

Frequency and Risk Factors of Nocturnal Enuresis among Primary School Children in Sharkia Governorate

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ABSTRACT

Background: nocturnal enuresis (NE) has a negative impact on children's health and imposes a long-term burden on families. With increasing the awareness and improving the cultural conditions more attention was given to NE.

Objective: To assess the frequency and associated risk factors of NE in a sample of primary school children in the Sharkia Governorate.

Patients and methods: The study was carried out in two randomly selected schools (Al Salam primary school and Tal Moftah primary school) in Abo Hammad district, Sharkia Governorate. The sample included children who had monosymptomatic, primary, or secondary nocturnal enuresis including 454 children ages 6–12 years.

Results: The frequency of NE was (8.8%). Children experienced more NE if they drank beverages containing caffeine during the day (12.2%). About 42.9% and 43.3% of children had constipation and urinary tract infection respectively suffering from NE. All children with social problems were belonging to the nocturnal enuresis group.

Conclusion: Nocturnal enuresis was a common problem in children. Most of its risk factors were preventable and treatable.

Keywords: Constipation, Frequency, Nocturnal Enuresis, Risk Factors.

INTRODUCTION

The National Institute for Health and Care Excellence (NICE) define nocturnal enuresis as the involuntary wetting while sleeping, with no implication as to the frequency of such episodes or their underlying pathophysiology. Up to the age of five, it's regarded as normal, and before ten years it is rather common ⁽¹⁾.

"Primary nocturnal enuresis" (PNE) refers to the involuntary urination during sleep that occurs repeatedly in children aged five and up who have never been able to consistently stay dry during the night. Children who suffer from enuresis solely at night are said to have primary nocturnal enuresis, whereas those who wet themselves during the day are said to have PNE with waking up symptoms (including people who also experience some complaints during the day, as urgency, frequency, or bedwetting). In cases of secondary nocturnal enuresis, it's crucial to screen out any underlying diseases, and referred to children who urinate during sleep uncontrollably after they have been dry for at least six months ⁽²⁾.

Bedwetting is a distressing problem, especially for older children. It may result in loneliness, ridicule, and a loss of confidence. Older children are often in need of advanced management plans and parenting help than younger ones. Additional stress is added to caring for a child with enuresis, and parents have more laundry and pull-up pants to buy. If this happens, it could hurt the family budget and the affected child is at risk of being abused or punished ⁽³⁾.

Nocturnal enuresis (NE) has the following frequent etiological factors: A sleep arousal disorder which is characterized by the inability of the child to wake up in response to a full bladder. The Bladder: low

bladder capacity or overactive bladder could be to blame. While you sleep, your emptying reflexes are not suppressed. Children with nocturnal polyuria have been shown to have low vasopressin levels and to urinate frequently and excessively throughout the night. Further aggravating factors could be constipation, parasitic infestation, and urinary tract infection ⁽⁴⁾.

Nocturnal enuresis is a prevalent health issue among Egyptian children as in many populations. **Ashraf et al.** ⁽⁵⁾ observed that 15.5% of elementary school students experienced nocturnal enuresis. Its frequency was determined to be 10% in Pakistan ⁽⁶⁾. Research in the United States found that the NE frequency rate for kids aged 5 to 12 was 17.5% ⁽⁷⁾. Furthermore, Egyptian research conducted in Assiut found that 17.8 percent of children aged 5 to 12 years old had NE ⁽⁸⁾.

Each child with enuresis needs to be evaluated on an individual basis for treatment. A family doctor is the best person to determine if additional testing is required for a child ⁽⁹⁾. Ninety percent of the time, if the child has no underlying medical or emotional issues, the problem will go away on its own. The primary care physician, such as a family doctor, can also play an important role in educating patients about nocturnal enuresis ⁽¹⁰⁾.

The study aimed to assess the frequency and associated risk factors of NE in a sample of primary school children in the Sharkia Governorate.

