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Original Research Article

Risk factors of nocturnal enuresis among school-going children of 6–15 years in a selected Upazila of Bangladesh

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ABSTRACT

Background: Nocturnal enuresis, or bedwetting, is a common condition among children aged five years and older, with potential psychosocial impacts such as low self-esteem, social anxiety, and disrupted family dynamics. Both genetic and environmental factors, including bladder dysfunction, sleep disturbances, stress, and lifestyle habits, contribute to its occurrence. In Bangladesh, data on risk factors for nocturnal enuresis among school-aged children are limited. To identify and analyze the risk factors associated with nocturnal enuresis among school-going children aged 6–15 years in Rupganj Upazila, Narayanganj, Bangladesh.

Methods: A cross-sectional analytical study was conducted among 384 school-going children aged 6–15 years from January 2022 to September 2023. Data on demographics, lifestyle, medical history and indirect evidence of urinary tract infection (UTI) were collected through structured questionnaires, anthropometric measurements, and dipstick urinalysis. Associations were assessed using Chi-square or Fisher's exact test, and risk factors were analyzed using univariate and multivariate logistic regression. Statistical significance was set at $p<0.05$.

Results: Among participants, number of enuretic children decreases with age. In multivariate analysis, significant predictors of nocturnal enuresis included younger age (6–7 years, OR=6.536), stressful events (OR=8.033), lower urinary tract symptoms (OR=27.643), sleep disturbances (OR=36.571), and drinking more fluids in the evening (OR=10.940). Family history, constipation, obesity, pinworm infestation and/or anal itching, and caffeinated drinks were significant in univariate analysis but not in multivariate models. Positive leukocyte esterase tests, indicating possible UTI, were more common in enuretic children.

Conclusion: Nocturnal enuresis in school-aged children is influenced by a combination of behavioral, physiological, and environmental factors. Early identification of significant predictors, such as stress, LUTS, sleep disturbance, and higher evening fluid intake, can guide targeted interventions to reduce the prevalence and psychosocial impact of enuresis in this population.

Keywords: Nocturnal enuresis, Risk factors, School-aged children, Bangladesh.

INTRODUCTION

Nocturnal enuresis, commonly known as bedwetting, is a prevalent condition among children, characterized by involuntary urination during sleep in children aged five years and older. Although often considered a benign developmental phase, persistent enuresis can have significant psychosocial implications, including low self-esteem, social anxiety, and disrupted family dynamics.[1,2] Understanding the underlying risk factors is crucial for early identification and management to improve both physical and mental well-being.

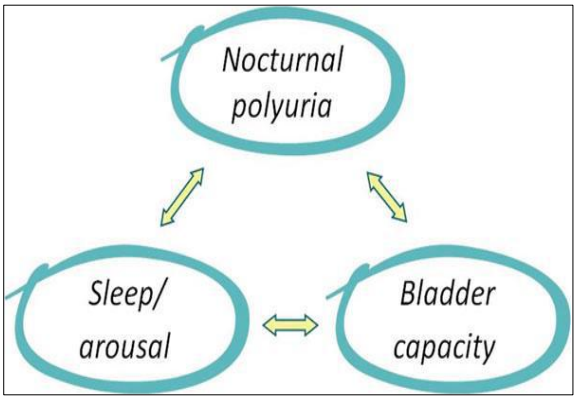

Figure 1: The main three factors of enuresis pathogenesis.

Reduced bladder capacity is assessed by recording voided volumes on a 2-day frequency–volume chart and comparing maximal voided volume (MVV) with age-expected bladder capacity (EBC), calculated as (age×30)+30 ml up to 12 years or 400 ml. Reduced MVV is defined as less than 65% of EBC. Bladder reservoir function matures throughout childhood with increasing capacity and voluntary control by adolescence. Evidence shows circadian variation in bladder function, with increased nocturnal capacity leading to the largest void in the first morning in healthy children. Many children with nocturnal enuresis, especially non-monosymptomatic cases, have reduced daytime voided volumes, while some show reduced capacity only at night. This phenomenon may be related to central nervous system regulation, particularly altered insular cortex activation during bladder filling.

