The Epidemiology and Factors Associated with Nocturnal Enuresis among Primary School Children in Minia City, Egypt

[1]Nashaat Nabil Kamal, [2]Doaa Mohamed Mahrous

[1]Department of Public health, Faculty of Medicine, Minia University. [2]Department of Pediatrics, Faculty of Medicine, Minia University, Egypt

Received: April, 2018 Accepted: June, 2018

Abstract

Background: Nocturnal enuresis is a common pediatric disorder. It can be defined as the involuntary passage of urine during sleep beyond the age of anticipated nighttime bladder control**.** Nocturnal enuresis can have a serious effect on the quality of life of children and their families. **Objective**: to estimate the frequency and types of treatment of nocturnal enuresis among children aged (6–12) years in Minia city, as well as to identify some risk factors associated with this problem. **Methods:** A cross-sectional, community based study was done among primary school children aged (6-12); they were selected from Minia city in Minia governorate, representing the urban and rural areas. **Results:** 16.5% of children were suffering from primary nocturnal enuresis. As the age of the child increases, the prevalence of enuresis is significantly decreased. Enuresis is significantly more common among children whose fathers' occupation were clerical work, housewife mothers, and also more common among children of low socioeconomic status with no sex variation. **Conclusion**: Nocturnal enuresis is a pediatric public health problem; it is associated with younger age, low socioeconomic and low educational level of the parents, non-working mothers, and family history of enuresis. The most beneficial treatment measure was awaking the child to void and restricting fluid intake.

Keywords: *Nocturnal enuresis- Epidemiology- Risk factors- Children- Minia*

Corresponding author: Nashaat Nabil Kamal Email: nashaatnabilkamal@yahoo.com

Introduction:

Nocturnal enuresis also known as, bedwetting can be defined as the involuntary passage of urine during sleep beyond the age of anticipated nighttime bladder control, after 4-6 y of age.[1] It is well known that nocturnal enuresis is a common, genetically complex and heterogeneous disorder among children.[2] Bedwetting is common; with approximately 5-10% of 7 year-olds regularly wetting their beds[3]**.** The prevalence of bedwetting decreases with age, but approximately 1% of bed-wetters continues to do so in adulthood.[4]

Nocturnal enuresis is subdivided into primary and secondary forms.[5] Primary enuresis refers to children who have never achieved six months of continuously dry nights. Secondary enuresis refers to children who previously attained at least six months of nighttime dryness but who have relapsed.[6]

The etiology of nocturnal enuresis is not fully understood, although there are three common causes: excessive urine volume, poor sleep arousal, and bladder contraction.[7] There are also likely to be genetic factors, with nearly two thirds of

children who wet the bed having one or both parents with a history of the condition.[8]

Differentiation of cause is mainly based on patient history and fluid charts completed by the parent or caregiver to inform management options.[7]

Nocturnal enuresis can be present with or without lower urinary tract symptoms. When only nocturnal enuresis is present, the disorder is referred to as mono-symptomatic enuresis. In the presence of other symptoms, the disorder is referred to as non mono-symptomatic enuresis.[5]

Nocturnal enuresis can have a serious effect on the quality of life of children and their families.[4] It can be a source of embarrassment for children causing them to refrain from certain age-appropriate activities such as sleepovers. Parents may become frustrated with their child's wetting because it is a drain of time, energy, and money. Some parents punish their children in response to their bedwetting.[9]

Successful treatment of enuresis relieves the emotional burden on the child and improves the child's daytime functioning, including social and school performance**.** Treatment can also prolong the crucial period of undisturbed sleep.[10]

Objective: The aim of this study is to estimate the frequency and types of treatment of nocturnal enuresis among children aged 6–12 years in Minia city, as well as to identify some risk factors associated with this problem.

Methods

A cross-sectional, community based study was done among primary school children aged (6-12 years old) during the period from October 2016 to April 2017. Children were selected from Minia city in Minia governorate, representing the urban and rural areas.

According to the estimated prevalence of enuresis and population size, a sample size of 1989 with confidence level of 95% was needed. Therefore 2000 students were selected for the study, randomly selected from the 6 randomly selected primary-schools in the city (3 from urban areas and 3 from rural areas). Every school received their sample size quota according to student numbers. Students were selected by a stratified random sampling technique. The objectives of the study were explained to the local educational authorities who gave the permission to carry out the study.