PATIENTS AND METHODS

A cross-sectional study was carried out in two randomly selected primary schools (Al Salam primary school and Tal Moftah primary school) in Abo Hammad district, Sharkia Governorate. Abo Hammad consists of

104 primary schools [11 in the city (urban) and 93 in the affiliated villages (rural)]. The study was done during the academic year of 2021/2022.

Sampling technique:

It is a multistage sampling method.

Stage 1: Sharkia Governorate has 17 districts, one district was chosen randomly using a simple random sampling technique (Abo Hammad district).

Stage 2: Abo Hammad district includes 104 primary schools, 11 primary schools in urban areas, and 93 primary schools in rural areas. Two schools were chosen using a simple random sampling technique, one urban and one rural.

Stage 3: The number of students in (Al Salam primary school) in the urban was 543 students and the number of students in (Tal Moftah primary school) in the rural area was 601 students. The number of students in each class was 45 students.

From the two randomly selected schools, the sample units were collected by cluster sampling techniques. Where the whole class was selected until the sample was fulfilled.

Inclusion criteria: All students aged from 6-12 years, and of both sexes.

Exclusion criteria: Children with diabetes insipidus or diabetes mellitus, epilepsy, spina bifida, or other physical illness leading to urinary incontinence (from school health records), and children with intellectual disability.

(A) A structured questionnaire was used when interviewing students and their guardians.

1- Socio-demographic questionnaire:

It was used to assess the socio-demographic characteristics of the studied sample.

Scoring of social class: The distinction between social classes was based on **Fahmy et al.** ⁽¹¹⁾ depending on the total score, either "low," "mid," or "high" with total points (48).

2- A predesigned questionnaire about nocturnal enuresis⁽¹²⁾:

- a) Presence of enuresis at night.
- b) Medical and family history of nocturnal enuresis.
- c) Various techniques for dealing with bedwetting.
- d) Risk factors of nocturnal enuresis (asking about the presence of constipation, urinary tract infection, parasitic infestation, drinking caffeinated beverages, and social troubles)

In this study, we assessed children who had monosymptomatic, primary, or secondary nocturnal enuresis.

(B) Laboratory investigations:

Laboratory investigations were done at the family

health center in Abo Hammad district for the detection of risk factors related to nocturnal enuresis such as:

- Urine analysis to detect urinary tract infections.
- Stool analysis to detect the presence of parasitic infections
- The average time spent on a questionnaire was 15 minutes. There were no stumbling blocks discovered in the form of technical or administrative hurdles.
- Contacting the guardians of positively infected (stool and/or urine) children to ensure that they received the necessary care at the health unit. Children who have been diagnosed with NE are allowed to be evaluated and treated by a specialist through the school's health insurance programs.

Ethical and administrative approvals:

Guardians of students who gave consent to participate in the study were questioned at the two schools chosen after obtaining permission from the local educational administration authorities. The study protocol was approved by the Faculty of Medicine, Zagazig University IRB *institutional review board *(IRB#:5546). This work has been carried out following The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

The collected data were analyzed by computer using (Statistical Package of Social Services) version 24 (SPSS program). Data were presented in tables and graphs. Continuous quantitative variables e.g. age were expressed as the mean \pm SD & median (range), and categorical qualitative variables were expressed as absolute frequencies (number) & relative frequencies (percentage). Chi-square test (χ^2): The Chi-square test was used for comparing categorical variables. Student t-test (t-test): was used for comparing numerical variables between 2 groups. The results were considered statistically significant when the significant probability was less than 0.05 ($P < 0.05$). P-value < 0.001 was considered highly statistically significant (HS), and P-value ≥ 0.05 was considered statistically insignificant (NS).

RESULTS

The mean age of the studied children was 9.5 ± 1.9 years old, with a range from 4 to 15 years old. Fathers of more than one-third of the studied group were university-educated (43.6%) versus 28.6 % of mothers who were university educated. The majority of fathers (86.6%) were working while only (31.7%) of mothers were working. The majority of the studied families (81.5%) had sufficient income. Moreover, (53.3%) of the studied families have less than or equal to 5 family members (**Table 1**)

Table (1): Socio-demographic characteristics of the studied primary schoolchildren.

