Prevalence and Risk Factors of Primary Nocturnal Enuresis in Primary School Children in Qena Governorate-Egypt

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ABSTRACT

Background: Primary Nocturnal Enuresis (PNE) is an important developmental problem for school age children and children with PNE seem to have psychological problems which may be the results or the etiology of enuresis. PNE is multifactorial and many risk factors have been described to explain this phenomenon. **Objective:** To determine the prevalence of PNE in Qena Governorate primary school children and to assess risk factors that can cause or affect the disease. **Methods:** a cross-sectional study of PNE was performed. We distributed 10580 questionnaires in 17 primary schools in Qena Governorate. After exclusion of secondary, diurnal or mixed enuresis, we detected the prevalence and risk factors of PNE. **Results:** Students with enuresis were 1065 (11.4%). The prevalence of PNE was 10.13%. PNE was higher in younger age, male gender and large families, while positive family history, deep sleep, low socioeconomic, threatening toilet training and the response of the parents and siblings with psychic abuse, are the main risk factors of PNE. We found that the psychological and stressor factors are associated with mild to moderate forms of enuresis. The child responded to enuresis by depression, isolation, nervousness and violence and this affects his school success. **Conclusion:** The prevalence of PNE in primary school children in Qena Governorate constitutes about 10.13%. We recommend that the parents should be well informed about these risk factors to avoid them and advice them to seek for medical and psychiatric help. **[Egypt J Neurol Psychiat Neurosurg. 2013; 50(2): 163-169]**

Key Words: nocturnal enuresis, children, psychological causes.

INTRODUCTION

Enuresis is defined in the "Diagnostic and statistical manual of mental disorders" (DSM-IV) as the repeated voiding of urine into bed or clothes at least twice a week for at least three consecutive months in a child who is at least 5 years of age. Nocturnal enuresis (NE) refers to voiding during sleep; diurnal enuresis defines wetting while awake.¹ NE is one of the most common developmental problems among the children.² The reported prevalence of enuresis at different ages varies considerably because of differences in the method of data collection, and characteristics of the population sampled. The ratio of the incidence of enuresis in boys versus girls is 2:1; enuresis is more common at all ages in lower socioeconomic groups and in institutionalized children. The prevalence of nocturnal enuresis among the children older than five years of age was reported to be 6.7-14.7%.^{3,4} Nocturnal enuresis can be further categorized into primary nocturnal enuresis or secondary nocturnal enuresis. Primary nocturnal enuresis is therefore bedwetting in a child aged 5 years or more who has never been dry for extended periods, while secondary nocturnal

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enuresis is the onset of wetting after a continuous dry period of more than 6-12 months which can be caused by such as urinary tract infection (UTI), diabetes mellitus, spina bifida and epilepsy.⁵

PNE is an important problem for school age children and it can cause emotional and social problems for the child as well as the family.⁶ Chronic anxiety, low self-esteem, and delayed developmental steps such as attending camps or sleeping at a friend's house may occur as secondary problems.⁷ The etiology of enuresis is not completely understood. This condition probably has a multifactor etiology. Most studies have consistently found that the risk factors for enuresis are male gender, smaller age, family history and divorced parents.^{8,9} The overall prevalence of nocturnal enuresis, as well as prevalence of nocturnal enuresis in different age groups, is greatly varied in different countries, ranging from 2.3% to 25%.9-11 Enuresis is frequently diagnosed among school children and is an important psychosocial problem both for parents and children. The relationship between enuresis and behavioral problems has been studied for several decades. Results range from enuretic children having no marked emotional, social or behavioral problems, to enuretic children with a 4.3-times increase in psychological difficulties compared with their non-enuretic peers, with this regard, nocturnal enuresis is evaluated as an important public health problem.^{12,13} Although enuretic children seem to have accompanying psychological problems, it must be investigated whether these problems are the results of enuresis or etiological factors. Nocturnal enuresis is multifactorial; few studies concluded that nocturnal enuresis might cause secondary emotional and social problems in children who continue to wet their bed.¹²⁻¹⁴ A number of etiologic factors have been described to explain this phenomenon.^{7,15}

Aim of the Work

The aim of this study is to determine the prevalence of PNE in Qena Governorate primary school children and to assess risk factors that can cause or affect the disease such as general approach of family to the children, school success of the students, general behavioral attitudes, method of toilet training and socio-demographic factors.