Data collection: Data was collected through a structured questionnaire. The questionnaire applied in the study consisted of two parts. The first part contained the demographic and socioeconomic data including age, gender, parental marital status, parental education, parental occupation, birth order, and other variables such as new baby's birth in the family, sleep quality, school achievement, and ways of punishment. The second part consisted of various kinds of enuresis (primary and secondary enuresis), history of enuresis in other children, history of urinary tract infection and respiratory infection in the child, pin worms, anal itching, seizures, diabetes, hyperactivity, breast feeding, and history of previous treatments for nocturnal enuresis.(Fahmi and EL-Sherbini, 1983) shows method and score we used for classification of socioeconomic status.[11]

Questionnaires were distributed to all students and they were instructed by the school teachers to take them home to their parents. Any parent (mother or father) fill the questionnaires and bring them at the next day. The response rate was (92%).

Statistical analysis:

The data was analyzed using the SPSS (Statistical package for social science) version 20 software. Chi-square and Z test

Table 1. Social background and some other characteristics in children with and without nocturnal enuresis.

Characteristics	Enuretics n (%) n=330	Non enuretics n (%) n=1670	Total	P
Age (Mean ±SD)	7.6±1.7	10.07±1.7	8.9±1.5	0.001
Age(years):				
6-7	197 (59.6)	140 (8.4)	337	<0.001
8-9	83 (25.2)	417 (25)	500	
10-12	50 (15.2)	1113 (66.6)	1163	
Gender:				
Male	170 (51.5)	770 (46.1)	940	0.072
Female	160 (48.5)	900 (53.9)	1060	
Birth order:				
1st	25 (7.6)	527 (31.5)	552	<0.001
2nd	190 (57.6)	88 (5.3)	278	
3rd or more	115 (34.8)	1055 (63.2)	1170	
Residence:				
Urban	160 (48.5)	900 (53.9)	1060	0.07
Rural	170 (51.5)	940 (56.3)	1110	
Father occupation:				
Professional	30 (9.1)	392 (23.5)	337	<0.001
Clerical	154 (46.7)	126 (7.5)	500	
Manual	146 (44.2)	1152 (69)	1163	
Mother occupation:				
Professional	7 (2.1)	270 (16.2)	277	<0.001
Clerical	26 (7.9)	250 (15)	276	
Manual	20 (6.1)	622 (37.2)	642	
Housewife	277 (83.9)	528 (31.6)	805	
Father education:				
University level or above	31 (9.4)	490 (29.3)	521	<0.001
Below university	165 (50)	944 (56.5)	1109	
Read, write	72 (21.8)	135 (8.1)	207	
Illiterate	62 (18.8)	101 (6.1)	163	
Mother education:				
University level or above	14 (4.2)	281 (16.8)	295	<0.001
Below university	135 (40.9)	801 (48)	936	
Read, write	99 (30)	405 (24.2)	504	
Illiterate	82 (24.9)	183 (11)	265	
Socio-economic status:				
High	25 (7.6)	479 (28.7)	504	<0.001
Middle	114 (34.5)	752 (45)	866	
Low	191 (57.9)	439 (26.3)	630	

P-value <0.05 = significant.

of proportion for qualitative data and mean, and standard deviation (±SD) for quantitative data. A logistic regression model was applied to estimate the odds ratios (OR) of significant predictive factors affecting nocturnal enuresis. P-values of <0.05 were considered to be statistically significant [12].

Ethical consent:
A written consent from parents to share in this work was taken.

Results:

Two thousands (2000) children were included in this study in the age group between 6 to 12 years old. 330 (16.5%) of the children were suffering from primary nocturnal enuresis. The mean age of all children was 7.6±1.7 and 10.7±1.7, respectively. As the age of the child increases, the prevalence of enuresis is significantly decreased (p<0.001). There was insignificant difference regarding gender (p>0.05). Birth order had a highly significant difference in the 2nd child more than the first or the third child and more (p<0.001). Enuresis is significantly more common among children whose fathers' occupation were clerical work compared to other occupations, housewife mothers, and also more common among children of low socioeconomic status (Table 1).