Socio-demographic characteristics		The studied group(N = 454)	
		No.	%
Age (years)	Mean ± SD	9.5 ± 1.9	
	(Min-Max)	(4-15 years)	
Education of the father	-Illiterate \ Read and write	15	3.3 %
	- School education	241	53.1 %
	- University certificate \ post	198	43.6 %
Education of the mother	-Illiterate \ Read and write	4	0.9 %
	- School education	320	70.5%
	- University certificate\ post	130	28.6 %
Working status of the father	No	61	13.4 %
	Yes	393	86.6 %
Working status of the mother	No	310	68.3 %
	Yes	144	31.7 %
Income	- Not enough	18	3.9 %
	- Enough only	370	81.5 %
	- Enough and saving	66	14.5 %
Number of family members	≤ 5	242	53.3 %
	> 5	212	46.7 %

The majority of the studied group was of moderate socioeconomic status (82.0%). While (16.0%) of them were of high socioeconomic status and only (2.0%) of them were of low socioeconomic status (**Figure 1**).

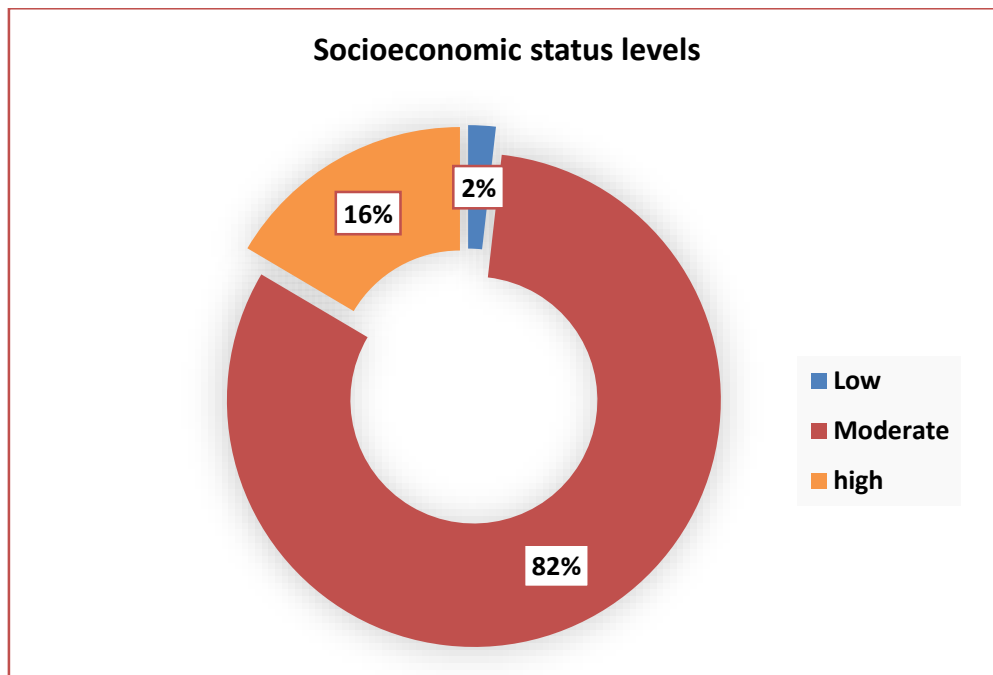
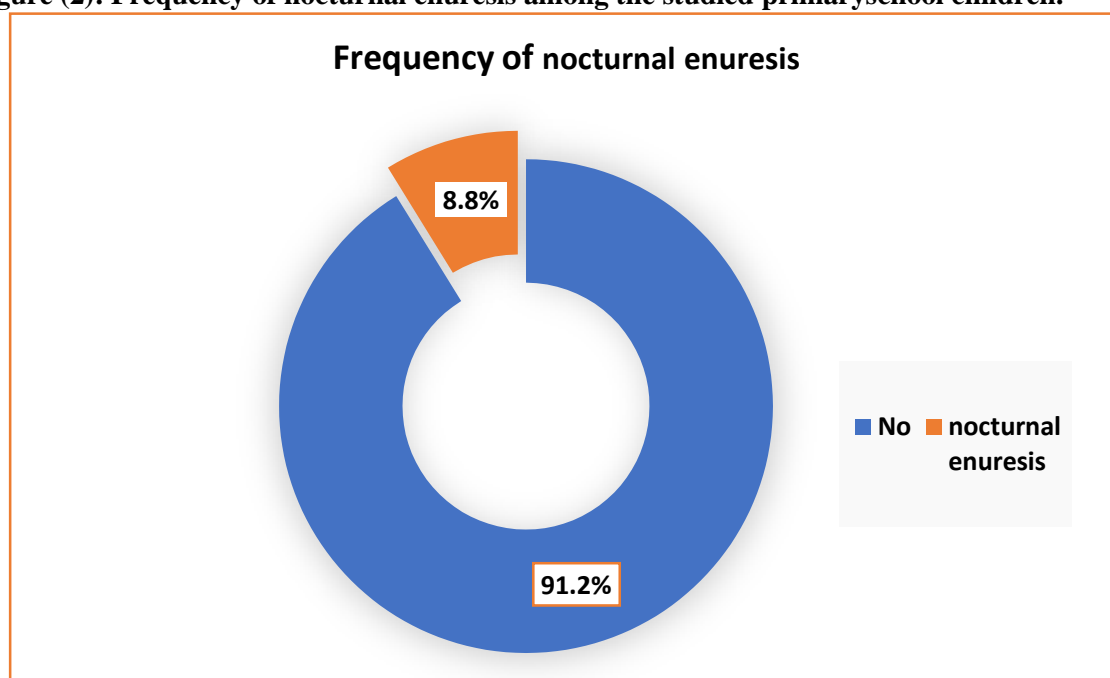