PATIENTS AND METHODS

A cross-sectional study of PNE was performed after it was approved by human research ethics committee of the Qena university hospital. We distributed 10580 questionnaires to parents of 6-12 years old students from 1^{st} grade to 6^{th} grade had taken as candidates for this research in 17 primary schools in Qena Governorate in the period from October 2011 to May 2012. The permission was obtained from the educational institute in Qena governorate and a written informed consent form was obtained from the parents, stating the study's objectives. The questionnaire contains 21 questions in a simple Arabic language, the questions include, the presence of nocturnal enuresis and, descriptive questions related to child and parents asked about socio-demographic data, NE data, physical or psychological disorders, and family stressors such as questions about the general approach of family to the child, the school success of the child, the general behavioral attributes, sleeping pattern and method of toilet training. Questionnaires were given to the students to be answered by their parents. The students were instructed to give it to their parents. Any parent (mother or father) can fill the questionnaires. The teachers help us in the collection of the questionnaires from children within one week. Those not wishing to participate were recorded as "not responding". Questionnaires were spread to 10580 students; only 9340 students return it back, with response rate of 88.3%. Those parents answered the questionnaire that their children have NE, were evaluated with detailed history & physical and laboratory examinations (in selected cases) as: complete urine analysis, random blood sugar, Lumbosacral x-ray and EEG. So, secondary reasons such as UTI, diabetes mellitus, spina bifida and epilepsy (clinically and by EEG) had been excluded. The DSM-IV criteria are used to define children with PNE and detect its severity.¹

The data was statistically analyzed using Student's *t*-test, one way ANOVA, and chi-square (linear by linear correlation) tests, as applicable (with a preset probability of P<0.05). Experimental results are presented as arithmetic mean±SD. A logistic regression model was applied to estimate the odds ratios (OR) of significant predictive factors. Statistical tests were conducted using the SPSS software package, version 16 (SPSS Inc., Chicago, IL, USA) on a personal computer.

RESULTS

In our study, questionnaires were spread to 10580 students in 17 primary schools in Qena Governorate, only 9340 return it back; with response rate of 88.3%. The parents answered the questionnaire that their children are non-enuresis students were 8275 (88.6%) while those who had enuresis were 1065 students (11.4%). We excluded 16 cases with diurnal enuresis and 80 cases of mixed (diurnal & nocturnal) enuresis and 23 cases with secondary reasons of nocturnal enuresis such as urinary tract infection (UTI), diabetes mellitus, spina bifida and epilepsy. The latter (secondary) presented with pain or urgency during micturition, change in urine color, polyuria with loss of weight and convulsion. They were diagnosed as 10 cases with UTI, 2 cases with diabetes mellitus, 2 cases with spina bifida, 4 cases with epilepsy and 5 cases with bilharziasis.

Therefore, the number of students with primary nocturnal enuresis out of those 9340 responder students were 946 students. That represented prevalence of about 10.13% (Table 1).

Table (2) shows some data and characters of the students with and without nocturnal enuresis. It reveals that PNE frequency was higher in younger age of students as it was decreased by age from 63.2% at 6-8 years to 36.8% at 9-12 years (Figure 1) with p-value of 0.014. Male gender was one of the risk factors of PNE as the frequency was high in males (69.1%) when compared with females (30.9%) with p-value of 0.029. In addition, we found that the incidence of PNE increased with large families with extra numbers of family members and siblings with p-value of 0.035 and 0.021 respectively, but it was not statistically significant with number of rooms in the house with p-value of 0.06.

Also and as shown in Table (3); the statistical analysis of some risk factors associated with severity of primary nocturnal enuresis.

Students who had mild to moderate PNE were 402 (42.5%) while those with severe PNE were 544 (57.5%). Positive family history of PNE, deep sleep pattern, low socioeconomic conditions, threatening methods of toilet training, and the response of the Parents & Brothers and sisters with verbal or psychic abuse to children with PNE, as risk factors significantly associated with the severity of enuresis in the students with p-value of 0.001, 0.006, 0.04, 0.012, 0.004 and 0.025 respectively. However, Psychological & Stressor factors associated with mild to moderate PNE and not with severe form of enuresis with p-value of 0.68. The severity of enuresis significantly affect the school success of the student in a p-value of 0.03. The child respond to enuresis by depression,

isolation, nervousness & violence and this was significantly affects the severity of enuresis in a p-value of 0.01.

Parents of 690 (72.94%) students considered NE a big problem while 226 (23.89%) of them found it a small problem and only 30 (3.17%) said about it no problem. Parents were seeking for medical advice in adolescent group more than pediatrics group, we found that 549 (58.0%) out of the 946 enuretic students asked for medical advice (Figure 2). The treatment methods were: medication, water restriction, awaking for voiding but only 98 (17.8%) of them got excellent improvement, 112 (20.4%) got good improvement while 70 (12.8%) with some improvement. No improvement found in a big number of them, 269 (49.0%).