Globally, the prevalence of nocturnal enuresis varies widely, affecting approximately 5–15% of children aged 6–15 years. The condition is influenced by multiple factors including genetic predisposition, bladder dysfunction, hormonal imbalance, and psychological stressors. Children with a family history of enuresis are more likely to develop the condition, suggesting a strong hereditary component.[4,5] Additionally, factors such as delayed maturation of the central nervous system and inadequate production of antidiuretic hormone at night have been identified as significant contributors.[6] Environmental and lifestyle factors also play a critical role in the occurrence of nocturnal enuresis.

Irregular sleep patterns, excessive fluid intake before bedtime, and inadequate toilet training practices may increase the risk. Moreover, social and familial stress, including parental conflict or high academic pressure, has been associated with higher prevalence, emphasizing the complex interaction between psychological and physiological mechanisms.[7,8] In Bangladesh, nocturnal enuresis is an under-researched area, particularly in rural and semi-urban settings. Many children with enuresis remain untreated due to lack of awareness, social stigma, or limited access to pediatric healthcare services. School-going children, in particular, are vulnerable to academic and social challenges resulting from persistent bedwetting, making early detection of risk factors essential. Identifying the risk factors specific to school-aged children in selected upazilas can inform targeted interventions, including parental education, behavioral modification, and clinical management. Understanding these determinants will also help healthcare providers design culturally appropriate strategies to reduce the prevalence and improve the quality of life for affected children and their families.

Objective

Therefore, this study aims to explore and analyze the various risk factors associated with nocturnal enuresis among school-going children aged 6–15 years in a selected upazila of Bangladesh, providing valuable insights for both preventive and therapeutic measures.

METHODS

Study design

The study was conducted using a cross-sectional analytical approach to assess the risk factors associated with nocturnal enuresis among school-going children.

Study place

The research was carried out in Rupganj Upazila of Narayanganj district, Bangladesh.

Study period

Data collection and analysis were conducted over a period spanning from January 2022 to September 2023.

Study population

The study population comprised school-going children aged six to fifteen years residing in Rupganj Upazila, Narayanganj.

Sampling method

Purposive sampling was employed to select both the schools and the participants for the study.

Sample size

The required sample size was calculated using a standard formula based on maximum prevalence due to lack of prior local data. Considering a prevalence rate of fifty percent, a five percent significance level, and a five percent margin of error, the estimated sample size was three hundred eighty-four participants.

Selection criteria

Children eligible for the study included both boys and girls within the age range of six to fifteen years, attending any grade of the selected schools. Children whose parents were unavailable or those who refused participation, including children aged seven years or older who did not provide assent, were excluded.

Study variables

The primary outcome variable was nocturnal enuresis. Independent variables included demographic characteristics such as age and gender, as well as potential risk factors including family history, maturational delay, evening fluid intake, consumption of caffeinated drinks, constipation, sleep disturbances, obesity, pinworm infestation and/or anal itching, stressful life events, lower urinary tract symptoms, and indirect evidence of urinary tract infection.

Data collection procedure

Ethical clearance was obtained prior to commencing the study. Schools were purposively selected, and consent was obtained from the school authorities. Eligible children and their parents were invited for interviews, during which the study objectives, ethical considerations, and potential benefits were explained. Written informed consent from parents and assent from children aged seven years or older were obtained. A structured questionnaire, prepared in English and translated into Bengali, was used to collect data regarding identification, demographics, presence and pattern of nocturnal enuresis, and relevant risk factors. Anthropometric measurements were taken, and BMI was calculated and plotted on CDC (Centers for Disease Control and Prevention) growth charts to assess obesity. Dipstick urinalysis was performed to detect indirect evidence of urinary tract infection. Participants were divided into two groups based on the presence or absence of nocturnal enuresis, and age categories were created to observe distribution trends.