Figure (1): Socioeconomic status of the studied primary school students.

Most of the studied children had no **nocturnal enuresis** (91.2%) and the frequency of **nocturnal enuresis** among the studied primary school children was 8.8% (**Figure 2**).

Figure (2): Frequency of nocturnal enuresis among the studied primary school children.



There was a statistically significant difference between children who had **nocturnal enuresis** and children who hadn't **nocturnal enuresis** regarding the education of both parents where lower education level was associated with **nocturnal enuresis** (Table 2).

Table (2): Relation between nocturnal enuresis and socio-demographic characteristics among the studied children.

Socioeconomic characteristics		Children with nocturnal enuresis (N=40)		Children without nocturnal enuresis (N=414)		p-value
		No.	%	No.	%	
Age in years	Mean \pm SD	9.4 \pm 2.88		9.5 \pm 1.8		0.799
	(Range)	(5 -15)		(4-13)		
Education of the father	-Illiterate \ Read and write (n=15)	2	18.3	13	86.7	<0.001*
	Primary/secondary (n=241)	34	14.9	207	85.1	
	University/post (n=198)	4	2.1	194	97.9	
Education of the mother	-Illiterate \ Read and write (n = 4)	0	0.0	4	100.0	0.04*
	Primary/secondary (n = 320)	35	10.9	285	89.1	
	University/post (n=130)	5	3.8	125	96.2	
Occupation of the father	No (n=61)	4	6.6	57	93.4	0.632
	Yes (n=393)	36	9.2	357	90.8	
Occupation of the mother	No (n=310)	28	9.0	282	91.0	0.861
	Yes (n=144)	12	8.3	132	91.7	
Income	Not enough (n=18)	0	0.0	18	100.0	0.543
	Enough (n=436)	40	9.2	396	90.8	
Number offamily members	> 5 (n=212)	18	8.5	194	91.5	0.620
	< 5 (n=242)	22	9.0	220	91.0	
Social class	Low (< 40%) (n=8)	0	0.0	8	100.0	0.670
	Moderate (40-<70%) (n=371)	33	8.9	338	91.1	
	High level (\geq 70%) (n=75)	7	9.3	68	90.7	

There was a high statistically significant association between nocturnal enuresis and different risk factors including caffeinated drinks, constipation, urinary tract infection, parasitic infection, and social or psychological problems in the family. (Table 3)

Table (3): Risk factors of nocturnal enuresis among the studied group.

