58
< 20	10 (11.1)	88 (16)	86 (24.7)	184 (18.7)	
20 - 30	80 (88.9)	410 (74.8)	206 (59.1)	694 (70.6)	
30	0 (0)	50 (9.1)	56 (16)	106 (10.8)	
Birth weight					0.29
ELBW (< 1000 g)	0 (0)	10 (1.8)	0 (0)	10 (1)	
VLBW (1000 - 1500)	0 (0)	0 (0)	38 (10.9)	38 (3.9)	
LBW (1500 - 2500)	10 (11.1)	40 (7.2)	78 (22.4)	128 (13)	
NBW (2500 - 4000)	80 (88.9)	498 (90.8)	232 (66.6)	810 (82.2)	
Delivery type					0.76
Natural	80 (88.8)	350 (63.8)	260 (74.7)	690 (70)	

Cesarean	10 (11.2)	198 (36.1)	88 (25.2)	296 (30)	
Gestational age					0.61
Term	70 (77.8)	488 (89)	303 (87)	861 (87.3)	
Preterm	20 (22.2)	40 (7.4)	29 (8.4)	89 (9)	
Postterm	0 (0)	20 (3.6)	16 (4.6)	36 (3.7)	
Duration of breastfeeding					0.87
< 12	0 (0)	60 (10.9)	40 (11.5)	100 (10.1)	
12 - 18	20 (22.2)	150 (27.4)	38 (10.9)	208 (21)	
> 18	70 (77.8)	338 (61.7)	270 (77.6)	678 (68.9)	
Lactation type					0.39
Breast milk	70 (77.8)	390 (71.2)	174 (50.1)	634 (64.3)	
Milk powder	10 (11.1)	48 (8.7)	60 (17.2)	118 (12)	
Both	10 (11.1)	110 (20.1)	114 (32.7)	234 (23.7)	
Growth status of children					0.0001
Optimum growth	90 (100)	350 (63.8)	153 (43.9)	593 (60.1)	
Slow growth	0 (0)	188 (34.3)	96 (27.5)	284 (28.8)	
Stop growth	0 (0)	0 (0)	70 (20.1)	70 (7.1)	
Growth failure	0 (0)	0 (0)	29 (8.3)	39 (4)	
Toilet in house					0.0001
Yes	90 (100)	508 (92.7)	153 (43.9)	890 (90.3)	
No	0 (0)	40 (7.3)	195 (56.1)	96 (9.7)	
Use of reusable nappies					0.0001
Yes	10 (11.1)	30 (5.4)	65 (18.6)	105 (10.6)	
No	80 (88.9)	518 (94.6)	283 (81.4)	899 (89.4)	
Time of toilet training					0.0001
< 2	90 (100)	120 (21.8)	0 (0)	210 (21.3)	
2 - 4	0 (0)	428 (78.2)	292 (84)	720 (73)	
> 4	0 (0)	0 (0)	56 (16)	56 (5.7)	
Correct approach to toilet training					0.0001
Yes	90 (100)	358 (65.3)	0 (0)	448 (45.4)	
No	0 (0)	190 (34.7)	348 (100)	538 (54.6)	