Data collection tools

Data were collected using structured questionnaires in Bengali and English, physical examination tools (weight and height measuring scales, CDC growth charts), and urinary dipstick kits. Written consent forms and assent forms were also utilized.

Data processing and analysis

Collected data were checked for completeness and consistency before being entered into IBM SPSS Statistics version 26. Categorical variables were summarized using frequencies and percentages, and continuous variables were expressed as means and standard deviations. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test as appropriate. Univariate and multivariate logistic regression analyses were performed to identify risk factors for nocturnal enuresis, with odds ratios and 95% confidence intervals calculated. Statistical significance was set at a p value of less than 0.05.

Ethical considerations

Ethical approval was obtained from the Institutional Ethical Committee of the National Institute of Kidney Diseases & Urology, Dhaka. Permission was also secured from school authorities. The study complied with the Helsinki Declaration, and participants were informed of their rights, including the right to withdraw at any time. Confidentiality was maintained, and no financial incentives were provided. All children identified with nocturnal enuresis were provided appropriate advice and guidance.

RESULTS

Among the enuretic male, 55% were in 6-7 year, 10% were in 8-9 year, 30% were in 10-12 year and 5% were in 13–15-year aged group. Among the enuretic female, 80% were in 6-7 year, 5% were in 8-9 year, 10% were in 10-12 year and 5% were in 13–15-year aged group. In both genders, with the increasing age, NE decreases.

Table 1: Distribution of the cases according to gender in different age group (n=40).

Age group (in years)	Male (n=20)	Female (n=20)
	N (%)	N (%)
6-7	11 (55)	16 (80)
8-9	2 (10)	1 (5)
10-12	6 (30)	2 (10)
13-15	1 (5)	1 (5)
Total	20 (100)	20 (100)

Table-2: Association of risk factors with nocturnal enuresis (n=384).

	Enuretic (n=40)	Non-enuretic (n=344)	P value
Family history of enuresis			
Yes	12 (30)	3 (0.9)	<0.001[b]
No	28 (70)	341 (99.1)	
Maturational delay			
Yes	1 (2.5)	2 (0.6)	0.282[b]
No	39 (97.5)	342 (99.4)	
Drinking more fluid in the evening			
Yes	15 (37.5)	25 (7.3)	<0.001[a]
No	25 (62.5)	319 (92.7)	
Caffeinated drinks in the evening			
Yes	11 (27.5)	42 (12.2)	0.015[a]
No	29 (72.5)	302 (87.8)	
Constipation			
Yes	17 (42.5)	39 (11.3)	<0.001[a]
No	23 (57.5)	305 (89.7)	
Sleep disturbance			
Yes	13 (32.6)	6 (1.7)	<0.001[a]
No	27 (68.4)	338 (98.3)	
Obesity			
Yes	6 (15)	18 (5.2)	0.028[a]
No	34 (85)	326 (94.8)	
Pinworm infestation and/or anal itching			
Yes	6 (15)	17 (4.9)	0.023[a]
No	34 (85)	327 (95.1)	
Stressful event			
Yes	30 (75)	41 (11.9)	<0.001[a]
No	10 (25)	303 (88.1)	
LUTS			
Yes	18 (45)	21 (6.1)	<0.001[a]
No	22 (55)	323 (93.9)	

P value was determined by [a]Chi-square test & [b]Fisher's exact test. Data were presented with frequency (%) and within parenthesis percentage over column in total.

Table 3: Risk factors analysis of nocturnal enuresis by Univariate logistic regression.