Risk factors of nocturnal enuresis	Children with nocturnal enuresis(N=40)		Children without nocturnal enuresis(N=414)		x ²	p-value
	No	%	No	%		
Caffeinated drinks during or after dinner						
■ No (n=168)	5	3.0	163	97.0	11.29	0.001*
■ Yes (n=286)	35	12.2	251	87.8		
Constipation						
■ No (n=440)	34	7.7	406	92.3	20.84	0.001*
■ Yes (n=14)	6	42.9	8	57.1		
Urinary tract infection						
■ No (n=424)	27	6.4	397	93.6	47.65	<0.001*
■ Yes (n=30)	13	43.3	17	56.7		
Parasitic infection						
■ No (n=432)	31	7.2	401	92.8	29.64	<0.001*
■ Yes (n=22)	9	40.9	13	59.1		
Social or psychological problems in the family						
■ No (n=458)	34	7.6	414	92.4	62.93	<0.001*
■ Yes (n=6)	6	100.0	0	0.0		

Urinary tract infection was the most significant risk factor associated with nocturnal enuresis followed by constipation and social problems among the studied children. (Table 4)

Table (4): Logistic regression of risk factors of nocturnal enuresis.

Risk factors	B	S.E.	Wald	Sig.	Exp(B)	95% C.I.	
						Lower	Upper
Caffeinated Drinks	0.635	0.532	1.425	0.233	1.887	0.665	5.353
Constipation	1.826	0.716	6.512	0.011*	6.208	1.527	25.234
Urinary tract infection	2.181	0.496	19.375	0.000*	8.856	3.353	23.390
Parasitic infection	1.100	0.613	3.217	0.073	3.005	0.903	10.002
Social/ psychological problems in the family	1.68	0.73	6.82	0.03*	4.33	1.3	7.8

DISCUSSION

There is a widespread issue with children called nocturnal enuresis that can lead to social stigma and emotional distress for the child and their family (13). Multiple variables contribute to its complicated etiology. Children who have reached the developmental milestone of the age of five typically have nighttime and daytime bladder control (14).

In the present study, the frequency of NE among the studied primary school children was 8.8 % as NE was reported by 40 children out of 454. This was similar to the results reported by **Bakhtiar et al.** (15) and another Two further research found the frequency were 8.25% and 8.88% among children with NE, respectively (16,17).

In Egypt, another study by **Elgohary et al.** (18) revealed an overall prevalence of NE of 8.29 percent (50/603 children).

On the other hand, the incidence of NE was found to be higher in an Egyptian study, done in Menoufia Governorate by **Salem et al.** (19) who found

that 14% of children had NE. According to data collected by **Salem et al.** (20), the prevalence in Damietta was 15.4 percent. Additionally, in Benha Governorate **Mohammed et al.** (21) reported a prevalence of 15.5%.

Regarding the relationship between socio-demographic characteristics and NE among the studied children, the present study revealed that there was no statistically significant difference between children who had NE and children who did not have NE regarding age ($P > 0.05$). This result is consistent with **Üçer and Gümüş** (22). On the contrary **Aljefri et al.** (23) found that the prevalence of NE decreases with increasing age because of the improvement of the developmental milestones.

Also, there was no statistically significant difference between children with or without NE regarding parents' occupation and economic status. This result came in agreement with **Gunes et al.** (24) and **Yousef et al.** (25). In contrast, **Kamal and Mahrous's** (26) Egyptian study reported that NE was found to be

more common among children whose fathers' occupation were clerical work (46.7%) compared to other occupations, and housewife mothers were found to have more enuretic children than working mothers (83.9% versus 16.1 % respectively), they explained this result by the fact that working mothers encourage early toilet training or seek treatment for such a condition at an earlier age. Also, reported that NE is more common among low social classes with a highly statistically significant difference ($P < 0.001$).