Table 1. Prevalence rate of primary nocturnal enuresis in primary school children.

		Enuresis						
	Responders			Primary	Coordony	No Enuresis		
		Total	Nocturnal	Mixed	Diurnal	Secondary		
Number	9340	1065	946	80	16	23	8275	
% out of responders		11.4%	10.13%	0.9%	0.17%	0.2%	88.6%	

Factor -	PNE (946 students)			No er	D		
	No %		Mean±SD no		%	% Mean±SD	
Age							
6-8 years	598	63.2%	6.8 ± 2.5	1432	17.3%	8.3±1.3	0.014*
9-12 years	348	36.8%		6843	82.7%		
Sex							
Male	653	69.1%		4586	55.4%		0.029*
Female	293	30.9%		3689	44.6%		
Family members	3 -11		6.3±1.20	3 – 6		4.1±1.15	0.035*
Siblings	1 - 8		5.1 ± 1.50	1 - 4		2.2 ± 0.82	0.021*
House room	1-5		4.2±2.9	1 - 4		3.3±1.25	0.06

Table 2. Data and Social characters in children with and without primary nocturnal enuresis.

* Significant p-value < 0.05



Figure 1. Age distribution of the Students with PNE.

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	Total PNE		Severity of enuresis					
Factor	n	%	Mild- moderate (Total=402)		Severe ^a (Total=544)		Univariate analysis	
			Ň	%	Ň	%	OR	p-value
Family history								
Yes	622	65.75%	210	52.2%	412	75.8%	0.3504	0.001**
No	324	34.25%	192	47.8%	132	24.2%		
Sleep pattern								
Deep	629	66.5%	230	57.2%	399	73.3%	0.4860	0.006**
Light	317	33.5%	172	42.8%	145	26.7%		
Socioeconomic status								
Low	434	45.9%	109	27.1%	325	59.7%		0.04*
Average	316	33.4%	152	37.8%	164	30.1%		0.04*
High	196	20.7%	141	35.1%	55	10.2%		
Threatening toilet training								
Yes	704	74.4%	289	71.9%	415	76.3%	0.7050	0.010*
No	242	25.6%	113	28.1%	129	23.7%	0.7950	0.012*
Stressors and psychological factors								
Yes as	560	59.2%	290	72.1%	270	49.6%	2.627	0.680
Violence	209	22.2%						
Divorce	3	0.3%						
Newborn	15	1.6%						
Transport	7	0.7%						
Frustration	326	34.4%						
No	386	40.8%	112	27.9%	274	50.4%		
School success								
Yes	533	56.6%	310	77.1%	223	23.6%		
No	413	43.4%	92	22.9%	321	76.4%	4.85	0.03*
Parents response								
Plain & bad words	535	56.6%	154	38.3%	381	70.0%		0.004**
Somatic punishment	59	6.2%	33	8.2%	26	4.8%%		0.004**
Deal nice with him	352	37.2%	215	53.5%	137	25.2%		
Brothers and sisters response								
Laugh at him	667	70.5%	254	63.2%	413	75.9%		0.025*
Psychic abuse	136	14.4%	39	9.7%	97	17.8%		0.025*
No care	143	15.1%	109	27.1%	34	6.3%		
The child response								
Depression & isolation	189	20%	78	19.4%	111	20.4%		0.01*
Nervousness & violence	681	72.0%	272	67.7%	409	75.2%		
Not care	76	8%	52	12.9%	24	4.4%		

Table 3. Analysis of some risk factors associated with severity of nocturnal enuresis.

^aSevere nocturnal enuresis >3 wet nights per week, OR odds ratio, * Significant at p-value <0.05 ** Significant at p-value <0.01



Figure 2. Percentage of students with PNE who got treatment.

DISCUSSION

In our study, the parents, who answered the questionnaire that their children non-enuresis students were 8275 (88.6%) and those had enuresis, were 1065 students in a prevalence of primary enuresis as 11.4%. This result comes in concordance with many studies carried out in many countries who reported that the prevalence of enuresis among 6-11 year old children ranged from 1.4 to 28%.^{16,17} And also with many researches which concluded that the overall prevalence of nocturnal enuresis, as well as prevalence of nocturnal enuresis in different age groups, is greatly varied in different countries, ranging from 2.3% to 25%.^{8,10-12}

After exclusion of diurnal, mixed and secondary nocturnal enuresis; we found that the prevalence of primary nocturnal enuresis in primary school children is about 10.13% which agrees with Piyasil and Udomsup, 2002¹⁸ who found that the prevalence of primary nocturnal enuresis was 15.4 and with Yousef et al.¹⁹, who reported that the occurrence of primary nocturnal enuresis was 8.7% in schoolchildren of Aden Governorate, also we agree with Semolic et al. 20 , who recorded the occurrence of primary nocturnal enuresis as 8.7%. But our results not agree with the prevalence got by Tai et al 2007²¹ which was 6.8% and not agree also with Kanaheswari 2003 which was $6.2\%^{22}$ but we can explain this by different cultural societies and also by different number of students involved in their studies.