Risk factors	Odds ratio (OR)	95% CI	P value*
Age (6 to 7 years)	9.831	4.795-20.153	<0.001
Stressful event (yes)	22.171	10.097-48.680	<0.001
Obesity (yes)	3.196	1.189-8.594	0.021
Pinworm infestation and/or anal itching (yes)	3.394	1.254-9.185	0.016
Family history (yes)	48.784	12.981-182.819	<0.001
Constipation (yes)	5.780	2.842-11.757	<0.001
LUTS (yes)	12.584	5.865-27.002	<0.001
Sleep disturbance (yes)	27.123	9.551-77.025	<0.001
Caffeinated drinks in the evening (yes)	2.727	1.269-5.864	0.010
Drinking more fluid in the evening (yes)	7.656	3.586-16.348	<0.001

*p value was determined by Univariate logistic regression. In multivariate logistic regression analysis, age (OR=6.536), stressful event (OR=8.033), LUTS (OR=27.643), sleep disturbance (OR=36.571) and history of drinking more fluid in evening (OR=10.940) were found to be significant predictors of nocturnal enuresis among children.

Table 4: Risk factors analysis of nocturnal enuresis by Multivariate logistic regression.

Risk factors	Odds ratio	95% CI	P value*
Age (6 to 7 year)	6.536	1.863-22.936	0.003
Stressful event (yes)	8.033	2.514-25.666	<0.001
Obesity (yes)	0.709	0.110-4.553	0.717
Pinworm infestation And/or anal itching (yes)	3.094	0.600-15.956	0.177
Family history (yes)	3.329	0.554-20.020	0.189
Constipation (yes)	2.123	0.620-7.268	0.231
LUTS (yes)	27.643	6.248-122.295	<0.001
Sleep disturbance (yes)	36.571	5.950-224.799	<0.001
Caffeinated drinks in evening (yes)	2.476	0.605-10.131	0.207
Drinking more fluid in evening (yes)	10.940	2.695-44.405	0.001

*P value was determined by Multivariate logistic regression. Number of positive leukocyte esterase test was significantly higher among the participants who had enuresis.

Table 5: Association of indirect evidence of UTI with nocturnal enuresis.

	Enuretic (n=40)	Non-enuretic (n=344)	P value*
Leukocyte esterase test positive	5 (12.5)	5 (1.5)	<0.001
Nitrite test positive	1 (2.5)	0 (0)	
Both tests positive	0 (0)	0 (0)	
Both tests negative	34 (85)	339 (98.5)	

P value was determined by * Fisher's Exact test. Data were presented with frequency (%) and within parenthesis percentage over column in total.

Stressful event, constipation, LUTS, sleep disturbance, obesity, Pinworm infestation and/or anal itching, history of caffeinated drinks in the evening, history of drinking more fluid in the evening and family history of enuresis were significantly associated with nocturnal enuresis among children.

In univariate logistic regression analysis, age, stressful event, obesity, Pinworm infestation and/or anal itching, family history, constipation, LUTS, sleep disturbance, history of caffeinated drinks in the evening and history of drinking more fluid in the evening were found to be significant predictors of nocturnal enuresis among children.

DISCUSSION

In the present study, an equal gender distribution with 20 males and 20 females across different age groups. The majority of cases in both genders were concentrated in the 6–7-year age group, more prominently among females (80%) than males (55%). The 10–12-year group showed a higher proportion of males (30%) compared to females (10%). Very few cases were observed in the older age group (13–15 years) in both genders, indicating a declining trend with increasing age. Family history of enuresis emerged as a strong univariate predictor, with an odds ratio (OR) of 48.78, consistent with previous research emphasizing the genetic predisposition in nocturnal enuresis.[9] Although family history lost statistical significance in multivariate analysis, its role as a potential underlying contributor aligns with the literature, highlighting the multifactorial nature of enuresis.

Lifestyle and behavioral factors, including consumption of caffeinated drinks in the evening, increased fluid intake before bedtime, and stressful events, were significantly associated with nocturnal enuresis. These findings corroborate earlier studies which identified evening fluid intake and psychosocial stress as important modifiable risk factors. 10 In multivariate analysis, stressful events (OR=8.03) and drinking more fluid in the evening (OR=10.94) remained significant, underscoring the potential for behavioral interventions as part of management strategies. Medical and physiological contributors were also identified. Lower urinary tract symptoms (LUTS) and sleep disturbances were strong predictors in multivariate analysis (OR=27.64 and OR=36.57, respectively), highlighting the interplay between bladder function and sleep regulation.

