

## Nocturnal Enuresis among School Children in Menofia Governorate, Egypt; a Hidden Problem

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**ABSTRACT: Background:** Nocturnal enuresis (NE) among school children is a hidden problem that is crucial to be diagnosed and treated as soon as possible, as it can result in many psychological consequences and poor scholastic achievements. **Objectives:** The main objective was health promotion of school children with better scholastic achievements. However the specific objectives were to; determine the prevalence and risk factors of nocturnal enuresis among school children in Menofia governorate of Egypt, and to examine its associations with behavioral and emotional problems. **Subjects and Methods:** The study was a cross-sectional comparative study that conducted during the academic year 2009/2010 on 723 students aged 6-18 years in Menofia governorate. A brief questionnaire was distributed to screen the primary enuretic children (No.83) who and their mothers were invited, together with a matched control group (No.144) after their consent to fill a well-designed questionnaire and Child Behavior Check List (CBCL). Teacher Report Form (TRF) will be also filled by their teachers. **Results:** Prevalence of primary NE was 11.5 %, however secondary type was 3.2%. Logistic regression analysis showed that, primary NE was significantly associated with positive family history (Odds ratio 2.76), history of urinary tract infection (Odds ratio 3.10) and an increased risk of internalizing, externalizing, total behavioral problems and poor academic achievements (Odds ratio were 3.05, 3.63, 4.47 and 2.37 respectively). Out of enuretics, 57.8% of them and 61.4% of their parents were greatly concerned with the impact of enuresis. Only 15.7% of the parents preferred medical treatment modalities, others preferred awaking the child for voiding, water restriction, diapering, alarm and bladder exercises in decreasing order. **Conclusions:** The family physician is in a prime position to screen, early detect and treat nocturnal enuresis among school children as soon as possible to prevent its consequences as low self-esteem, psychological and behavioral problems and low school success.

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**Keywords:** Nocturnal enuresis, risk factors, internalizing, externalizing psycho-behavioral problems.

### 1. Introduction

Nocturnal enuresis (NE) can be defined as an involuntary passage of urine during sleep beyond the age of 5 years [1]. It can be further categorized into primary which is bedwetting in a child who had never been dry and secondary when occurs after a continuous dry period more than 6 months [2]. The aetiology of enuresis is not completely understood. Several pathophysiological mechanisms have been proposed, including bladder dysfunction, small functional bladder capacity, abnormal vasopressin levels, nocturnal polyuria, and abnormal sleep patterns [3]. Chronic renal failure, constipation, diabetes insipidus, diabetes mellitus, hyperthyroidism, pinworm infection, psychological stress, seizure disorders, sickle cell disease and urinary tract infections were recorded in secondary enuresis [3]. There is an increasing evidence to support the fact that, the efficacy of many, if not all, enuresis' treatment modalities are dependent upon the underlying pathophysiological mechanisms. So using of diagnostic tools is essential in order to target the

treatment modality directly towards the pathophysiological mechanism [3]. Nocturnal enuresis is crucial to be diagnosed and treated as soon as possible, as it can result in many psychological consequences such as low self-esteem, shame and embarrassment which affect how they interact with their friends and families [4]. Nocturnal enuresis may cause secondary emotional and social problems in children who continue to wet their beds. Although enuretic children seem to have many accompanying psychological problems, it must be investigated whether these problems are the results or etiological factors of enuresis. [3]. **The main objective** of the study was health promotion of school children with better scholastic achievements. **Specific objectives:** Only a few studies were conducted in Egypt about the prevalence of nocturnal enuresis. So this study was conducted to find out the prevalence and risk factors of nocturnal enuresis among school children in Menofia governorate of Egypt, and to examine its associations with behavioral and emotional problems.

