

Prevalence and Risk Factors Associated with Nocturnal Enuresis Among Primary School Children in Al-Eskan Region, Makkah Al-Mokarramah

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ABSTRACT

Background: Nocturnal enuresis is a common problem worldwide among children and adolescents, across all races and cultures, but usually underreported. Though this condition is labeled benign, it often leads to important social implications and disturbances both in affected children and their parents.

Objectives: To estimate the prevalence of nocturnal enuresis and determine its associated factors among primary school children in Al-Eskan region, Makkah Al-Mokarramah, 2013.

Methodology: This was a cross sectional study including a representative sample of male primary school children in Al-Eskan region, Makkah Al-Mokarramah. The sample size was obtained from one randomly chosen school named Al-Baraa Bin-Maleek primary school. The study included 668 male students. Sample was chosen as a percentage proportionally related to the total number of the student in each grade. A self-administered questionnaire which has three parts was utilized for data collection: personal information, information for nocturnal enuresis and information for possible associated factors.

Results: Out of 178 questionnaires distributed to school children, 152 questionnaires were returned completed giving a response rate of 85.4%. Their age ranged between 6 and 12 years with a mean of 9.5 and standard deviation of 1.8 years. The prevalence of nocturnal enuresis among primary school children was 8.6%. Among enuretic primary schoolchildren, nocturnal enuresis was considered primary in 84.6% while it was considered secondary in 15.4% of them. Nocturnal enuresis was more frequent among children at the age of 8 years, those who live with either father or mother, with history of parental consanguinity, low-income families, low educated fathers, living in smaller number of rooms, those

having recurrent UTI, stool incontinence, habit of eating chocolate or fast foods at dinner, psychological trouble (changing school or home, losing of admirable person, parental separation and acute family problem) and those having history of nocturnal enuresis among siblings. Among children with a history of bedwetting, only parents of two children (4.1%) tried herbal and traditional medicine and another 2 parents (4.1%) reported medical consultation. No treatment was prescribed for any cases.

Conclusion: The prevalence rates for nocturnal enuresis in Makkah Al-Mokarramah, KSA were comparable with other studies from Saudi Arabia and worldwide. The majority of the parents of children with nocturnal enuresis in present study do not have adequate attention about nocturnal enuresis and none of the enuretic children receive professional treatment.

Keywords: Nocturnal Enuresis, Primary School, Children, Prevalence, Risk Factors.

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INTRODUCTION

Nocturnal enuresis is defined as an involuntary and undesirable bedwetting, in the absence of congenital or acquired defects of the central nervous system or the urinary tract in a child five years or over, especially in boys.¹⁻⁶ It is a common problem worldwide among children and adolescents, across all races and cultures, but usually underreported. Though this condition is labeled benign, it often leads to important social implications and disturbances both in affected children and their parents.^{2,5,7-9} Nocturnal enuresis (NE) is primary when the child has never been continent of urine for a prolonged period and secondary if incontinence recurs after a period of continence of 6 months.^{1,8-10} Most children with primary

NE have no disease mechanism explaining the nocturnal enuresis.^{1,9} Primary NE is the most common type with at least one episode of bedwetting/month in 15- 30% of 6 year olds and 4-16% of 12 year olds, with spontaneous remission rate of 14% per year.^{2,4,8-11} Another classification of NE from the recent urology literature is based on the presence of other bladder symptoms. Poly-symptomatic NE is bedwetting associated with severe urgency, severe frequency, or other signs of irritable bladder. Monotonous NE is bed wetting associated with normal daytime urination.^{8,9} The final common pathway in physiological or mono-symptomatic NE is the inability to recognize the sensation of a full

bladder during sleep and a small functional bladder to awaken from sleep to urinate into the toilet. Both etiological factors may represent inherited normal variation, as the evidence for genetic predisposition is strong.^{4,9,10} Causes of NE may be a small bladder capacity, excessive output of urine during sleep due to inadequate anti-diuretic hormone production, anxiety events experienced by the child, genetic, upper airway obstruction such as enlarged tonsils or adenoid and less frequently structural problems in urinary tract or nervous system.^{4,9,10} Most studies have consistently found that the risk factors for nocturnal enuresis are male gender, low age and family history of nocturnal enuresis, divorced parents and deep sleep.^{2-4,6}

This study aimed to investigate the prevalence and associated factors of nocturnal enuresis among primary school children in Al-Eskan region, Makkah Al-Mokarramah, 2013.