Constipation, obesity, and pinworm infestation were significant in univariate analysis but did not retain significance after adjustment, suggesting their effects may be mediated through other factors or represent secondary associations. Previous studies have similarly reported the importance of LUTS and sleep disruption as major contributors to enuresis in school-aged children.[11] Indirect evidence of urinary tract infection (UTI), assessed through leukocyte esterase and nitrite testing, was higher in enuretic children compared to non-enuretics, although absolute numbers were small. This supports prior research suggesting that subclinical

infections or bladder inflammation may contribute to enuresis in a subset of children, though it is not the primary driver in most cases. The low prevalence in our sample aligns with the general understanding that UTI is a less frequent but clinically relevant factor in enuresis.

CONCLUSION

Based on our results, nocturnal enuresis in children is influenced by multiple factors, including younger age (6–7 years), stressful events, lower urinary tract symptoms, sleep disturbances, and increased evening fluid intake, all of which emerged as significant predictors in multivariate analysis. Indirect evidence of urinary tract infection was more common among enuretic children. These findings highlight that both behavioral and physiological factors contribute to nocturnal enuresis, emphasizing the importance of comprehensive assessment and targeted interventions to manage and reduce its occurrence in pediatric populations.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Chinawa JM, Obu HA, Manyike PC, Odetunde OI. Nocturnal enuresis among school-age children in south-eastern Nigeria: A concealed social malaise. Int J Trop Dis Heal. 2014;4(6):683-95.
2. Dahan P, de Bessa J, de Oliveira DM, Gomes CC, Cardoso JC. Association between asthma and primary nocturnal enuresis in children. J Urol. 2016;195(4):1221-6.
3. Avner ED, Harmon W, Niaudet P, Niaudet P, editors. Pediatric nephrology. Lippincott Williams & Wilkins. 2004.
4. De Guchtenaere A, Vande Walle C, Van Sintjan PI, Raes A. Nocturnal polyuria is related to absent circadian rhythm of glomerular filtration rate. J Urol. 2007;178(6):2626-9.
5. Dehoorne JL, Walle CV, Vansintjan PI, Raes AM. Characteristics of a tertiary center enuresis population, with special emphasis on the relation among nocturnal diuresis, functional bladder capacity and desmopressin response. J Urol. 2007;177(3):1130-7.
6. Dhondt K, Van Herzeele C, Roels SP, Raes A, Groen LA, Hoebeke P. Sleep fragmentation and periodic limb movements in children with monosymptomatic nocturnal enuresis and polyuria. Pediat Nephrol. 2015;30(7):1157-62.
7. Dossche L, Walle JV, Van Herzeele C. The pathophysiology of monosymptomatic nocturnal enuresis with special emphasis on the circadian rhythm of renal physiology. European J Pediat. 2016;175(6):747-54.
8. Shaheen DG, El-Masry R, Hammad A, Montasser N. Nocturnal enuresis and its effect on quality of life among Egyptian children. Ann Pediatr. 2021;4(1):1048.
9. El-Shereef E, Saleh M, Salah El-Deen G, Al-Attar T. Prevalence, risk factors and impact associated with nocturnal enuresis among children in some rural areas of Assiut governorate: a cross sectional study. Med J Cairo Univ. 2011;79(2):61-9.
10. Franco I. The central nervous system and its role in bowel and bladder control. Cur Urol Rep. 2011;12(2):153-7.
11. Huang CY, Yu CC. Different diagnostic criteria for periodic leg movements in patients with obstructive sleep apnea after continuous positive airway pressure titration. Neuropsychiatric Disease and Treat. 2019;5:2129-36.

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