Our results revealed that PNE frequency was higher in younger age of students as it was decreased by age from 63.2% at 6-8 years to 36.8% at 9-12 years with pvalue of 0.014 which come in harmony with the results of Yousef et al.¹⁹, which found that primary nocturnal enuresis decreased by age from 31.5% at 6-8 years to 8.7% at over 15 years. In addition, with Safarinejad²³ who found a significant relationship between the prevalence of enuresis and age and also with Tai et al 2007.²¹ Male gender was one of the risk factors of PNE in our results as the frequency was high in males (69.1%) when compared with females (30.9%) with p-value of 0.029 which agrees with many researchers as with Brockmann et al.²⁴, Sureshkumar et al.²⁵, Semolic et al.²⁰, Tai et al.²¹ and Pashapour²⁶ but it was not agree with Ali et al.²⁷ or Piyasil and Udomsup¹⁸, who concluded that enuresis not related to sex.

Also we found that the incidence of PEN increased with large families with extra- numbers of family members and siblings which agree with Ali et al.²⁷, who found that low socio-economic status of the family was associated with nocturnal enuresis, Semolic et al.²⁰ and with Yousef et al.¹⁹ found that the PNE was higher in families of low socioeconomic class.

According to our results we concluded that there was a significant association between Positive family history of PNE, deep sleep pattern and with the occurrence and severity of enuresis in the students, this come in harmony with Yousef et al.¹⁹, Safarinejad²³ and Tai et al.²¹, who considered them important risk factors of incidence of PNE and also significantly associated with its severity.

The enuretic child may be at increased risk for emotional or even physical abuse from family members and may experience stress related to fear of detection by peers. These factors contribute to the loss of self-esteem that the enuretic child often experiences.²⁸ In our study we found that threatening methods of toilet training, the response of the Parents & Brothers and sisters with verbal or psychic abuse to children with PNE are very important risk factors significantly associated with the severity of enuresis in the students that agree with many studies carried out by Safarinejad²³, Piyasil and Udomsup¹⁸, and can significantly affect the school success of the student. The child respond to enuresis by depression, isolation, nervousness & violence and this was significantly affects the severity of enuresis which come in concordance with the results of Brockmann et al.²⁴, who found that PNE Children had a higher prevalence of hyperactive behavior and poor academic performance.

According to our data, Stressful events as violence, divorce, newborn, Transport & Frustration associated with PNE but Psychological and Stressor factors associated with mild to moderate PNE and not with severe form of enuresis that agrees with Sureshkumar et al.²⁵ and Yousef et al.¹⁹.

Parents were found to be more disturbed by the problem than their children.²⁰ Moreover, the seeking for professional help in adolescent group was significantly higher than those of pediatric group.¹⁶

According to our study, parents of 690 (72.94%) students considered NE a big problem and about 549 (58.0%) students asked for medical advice that agrees with the results of Piyasil and Udomsup, 2002^{18} who found that 58% of the parents thought that the enuretic problem needed further treatment. Treatment methods used were medication, water restriction, awaking for voiding but only 98 (17.8%) of them got excellent improvement, 112 (20.4%) got good improvement while 70 (12.8%) with some improvement. No improvement found in a big number of them, 269 (49.0%).

Conclusions

Our study concluded that the prevalence of PNE in primary school children in Qena Governorate constitute about 10.13%

PNE frequency was higher in younger age, male gender, low socio-economic status of the family and in families with many siblings. Positive family history of PNE, deep sleep pattern with difficult in awaking the child, threatening methods of toilet training, the response of the parents, brothers and sisters with verbal or psychic abuse to children with PNE are very important risk factors & enuresis can significantly affect the school success of the student and the child may respond to enuresis by depression, isolation, nervousness & violence. Also we found that psychosocial factors appear to contribute to moderate but not severe nocturnal enuresis.

Therefore, we recommend that the parents should be well-informed about these risk factors to avoid them. Also, parents should seek for medical and psychiatric help firstly to treat the condition especially it is associated with secondary reasons and for psychic therapy to children.