The current study revealed a statistically significant association between NE among children and parents' education which was more prevalent in lower educated parents. While there was no statistical significance between NE and number of family members and income. This conclusion is consistent with **Bakhtiar et al.** ⁽¹⁵⁾, who observed that the incidence of NE was lower in the offspring of women with greater levels of education because of increasing their awareness of the problem. On the other hand, **Aljefri et al.** ⁽²³⁾ found that the number of family members was significantly associated with NE as large family size and/or more than five siblings were the most likely factors associated with the occurrence of NE; $P < 0.001$.

As regards risk factors of NE among the studied group, NE was significantly associated with drinking beverages containing caffeine during and after dinner. This was in the same line with the results of **Hamed et al.** ⁽²⁷⁾ study It found that 72.9% of NE kids consume caffeine-containing drinks, which are known to have a diuretic effect. The fact that 80.8% of these children drink up to 4 units of caffeinated drinks daily may contribute to the occurrence and severity of NE in this population. Also, **Huang et al.** ⁽¹⁴⁾ Behavioral factors, like as drinking many sugary drinks during the day, have been linked to diuretic effects and nighttime wetting. In contrast, **Shah et al.** ⁽²⁸⁾ found no statistically significant difference in Cola drink consumption between children with NE (48.6 percent) and children without NE (56.1 percent).

In this study about 42.9% of constipating children had NE, this came in agreement with the findings of **Mohammed et al.** ⁽²¹⁾ study in Al-Sharkia Governorate in Egypt; where constipation was one of the factors affecting 33.3% and 66.7% of secondary and primary enuresis respectively. Furthermore, the results of **Salem et al.** ⁽¹⁹⁾ showed that constipation was often associated with NE, where 13.7% of enuretic children had constipation compared to only 5.4% of non-enuretic children. As a result, numerous studies have shown that it is crucial to achieve normal bowel and bladder function before beginning treatment for NE. A hyperactive colon may be the cause of the feeling of a full bladder which is a result of an accumulation of stool.

In the present study, urinary tract infection was found in 43.3% of children with NE and the results showed that there was a statistically significant

association between UTI and NE in logistic regression analysis; where urinary tract infection was the most significant risk factor for NE followed by constipation. Urine analysis and culture will confirm the infection that caused the symptoms of dribbling, frequency, burning micturition, and urgency. Similarly, urinary tract infection was identified as a common cause of NE in many studies ^(29,30). In addition, **Gunes et al.** ⁽²⁴⁾ Enuresis was linked to a prior history of UTIs and chronic constipation, according to the results of statistical analysis. Similarly, **Mohammed et al.** ⁽²¹⁾ found that urinary tract infection (UTI) is a common problem among NE children. Which revealed that; 75% of UTI cases were among secondary enuresis, while 25% were among the primary type.

In the current study, there was a high statistical significant association between nocturnal enuresis and social or psychological problems in the family. However, by logistic regression analysis, social or psychological problems in the family were not a significant risk factor for NE. **Aljefri et al.** ⁽²³⁾ study revealed that children with psychiatric or social problems were nearly twice as likely to have NE. (OR = 1.91, $P < 0.001$).

In the present study, the parasitic infection was significantly associated with NE, however, by logistic regression analysis, it was not a significant risk factor for NE. **Hamed et al.** ⁽²⁷⁾ found that Pinworm infestation was identified in 61.5% of NE students. Moreover, **Out-Bassey et al.** ⁽³¹⁾ reported a statistically significant difference in NE between children with and without pinworm (53% vs. 34 %, respectively) in Nigerian school-age children.

CONCLUSION

Nocturnal enuresis is a common medical problem among children. Most of its causing risk factors are controllable, preventable, and treatable.

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