Table (2): Frequency of bed wetting per week among enuretic children.66

Nights/ week	Number	%
Every night	88	26.7
2-6 nights per week	110	33.3
< 2 nights per week	132	40
Total	330	100.0

Forty percent (40%) enuretic children had bed wetting <3 nights per week, while 26.7% had every night bed wetting per week (Table 2).

The results of the applied model in the logistic regression showed that family history of nocturnal enuresis was the most contributing risk factor (OR =2.5, CI: 4.3-1.3, p<0.001), followed by presence of constipation (OR =2.1, CI: 3.5-1.3, p<0.001). Deep sleep was also a significant risk factor (OR =1.02, CI: 2.12-0.81, p<0.001), and presence of family troubles (OR =1.1, CI: 3.1-0.6, p=0.02) in Table 3.

The highest method of treatment option was awaking a child for voiding (47.3%), followed by water restriction (36.3%), using drugs was used in 10% and diapering was used among 6.4% of the enuretic children (table 4). Variations of parent's reaction towards enuresis according to their residence was also shown, punishment was more in rural areas than in urban areas with statistical significant difference (p<0.001), while consult others and do nothing were higher significantly among urban than rural parents (p= 0.04, and 0.001, respectively).

Discussion

Enuresis is a very common problem in children, which causes embarrassment, stress, and discomfort for them and their families. It has multiple causes. Most children with mental age of 5 years achieve night and daytime bladder control.[13]

Our study included 2000 children, 330 (16.5 %) of children were suffering from primary nocturnal enuresis. Such result comes in parallel with a work carried out in Saudi Arabia and mentioned that; the prevalence of nocturnal enuresis among school children was reported to be 15%.[14] The results also are in close with that of a study carried out in Turkey on 7-11 years old children, enuresis prevalence was14%.[15] The prevalence of nocturnal enuresis was, reported to be 9.2% in South Korea on 12570 children aged 7-12 years.[16]

Similar studies were done in Egypt and come in parallel with our current study.[17,18]

Table (3): Possible relationship of different factors in children withnocturnal enuresis

Characteristics	Enuretics n (%) n=330	Non enuretics n (%) n=1670	Total n (%) n=2000	X^2 P	OR	95% CI
Deep sleep:						
yes	217(65.7)	580 (10.8)	797(39.8)	110.6		
No	113 (34.3)	1090 (89.2)	1203(60.2)	**<0.001**	1.02	2.12–0.81
Family history of NE:						
yes	87(3.3)	22 (1.3)	109(5.4)	335.4		
No	243 (73.6)	1648 (98.7)	1891(94.6)	**<0.001**	2.5	4.3–1.3
Family troubles (divorce, death of one parent, birth of new sibling):						
Yes	30 (9.1)	97 (5.8)	127(6.4)	4.9		
No	300 (90.9)	1573 (94.2)	1873(93.6)	**0.02**	1.1	3.1–0.6
Constipation:						
Yes	56 (17)	26 (1.6)	82(4.1)	166.5		
No	274 (83)	1644 (98.4)	1918(95.9)	**<0.001**	2.1	3.5–1.3
Respiratory infection						
Yes	32 (9.7)	189 (11.3)	221(11.1)	0.7		
No	298 (90.3)	1481(88.7)	1779(88.9)	0.3	0.3	1.01-0.08
Seizures						
Yes	12 (3.6)	40 (2.4)	52 (2.6)	1.7		
No	318(96.4)	1630 (97.6)	1948 (97.4)	0.1	1.01	2.1-1.1

P-value<0.05= significant. OR: odds ratio, and CI: confidence interval

Studies performed in Pakistan and Iran revealed that the prevalence of nocturnal enuresis was 10% and 17.5 % respectively.[19,13]

Talking about age, our study revealed that the frequency of primary nocturnal enuresis decreases markedly as the age increases, among enuretic children, primary nocturnal enuresis was 59.6% at the age of 6-7 years, 25.2% at the age of 8-9 years old, and 15.2% at the age of 10-12 years old with highly significant level (P<0.001) and the mean age of enuretic children (7.6±1.7) is significantly lower than that of non-enuretic children (10.07±1.7) years. These results are on line with a study done in Korea and in Khorramabad, which found that the prevalence of nocturnal enuresis decline with increasing age of the child[16, 20]. Another Egyptian study revealed a gradual decline in prevalence of nocturnal enuresis with increasing age and mentioned that 17.4% of children aged 6-8 year old had enuresis, while this ratio was 7.6 in 12-15 years old children.[21]