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الملخص العربي

مدي انتشار وعوامل الخطورة في حالات التبول الليلي الأولي بين أطفال المدارس الابتدائية في محافظة قنا

مقدمة : يعزي البوال الليلي الأولى إلي حدوث تبول أثناء النوم, وإنه لمشكلة مهمة نتعلق بالنمو لأطفال المدارس ومن الممكن ان يسبب مشاكل اجتماعية ونفسية للطفل بالإضافة إلي المشاكل الأسرية. وفي الحقيقة فإن المشكلات النفسية والتطورية لمرض البوال الليلي تعد أكثر أهميةً وتدميراً للطفل من عرض التبول نفسه. إن البوال الليلي مشكله متعددة العوامل، وهناك بعض الأبحاث قد توصلت إلي أن البوال الليلي قد يسبب مشاكل نفسية واجتماعية للأطفال وقد وصفت العديد من عوامل الاختطار التي توضح هذه الظاهرة.

الهدف: يهدف هذا البحث إلي تحديد معدل الانتشار للمرض البوال الليلي الأولي في مدارس محافظة قنا الابتدائية, وأيضا تحديد عوامل الاختطار التي قد تسبب أو تؤثر علي المرض.

المرضي وطرق البحث: تم عمل دراسة لمرض البوال الليلي الأولي, وعمل استبيان لآباء عدد ١٠٥٨٠ تلميذاً ما بين سن ٦ إلي ١٢ سنة من الصف الأول إلي الصف السادس الإبتدائي في مدارس محافظة قنا. تم استبعاد البوال الليلي الثانوي, والبوال النهاري, والبوال النهاري والليلي معا, واستطعنا تحديد مدي انتشار وعوامل الاختطار للبوال الليلي الأولي في هذه المدارس الابتدائية.

النتائج: بنشر استبيان علي حوالي ١٠٥٨٠ تلميذاً في ١٧ مدرسة ابتدائية بمحافظة قنا, وعاد منهم ٩٣٤٠ تلميذاً بمعدل استجابة ٨٨.٣. وبإجابة الآباء علي الاستبيان تبين أن عدد ٨٢٧٥ (٨٨.٦) لا يعانون من البوال بصفة عامة. بينما الأطفال الذين يعانون من البوال هم ١٠٦٥ تلميذاً (١١.٤%) وباستثناء ١٢ حالة تعاني من البوال النهاري و٨٠ حالة تعاني من البوال المختلط (ليلي ونهاري) وأيضاً ٢٢ حالة تعاني من بوال لأسباب ثانوية.من ذلك يكون عدد الأطفال الذين يعانون من البوال الليلي الأولي هم ٩٤٦ من ٩٣٤٠ تلميذاً بمعدل انتشار ١٠٦٣%.

كما أوضحت الدراسة أن البوال الليلي الأولي أكثر تكراراً في صغار السن من الذكور, والأسر كبيرة العدد, وجود تاريخ عائلي موجب, والنوم العميق, وانخفاض مستوي المعيشة, و التهديد الشديد للتدريب علي دخول الحمام, ورد فعل الآباء والإخوة الأخوات بالاعتداء كلامياً ونفسياً علي الطفل الذي يعاني من البوال الليلي الأولي؛ هذه كانت أهم عوامل الاختطار للمرض وهي أيضا ضرورية في تحديد حدة المرض عندهم .إن العوامل النفسية والضغوط تكون مصاحبة للحالات البسيطة والمتوسطة وليس الشديدة من حالات البوال الليلي الأولي, فالتبول يؤثر علي الطفل في صور عدة مثل الاكتاب أو الانعزال أو العصبية أو العنف وبالتالي تزيد من حدة المرض وأيضاً تؤثر على معدل النجاح في المدرسة.

الخلاصة: تبين أن معدل الانتشار للبوال الليلي الأولى في المدارس الابتدائية بمحافظة قنا هو ١٠.١٣% تقريباً وأهم عوامل الاختطار للبوال الليلي الأولى هي صغر السن والجنس الذكري وانخفاض مستوي المعيشة للأسرة وفي الأسر كثيرة العدد ووجود تاريخ عائلي موجب وأصحاب النوم العميق و التهديد والتخويف للتدريب على دخول الحمام وكرد فعل للإيذاء الكلامي والنفسي للطفل من قبل الآباء والإخوة الأخوات.

التوصيات: توصي الدراسة بوجوب إعلام الآباء بعوامل الاختطار لهذا المرض ليتم تجنبها، وأيضاً نصح الآباء لطلب المساعدة الطبية والنفسية في الحالات الشديدة .