MATERIALS AND METHODS

A cross sectional analytic study was carried out in Makkah AL-Mukarramah which is the holy capital of the Kingdom of Saudi Arabia located in the western region in area called Alhejaz. Makkah has three primary health care regions. Prince Ahmad is one of them where Al-Eskan region is located; there are 2 primary schools for males in AL-Eskan region. The study population included a representative random sample of male primary school children in AL-Eskan area. There are 1222 primary school male students in 2 governmental schools. The sample size was estimated to be 152 children using online sample size calculator from www.raosoft.com, with confidence level of 99%, prevalence of 15% and margin error of 7%. In order to compensate for dropout, 178 questionnaires were distributed. The sample size was obtained from one randomly chosen school named Al-Baraa Bin-Maleek primary school. It included 668 male children. Sample was chosen as a percentage proportionally related to the total number of the student in each grade. The number of students in each grade was obtained from one class; therefore, the required number of students was obtained from one randomly selected class. A self-administered questionnaire which was utilized for data collection; it was composed of three parts: personal information, information for nocturnal enuresis and information for possible associated factors. Questionnaires were distributed to the randomly chosen school children by the researcher, thereafter the selected children were given the questionnaire to be submitted to their parents. Parents were instructed to fill the questionnaire and return it back to the school. Questionnaires were collected in the second day. Bedwetting always or often was considered nocturnal enuresis (being dry for a maximum of two days/week) for the associated factors while bedwetting always, often or sometimes were considered for studying the impact of nocturnal enuresis on child and family. Primary nocturnal enuresis was defined as continuous wetting since early childhood till the time of the study i.e. urinary continence for a period of at least 6 months has never been accomplished.¹² Secondary nocturnal enuresis was considered when the child has been toilet trained for at least 6 months after the age of bladder control, and bladder control is subsequently lost.¹²

Data analysis was carried out using statistical package for the social sciences version 20 (SPSS 20) software. Descriptive statistics were performed in the form of frequencies and percentage. Analytic statistics were performed using chi-square

test to assess the association between nocturnal enuresis and other categorical risk factors. Fischer Exact test was applied in case of small frequencies in 2X2 contingency tables. Statistically significant was considered by p-value less than 0.05.

RESULTS

Out of 178 questionnaires distributed to school children, 152 questionnaires were returned completed giving a response rate of 85.4%. Their age ranged between 6 and 12 years with a mean of 9.5 and standard deviation of ± 1.8 years. The father's and mother's educational level were at least university among 59.9% and 52.6%, respectively. Eighteen children (11.8%) live with either father or mother only or other persons. The monthly income of the family was more than 10000 SR among 44.1% of the school children while it was less than 3000 SR among 13.2% of them. Almost two-thirds of them (64.5%) live in flat. Number of total rooms in the house was more than 4 among 71.1% of children while the number of bedrooms was more than 2 in 51.3% of them. Number of bathrooms was 4 or more among 25.7% of the participants. (Table 1)

Parental consanguinity was reported by 11.8% of the school children. As shown in figure 1, bedwetting was rarely reported by 15.8% of school children and sometimes by 7.9% of them. The prevalence of nocturnal enuresis among primary school children was 8.6% (history of bedwetting always or often and/or for more than two days per week). Among enuretic primary schoolchildren, nocturnal enuresis was considered primary in 84.6% while it was considered secondary in 15.4% of them.