## 2. Subjects and Methods

**Type and timing of the study:** The study was a community-based cross-sectional comparative study which was conducted during the academic year 2010/2011. **Site of the study:** Using a multistage stratified random sampling technique, the study was conducted in three schools (one primary, one preparatory and one secondary) from Al-shohadaa city and another similar three schools from Drageal village, representing the urban and rural areas of Menofia governorate respectively. **Subjects:** The sample size was calculated (at 80% power of study, 95% confidence level and 5% level of significance) as 710 which were increased to 867 to overcome any refusal, dropping out or invalid response. The objectives of the study were explained to the local educational authorities to get a permission to carry out the study. Students were selected by a systematic random sampling technique from students' list as every tenth one. **Tools of the study:** 1-A preliminary brief questionnaire (Questionnaire No.1) for screening of enuretic children depending on the ICD-10 definition of NE which is at least one wet night per month for three consecutive months and primary enuresis was defined as bed wetting in a child who never had night time bladder control for 6 months or more [1]. 2- A full questionnaire (Questionnaire No.2) for collection of information about: A- Personal data such as age, sex, residence, parental education, socio-economic level of the child which was calculated using the socio-economic scoring system prepared by Abd El-Twab, 2004 [5]. B-Frequency of wetting of the affected children, parasitic infestation, constipation, encopresis, urinary tract infections, previous treatment modalities, family history of wetting, parental concern towards their enuretic child and whether the child was embarrassed by his wetting or not which ranged from Great deal to No deal. 3- Arabic form of the Child Behavior Checklist (CBCL) and Teacher's Report Form (TRF) to obtain standardized parent and teacher's reports on children's behavioral and emotional problems [6,7]. **Procedure:** The preliminary brief questionnaire (No.1) was distributed to all selected students within sealed envelopes in order to prevent embarrassment of the children. They were instructed by the school teachers to take it home to their parents. A brief information leaflet was attached to the questionnaire informing the parents about the voluntary nature of study in order to get their consent. The students were instructed to help their parents to fill the questionnaire if needed. The teachers collected the questionnaires from children after one week. Those not wishing to participate were recorded as "not responding". Out of 867 questionnaires distributed, 798

(92 %) were collected, and of these, 723 (90 %) were eligible to be evaluated. A comparative study were conducted where the children having only primary NE (No.83) were considered as a case group, however a randomly selected group of non enuretics with matched age, sex and socioeconomic criteria (No.144) were considered as a control group. An interview with children and their parents in both groups were conducted after their consent. The children and their parents were subjected to 1- Questionnaire No.2. 2- Arabic translation of the Child Behavior Checklist (CBCL) where parents rated their children on 120 items on a three-point Likert scale, ranging from 0 (not at all) to 2 (much). The CBCL contains eight syndrome scales: Withdrawal, Somatic complaints, Anxious/Depressive, Social problems, Thought problems, Attention problems, Delinquent behavior, and Aggressive behavior. The first three syndrome scales can be grouped into the broad-band factor Internalizing. The latter two syndrome scales can be grouped into the broad-band factor Externalizing. The parents were asked to score each item that describes the child now or within the past 6 months. By summing 1's and 2's on all problem items, eight syndromes, two second-order factors (Internalizing and Externalizing) so a Total Problem score can be created. The CBCL scale scores were corrected by excluding the items of day and nocturnal enuresis, so that the association between current enuresis and behavioral problems could be assessed. On the broadband factors, a total score of 63 or higher is considered to be of clinical value. 3- The Teacher's Report Form (TRF) [7], which is a teacher version of the CBCL, used to obtain standardized teacher reports on children's behavioral and emotional problems [8]. The problem items were scored like those on the CBCL, but they use a 2-month baseline. Regarding academic achievement, teachers were asked the question, "Compared with other pupils, how do you rate the child's academic achievement on the whole?" The response format ranged from 1 to 3 (poor 1, fair 2, good 3). Parents and teachers were told that, our general purpose was to investigate children's mental health problems; they were not told that we were investigating relationships between the nocturnal enuresis and children's behavioral problems.

### Statistical Analysis

It was carried out using SPSS statistical program (Statistical Package for Social Sciences) version 14. Chi-square test was used to determine the significant predictive factors for nocturnal enuresis at 5% level of significance and logistic regression analysis was applied to estimate its odds ratios. Because the CBCL

and TRF norms for Egyptian children have not been well established, we took the 90th percentiles of their scores as cutoff points to create dichotomous variables for the logistic regression analysis as it was used in a number of other studies [9, 10, 11].