The current study showed that there was no difference among boys and girls, NE was found in 51.5% among males and in 48.5% among females with no significant difference (P>0.05). Such results were matching with another Egyptian studies[17,21], as well as a Chinese study which explained that the prevalence of enuresis was not significant among males & females.[22]

Table (4): Methods of treatment and parental reaction towards nocturnal enuresis in relation to residence.

Methods of treatment	Urban No %	Rural No%	Total No%	P value
Water restriction	70 53.3	50 46.7	120 100	0.1
Awaking for voiding	87 55.8	69 44.2	156 100	0.017
Diapering	14 66.7	7 33.3	21 100	0.001
Drugs	17 51.5	16 48.5	31 100	0.32
Parental reaction towards enuresis				
Nothing	21 40.4	31 59.6	52 100	0.001
Punishment	44 43.1	58 56.9	102 100	0.001
Consult a physician	38 52.8	34 47.2	72 100	0.1
Consult others	57 54.8	47 45.2	104 100	0.04
Total	160 48.5	170 51.5	330 100	

Studies performed in Iran and China showed higher prevalence of enuresis among boys.[23,24]

Conversely, a study in Sanandaj reported higher prevalence of enuresis among girls compared to that in boys due to insufficient cares and higher risk of urinary tract infection among girls.[25]

Birth order had a significant effect on the prevalence of enuresis. It occurs in the second child more than that of first or third child or more with a highly significant difference (P<0.001) and such results were similar with a study conducted in Khorramabad and mentioned that nocturnal enuresis in the second children was 2.3 times higher than the rate in the only children.[20] On opposing another Egyptian and Turkish studies did not report a significant relationship between birth order and the prevalence of primary enuresis.[21,26]

Nearly half (48.5%) of our enuretic cases were living in urban areas and (51.50%) living in rural areaswithout significant difference (P>0.05). This study is in parallel with a work performed in Taiwan.[27]

Nocturnal enuresis was found to be more common among children whose fathers' occupation were clerical work (46.7%) compared to other occupations, this agrees with an Egyptian and a Turkish studies that found that office workers have high incidence of nocturnal enuresis among their children.[17,28]

In the present study, housewife mothers were found to have more enuretic children than working mothers (83.9% versus 16.1 % respectively), and such results agree with an Egyptian study which mentioned that, working mothers were found to have less enuretic children than housewives. This result can be explained by the fact that working mothers encourage early toilet training or seek treatment for such a condition at an earlier age.[21,29] On the other hand, there is a research performed in Iran reported that working mothers were found to have more enuretic children than housewives.[30]

According to socio-economic status, nocturnal enuresis is more common among low social class with a highly significant difference (P< 0.001), and such results were correlated with an Egyptian work which mentioned that, the prevalence of

enuresis is significantly lower among children with high socioeconomic status 11.7% than those of low socioeconomic status 32.4%.[16] Another Australian study mentioned that low socioeconomic status has been found to be a risk factor for the development of wetting problems.[31]

The results of the current study showed that family history of nocturnal enuresis was the most contributing risk factor. 26.3% of cases reported that nocturnal enuresis was a problem in their families, 3.3% reported their father has a history of enuresis, 1.5% reported positive mother enuresis history, while 21.5% reported a positive brother/ sister enuresis history with a highly significant difference ($P<0.001$). Our results come on line with many other studies.[23,32,33,34]

The analysis of the present study focused on presence of risk factors in enuretic children, presence of family troubles and deep sleep were significant risk factors. These results are supported by another Egyptian and Turkish studies which mentioned that there is a close relationship between disturbed family environment and the frequency of enuresis[18, 35]. On the other hand these were not in agreement with another Egyptian study done in Assiut city.[17]

Variations of parent's reaction towards enuresis according to their residence was also shown in our study, punishment was more in rural areas than in urban areas with statistical significant difference , this is in agreement with previous Egyptian and American studies.[18,36] Consult others and do nothing were higher significantly among urban than rural parents.