As shown in table 2, dysuria, divided stream, haematuria, frequency, and day-time wetting of clothes were significantly associated with nocturnal enuresis. Although urgency was reported more among enuretics, it was not significantly associated with nocturnal enuresis. Weak stream was more reported among non-enuretics with no significant association with nocturnal enuresis.

From table 3, the highest prevalence of nocturnal enuresis was reported among schoolchildren aged 8 years (40%) followed by those aged 10, 11 and 9 years (11.1%, 10.7% and 8.7% respectively) while the prevalence was zero among those age 6, 7 and 12 years. This difference was statistically significant, $p < 0.005$. The prevalence of NE was higher among children who live with either father or mother alone or others than those living with both parents (27.8% versus 6%). This difference was statistically significant. Similarly, the prevalence of NE was higher among children with history of consanguinity among parents than those without parental consanguinity history (22.2% versus 6.7%). This difference was statistically significant, $p < 0.027$. Regarding family income, the highest prevalence of NE was reported among children with lowest family income (35%). The association between family income and history of NE was statistically significant ($p < 0.001$). Children whose fathers were illiterate or primary school educated showed higher prevalence of NE than those whose parents with at least university educated (50% versus 9.9%), $p < 0.001$. Children who had lower number of rooms at their house (≤ 4) showed higher prevalence of NE than those who had > 4 rooms (18.2% versus 4.6%), $p = 0.007$. Maternal educational level, type of housing, number of bedrooms and number of bathrooms were not significantly associated with history of NE among primary school children.

Table 1: Socio-demographic characteristics of the participants.

		Frequency	Percentage
Age	6	12	7.9
	7	19	12.5
	8	10	6.6
	9	23	15.1
	10	36	23.7
	11	28	18.4
	12	24	15.8
Paternal education	Illiterate/primary	8	5.3
	Intermediate/secondary	53	34.9
	University and above	91	59.9
Maternal education	Illiterate/primary	27	17.8
	Intermediate/secondary	45	29.6
	University and above	80	52.6
With whom you live?	Both parents	134	88.2
	Either father or mother or others	18	11.8
Family income (SR/month)	<3000	20	13.2
	3001-5000	23	15.1
	5001-10000	42	27.6
	>10000	67	44.1
Type of housing	Flat	98	64.5
	Villa	43	28.3
	Others	11	7.2
HOUSING DESCRIPTION			
Number of rooms	≤4	44	28.9
	>4	108	71.1
Number of bed rooms	≤2	74	48.7
	>2	78	51.3
Number of bathrooms	≤2	43	28.3
	3	70	46.1
	≥4	39	25.7