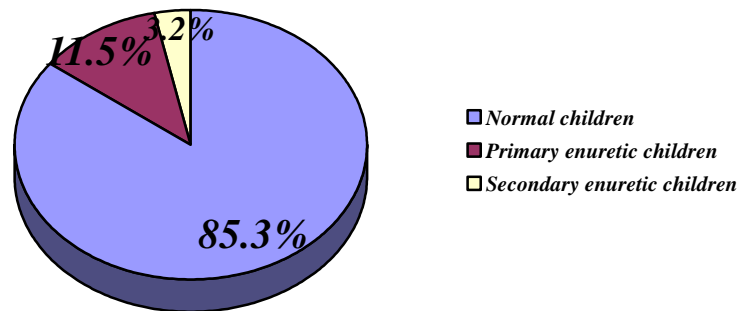
### 3. Results and Discussion

The high response rate (92 %) was probably due to the distribution method of the questionnaires that was by the way of teachers. Nocturnal enuresis is a common health problem among Egyptian children, as in many other populations. The prevalence rate of primary enuresis in school children was found to be 11.5%, however secondary enuresis was 3.2%. In another Egyptian study, the prevalence of primary enuresis among first rank primary school children (6-7 years old) in Assiut city was found to be 20.2% [12]. It differs across the countries ranging from 4.3% in Chinese children [13], 12.9% in France [3], 15% in Saudi Arabia [14] and 52% in Jamaican primary school children [15]. These differences might be due to the socio-cultural, attitude and behavioral variations among parents. According to our results, 17.4% of children aged 6-8 years old had primary enuresis, while this ratio was 7.6% in 12-15 years old children. As found in many studies [16], the prevalence of enuretics decreased as the age increased because NE is mostly expected to improve spontaneously. This trend was also similar to most reports in the literatures [3]. In Korea the prevalence of enuresis declined from 20.4% in 7 years-old to 5.6% in 12 years-old children [17]. This study showed that, gender did not have a significant effect on the prevalence of enuresis although male predominance was detected in a study performed in Turkey [18], and other countries [19, 20]. The general principle about gender in a Malaysian study showed that, enuresis was more common in boys in the early years but equals in the latter years [21]. In this study, birth order was a significant determinant of NE that was disagrees with the Malaysian study [21]. However in a study in England and Scotland [22], it was found that, primary NE was more likely in a child who was not the first born in the family which may be due to sense of neglect. In our study, consistent with the literatures, NE was found to be more in children with positive family history (Odds ratio: 2.76). Furthermore, previous studies reported that, prevalence of family history in enuretic children ranged from 22% to 5%. Other studies also support a genetic basis for enuresis [3]. In the present study, NE has been related to low parental education level which agreed with a study in Turkey as low parental education level thought to form a base for wrong beliefs about the

disease and its causes [23]. However, it disagreed with a study in Taiwan that showed a greater prevalence rate in children with parents of high educational status [16]. It was found that, low socio-economic status of the families was associated with a higher prevalence of NE. This result was in agreement with a study done in 2001 on Turkish children [18]. In this study, working mothers were found to have less enuretic children than house wives. This was thought to be due to the higher educational level of working mothers. Enuresis was significantly more common with rural inhabitation that might be related to poor sanitation, lower educational level of parents, and low monthly income. In this study, 54.2% of children wet every night that is consistent with a study on Turkish children in 2007 in which, 33.3% of enuretics wet every night [2]. In Karachi, 30% of the children with bed wetting wet every night [24]. In our study, we found a positive association of heavy sleep, snoring and lack of a comfortable sleep with NE which was consistent with **Cederblad et al.**, who found that, two thirds of the school-age enuretics used to sleep very heavily [25]. **Kalo et al.**, found that, deep sleep was significantly more among enuretic children compared with non enuretics [14]. An epidemiological study by **Neveus et al.**, reported that, most of the dry children were relatively easy to arouse from sleep [26]. It is obvious that, waking up is still a problem in enuretics so some questions were remaining to be answered on this matter. In a community sample of children, those with habitual snoring more often had primary NE than those without snoring [27]. In this study we found an association between enuresis and history of urinary tract infections (UTIs) and constipation. **Kajiwara et al.**, also found that children with a history of cystitis had a significantly higher rate of NE than children without such history [28]. **Ozden et al.**, found that, recurrent UTIs were significantly higher in enuretics when compared to non-enuretics [2]. The reason for this is not clear, however, it has been suggested that, the strong contraction of the proximal urethra and pelvic floor muscles might cause UTIs by leading to urethrovesical reflux of bacteria [3]. Pelvic floor over activity and bladder dysfunction are thought to simultaneously cause over constriction of the anal sphincter resulting in constipation [3]. **Inan et al.**, also found that, constipation was more frequent in enuretics [29]. Encopresis was found to be more among enuretic children. This was consistent with the previous literatures [3]. Regarding parental and child's concerns toward the problem of enuresis, 57.8% of enuretic children and 61.4% of their parents consider "it is a great deal". These results agreed with **Foxman et al.** [30], who found