This work focused on the treatment methods assumed by the enuretic children and their parents in an attempt to overcome this problem, the highest method of treatment option was awaking a child for voiding(47.3%), followed by water restriction (36.3%), using drugs was used in 10% but only 6.4% of enuretic children use diapers. These results are supported by Chinese and Turkish works.[22,36]

Differences in the management of children in different studies are related to several factors, parent's views and traditional beliefs had a strong influence on succeeding management.

Conclusion:

The present study revealed that nocturnal enuresis is a pediatric public health problem; it is associated with younger age, low socioeconomic and low educational level of the parents, non working mothers, and family history of enuresis. NE markedly decreases by age. The most common treatment measure was awaking the child to void and restricting fluid intake.

References

1. Ozden C., Ozdal O, Altinova S., Oguzulgen I., Urgancioglu G., and Memis A. (2007): Prevalence and Associated Factors of Enuresis in Turkish Children. IntBraz J Urol; 33 (2):216-22.

2. 2- Wen J., Wang Q., and Liu K. (2006): An Epidemiological Study of Primary Nocturnal Enuresis in Chinese Children and Adolescents. EurUrol; 49(6):1107-13.

3. Neveus T. (2011): Nocturnal enuresis-theoretic background and practical guide-lines. PediatrNephrol; 26(8): 1207-1214.

4. Nathen D, Balain J, and Evans J. (2014): Nocturnal enuresis guideline. Aailable from www.Nuh.Nhs.uk/handlers/downloads.ashx?id=61094. Accessed 9 May 2016.

5. Austin PF, Bauer SB, Bower W et al. (2014): The Standardization of Terminology of Lower Urinary Tract Function in Children and Adolescents: Update Report from the Standardization Committee of the International Children's Continence Society. J Urol, 4(4): 77-86.

6. Tekgul S, Nijman RJ, Hoebeke P et al. (2009): Diagnosis and management of urinary incontinence in childhood. 4th International