that, two-thirds of American parents worried about the symptom, and over half the children were disturbed by the problem. In the present study only 31.3% of the children were seen by a physician. This low rate demonstrated that, most of the children with enuresis were not treated. **Oge et al.**, [18] from Turkey reported that, the families mostly choose the traditional methods in attempt to treat enuresis. In the present study, only 15.7% of the children were treated with medications provided by physicians. The use of medical treatment is low when compared to other studies, which may be related to low socioeconomic level, ignorance and false believes of their parents. Also it may be due to that, few parents know the availability of medical treatment[3]. Our results showed that, current NE were associated with a markedly increased

risk of behavioral, emotional, and academic problems, (Odds ratio were 3.05, 3.63 and 4.47 for internalizing, externalizing and total problems respectively). These results were consistent with most previous studies which reported that, bed-wetting had adverse impacts on children's mental health. However, the association in our sample is stronger than those in Western children [9,19,21]. On the other hand, children with NE may experience social isolation, fear of detection, sense of immaturity, and loss of self-esteem, all of which act as a psychological stress which may increase the risk for behavioral and emotional problems. Furthermore, NE and behavioral problems may share the same biological, social, and psychological causes [31].



**Figure 1. Prevalence of enuresis among school children (6-18 years)**

**Table 1. Prevalence of nocturnal enuresis among school children according to age, sex and residency**

Items		Primary Enuretics (No. 83)		Secondary Enuretics (No. 23)		Non Enuretics (No. 617)		Total (No. 723)	
		No.	%	No.	%	No.	%	No.	%
<b>Age</b>	6-	26	17.4	3	2.1	120	80.5	149	20.6
	8-	23	16.9	4	2.9	109	80.2	136	18.8
	10-	17	11.8	3	2.1	124	88.2	144	19.9
	12-	11	7.6	8	5.6	125	86.8	144	19.9
	15-18	6	4.0	6	4.0	138	92.0	150	20.8
<b>Total</b>		83	11.5	23	3.2	617	85.3	723	100
<b>Sex</b>	Male	46	13.0	14	4.0	293	83.0	353	48.8
	Female	37	10.0	9	2.4	324	87.6	370	51.2
<b>Residency</b>	Urban	38	9.9	10	2.6	336	87.5	384	53.1
	Rural	45	15.3	13	3.8	281	82.9	339	46.9

**Table 2. Comparison between enuretic and control groups as regard their socio-demographic criteria.**

Socio-demographic factors	Enuretic group (No. 83)		Control group (No. 144)		$X^2$	<i>p</i> -value
	No.	%	No.	%		
<b>Birth order</b>						
1-3	19	22.9	60	41.7	39.22	< 0.001
4-6	29	34.9	73	50.7		
> 7	35	42.2	11	7.6		
<b>Fathers' education</b>						
Primary school or less	44	53.0	56	38.9	4.26	< 0.05
Secondary school or more	39	47.0	88	61.1		
<b>Mothers' education</b>						
Primary school or less	54	65.1	43	35.9	26.66	< 0.001
Secondary school or more	29	34.9	101	64.1		
<b>Socioeconomic level</b>						
Mild	42	50.6	36	25.0	15.73	< 0.001
Moderate	28	33.7	80	55.6		
<b>Residency</b>						
Rural	45	54.2	56	38.9	5.01	< 0.05
Urban	38	45.8	88	61.1		
					<b>Odds ratio</b>	<b>Confidence interval</b>
<b>Working mother</b>	6	7.2	32	22.2	0.27	[0.11;0.68]
<b>Relative marriage</b>	11	13.2	15	10.4	1.31	[0.57;3.01]
<b>Familial stress</b> (e.g.; divorce or death of one parents)	6	7.2	5	3.5	2.17	[0.64;7.33]

**Table 3. Risk factors of nocturnal enuresis among studied school children.**

Items	Enuretic group (No.83)		Control group (No.144)		Odds ratio	Confidence interval
	No.	%	No.	%		
Deep sleep	38	45.8	32	22.2	2.96	[1.65;5.30]
Snoring or uncomfortable sleep	31	37.8	22	15.3	3.31	[1.75;6.24]
Recurrent Urinary tract infections	22	26.5	15	10.4	3.10	[1.50;6.39]
Constipation	12	14.6	6	4.2	5.42	[1.40;10.79]
Encopresis	8	9.6	3	2.1	5.01	[1.29;19.46]
Nocturnal enuresis in other siblings	34	40.9	10	6.9	9.30	[4.27;20.23]
Nocturnal enuresis in relatives	19	22.9	14	9.7	2.76	[1.30;5.85]

**Table 4. Parental and Child's concerns and attitude regarding nocturnal enuresis**

Items	Enuretics	
	No.	%
<b>Parental concern</b>		
Great deal	51	61.4
Some deal	16	19.3
No deal	16	19.3
<b>Child's concern</b>		
Great deal	48	57.8
Some deal	19	22.9
No deal	16	19.3
<b>Frequency</b>		
Every night	45	54.2
Less than every night	38	45.8
<b>Visit a physician</b>	38	45.8
<b>Therapies</b>		
Medication	13	15.7
<b>Other therapeutic methods</b>		
Awaking for voiding	76	91.6
Water restriction	45	54.2
Diapering	12	14.5
Bladder exercise	7	8.4
Alarm	5	6.0

**TABLE 5 . Association between nocturnal enuresis and behavioral, emotional and academic achievement problems**

Behavioral Report Forms	Enuretic group (No 83)		Control group (No 144)		Odds ratio	Confidence interval
	No.	%	No.	%		
<b>Parents' report form (CBCL)</b>						
Withdrawn	12	14.5	7	4.9	3.31	[1.23;8.77]
Somatic Complaints	13	15.7	11	7.6	4.63	[2.12;10.12]
Anxious/Depressed	18	21.7	9	6.2	4.15	[1.77;9.75]
Social Problems	29	43.9	20	13.9	3.33	[1.73;6.40]
Thought Problems	37	44.6	26	18.1	3.65	[1.99;6.69]
Attention Problems	26	31.3	18	12.5	3.19	[1.62;6.29]
Delinquent Behavior	23	27.7	12	8.3	4.22	[1.97;9.03]
Aggressive Behavior	19	22.9	11	7.6	3.59	[1.61;7.99]
Internalizing	18	21.7	12	8.3	3.05	[1.38;6.70]
Externalizing	22	26.5	13	9.0	3.63	[1.72;7.69]
Total Problems	24	28.9	12	8.3	4.47	[2.10;9.55]
<b>Teachers' report form ( TRF )</b>						
Withdrawn	26	31.3	23	16.0	2.40	[1.26;4.57]
Somatic Complaints	31	37.3	22	15.3	3.31	[1.75;6.24]
Anxious/Depressed	28	33.7	21	14.6	2.98	[1.56;5.71]
Social Problems	29	43.9	23	16.0	2.83	[1.50;5.33]
Thought Problems	37	44.6	28	19.4	3.33	[1.83;6.06]
Attention Problems	26	31.3	21	14.6	2.67	[1.39;5.14]
Delinquent Behavior	23	27.7	16	11.1	3.07	[1.51;6.22]
Aggressive Behavior	24	28.9	19	13.2	2.68	[1.36;5.77]
Internalizing	26	31.3	20	13.9	2.83	[1.46;5.48]
Externalizing	21	25.3	16	11.1	2.71	[1.32;5.55]
Total Problems	19	22.9	13	9.0	2.99	[1.39;6.44]
Poor academic achievement	21	25.3	18	12.5	2.37	[1.18;4.77]

#### 4. Conclusion

Enuresis is a pediatric public health problem that associated with young age, low income, family history of enuresis and history of urinary tract infections in addition to a lot of emotional and psychological problems. It leads to low self-esteem, some secondary psychological problems and low school success. Most of the children with enuresis do not have adequate attention about enuresis and didn't receive any professional treatment.

#### Recommendation

At the end we can recommend that, great efforts at all levels regarding NE among school children should be made including preventive, etiological determination, psychological and behavioral exploration and management. The misconceptions among parents require health education intervention. Also true information about the medications is important for convincing the parents with different treatment modalities. So the family physician is in a prime position to screen, early detect and treat the affected school children with conduction of health education program for the enuretic children and their parents with pediatrician support when needed.

#### Limitations of the Study

As it is true for all cross-sectional research, we could not demonstrate the causal direction between nocturnal enuresis and behavioral problems. A prospective study with clinical interviews is needed to confirm our results. It is unclear to what extent the CBCL and TRF syndromes, based on a predetermined cutoff point for the instruments, would match clinical diagnose.

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