Consultation on Incontinence, Committee 9. Health publication ltd.
7. Ratidzai Magura (2015): "Nocturnal enuresis in children". The Pharmaceutical Journal. 294(7843/4).
8. Gontard A., Schaumburg H., Hollmann E., et al. (2001): The genetics of Enuresis: A Revie. J Urol 166:2438-2443.
9. Feldman M (2013): Management of primary nocturnal enuresis, Canadian Paediatric Society, Community Paediatrics Committee, Paediatric Child Health, 10(10): 611-4.
10.Van Herzeele C, Dhondt K, Roels SP, et al. (2016): Desmopressin (melt) therapy in children with monosymptomatic nocturnal enuresis and nocturnal polyuria results in improved neuropsychological functioning and sleep. PediatrNephrolBerlGer; 31(9): 1477-84.
11.Fahmi S.and EL-Sherbini A. (1983): Determing simple parameters for Social Clssification for Health Research. Bulletin of H.I.P.H.
12.Wasserstein R. and Lazar N. (2016): "The ASA's Statement on p-Values: Context, Process, and Purpose". The American Statistician. 70(2): 129-133.
13.Ghahramani M., Mahdi B., and Amir G. (2008): Nocturnal Enuresis and its impact on Growth. Iran J Pediatr; 18 (2): 167-170.
14.Kalo B., and Bella H., (1996): Enuresis: Prevalence and Associated Factors Among Primary School Children in Saudi Arabia. Acta Pediatr; 85(10): 1217-22.
15.Gumus B, Vurgan N, and Lekili M. (1999): Prevalence of Nocturnal Enuresis and Accompanying Factors in Children Aged 7-11 years in Turkey. Acta Paediatr.; 88(12): 1369-72.
16.Lee SD., SohnDW., and Lee JZ. (2000): An Epidemiological Study of Enuresis in Korean Children. Br J Urol; 85: 869-873.
17.Emad M. Hammad, Ghada O. El-Sedfy and Sabra M. Ahmed (2005): Prevalence and Risk Factors of Nocturnal Enuresis in a Rural Area of Assiut Governorate. Alexandria Journal of Pediatrics; 19(2): 429-436.
18.Ashraf H., Anees G. and Ibrahim A. (2014): Frequency of Bedwetting among primary school Children in Benha city, Egypt. The Egyptian Journal of Medical Human Genetics; 15, 287 292.
19.Mithani S., and Zaidi Z., (2005): Bedwetting in School Children of Krachi. J Pak Med Assoc; 55(1):2-5.
20.Bakhtiar K, Pournia Y, Ebrahimzadeh F et al. (2014): Prevalence of Nocturnal Enuresis and Its Associated Factors in Primary School and Preschool Children of Khorramabad. Int.JPediatr: 120686.
21.Al-Kot M. and Deeb M. (2012): Nocturnal Enuresis among School Children in Menoufia Governorate: A hidden Problem. Journal of American Science, 8(1);328-334.
22.Jian G., Qing W., Yue C et al. (2006): An Epidemiological Study of Primary Nocturnal Enuresis in Chinese Children and Adolescents. Pediatric Urology, ; 49(6): 939-1152.
23.Hakim A., Soroush S., and Kompan F. (2015): Parents' opinions about affecting factors on children enuresis. JPE; 1(3): 8-14.
24.Su M., Li A., So H. et al. (2011): Nocturnal enuresis in children: Prevalence, correlates, and relationship with obstructive sleep apnea. J Paediatr; 159(2): 238-42.
25.Ghotbi N. and Kheyrabadi G. (2001): Enuresis: Its Prevalence and Associated Factors in Primary School Students in Sanandaj. Sci J Kurdistan uni med sci; 5(20): 30-4.
26.Gunes A, Gunes G, AcikY,and Akilli A. (2009): The epidemiology and factors associated with nocturnal enuresis among boarding and daytime school children in Southeast of Turkey: a cross sectional study. BMC Public Health; 9-357.
27.Tai H., Chang YJ., Chang SC., et al. (2007): The Epidemiology and Factors Associated with Nocturnal Enuresis and its Severity in Primary School Children in Taiwan. ActaPaediatr.; 96(2):242-5.
28.Ali G., Gulsen G., Acik Y. and Adem A. (2009): The Epidemiology and Factors Associated with Nocturnal Enuresis Among Boarding and Daytime School Children in Southeast of Turkey: A cross Sectional Study. BMC Public Health, 9; 375-383.
29.El-Defrawi M., Sobhy S., and El-Tony A. (1994): Epidemiological study of enuresis in children aged 6-12 years in Ismailia. Egypt J Psychiatry 1994; 17:25–32.
30.Hashem M., Morteza A., Mohammad K., and Ahmad-Ali N. (2013): Prevalence of nocturnal enuresis in school aged children, the role of

personal and parents related socio-economic and educational factors. Iran J Pediatr.; 23(1):59–64.
31.Caldwell H. Y., Hodson E., Craig C., and Edgar D. (2005): Bedwetting and Toileting Problems in Children. Med J Aust, 182 (4); 190-195.
32.Yazici C., Nalbantoglu B, Topcu B,and Dogan C. (2012): Prevalence of nocturnal enuresis and associated factors in school children in Western Turkey. Can J Urol; 19(4): 6383-88.
33.Gontard A., Schaumburg H., Hollmann E., et al. (2001): The genetics of Enuresis: A revie. J Urol 166:2438-2443.
34.Neveus T., von Gontard A., and Hoebeke P., (2006): The Standardization of Terminology of Lower Urinary Tract Function in Children and Adolescents: Report from the Standardization Committee of the International children's Continence Society. J Urol; 176:314-324.
35.Carman K B, Ceran O, Kaya C, Nuhoglu C, and KaramanM I. (2008): Nocturnal Enuresis in Turkey: prevalence and accompanying different socioeconomic environments. Urol Int, 80(4); 362-6.
36.Haque M., Ellerstein N., and Gundy J. (1981): Parental Perceptions of Enuresis. A collaborative Study. Am. J. Dis. Child. 135 (9): 809-11.
37.Pashapour N., Golmahammadlou S., and Mahmoodzadeh H. (2008): Nocturnal Enuresis and its Treatment among Primary-school Children in Oromieh, Islamic Republic of Iran "health Journal: 14(2):18-23.