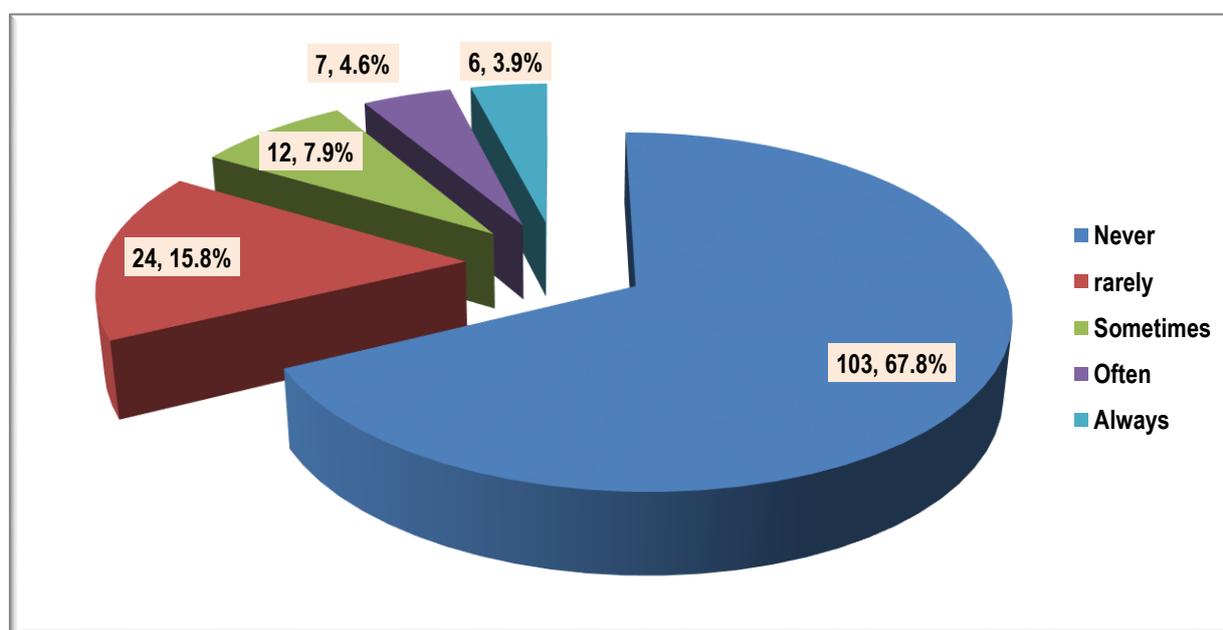


Figure 1: History of bedwetting among primary school children in Al-Eskan region, Makkah Al-Mokarramah.

Table 2: Association between different urinary symptoms and history of nocturnal enuresis among primary school children.

Urinary symptoms	Nocturnal enuresis		p-value
	No; (n=139); N (%)	Yes; (n=13); N (%)	
Dysuria	No (n=137)	132 (95.0)	<0.001*
	Yes (n=13)	6 (46.2)	
Weak stream	No	126 (90.6)	0.604**
	Yes	13 (100.0)	
Divided stream	No (n=121)	115 (95.0)	0.002*
	Yes (n=31)	24 (77.4)	
Haematuria	No (n=148)	139 (93.9)	<0.001**
	Yes (n=4)	0 (0.0)	
Frequency	No (n=74)	71 (95.9)	0.048**
	Yes (n=78)	68 (87.2)	
Urgency	No (n=54)	51 (94.4)	0.254**
	Yes (n=98)	88 (89.8)	
Day-time Wetting of clothes	No (n=105)	100 (95.2)	0.012*
	Yes (n=47)	39 (83.0)	

* Chi-square test

** Fisher's exact test

Table 3: Association between personal characteristics of schoolchildren and history of nocturnal enuresis.

Personal risk factors	Nocturnal enuresis		p-value
	No; (n=139)	Yes; (n=13)	
Child's age (years)	6 (n=12)	12 (100)	0.006*
	7 (n=19)	19 (100)	
	8 (n=10)	6 (60.0)	
	9 (n=23)	21 (91.3)	
	10 (n=36)	32 (88.9)	
	11 (n=28)	25 (89.3)	
	12 (n=24)	24 (100)	
With whom the child live	Both parents (n=134)	126 (94.0)	0.002*
	Either father or mother or others (n=18)	13 (72.2)	
Consanguinity	No (n=134)	125 (93.3)	0.028**
	Yes (n=18)	14 (77.8)	
Family income (SR/month)	<3000 (n=20)	13 (65.0)	<0.001*
	3001-5000 (n=23)	23 (100)	
	5001-10000 (n=42)	39 (92.9)	
	>10000 (n=67)	64 (95.5)	
Maternal education	Illiterate/primary (n=27)	23 (85.2)	0.433*
	Intermediate/secondary (n=4553)	42 (93.3)	
	University/above (n=80)	74 (92.5)	
Paternal education	Illiterate/primary (n=8)	4 (50.0)	<0.001*
	Intermediate/secondary (n=45)	53 (100)	
	University/above (n=80)	82 (90.1)	
Type of housing	Flat (n=98)	87 (88.8)	0.252*
	Villa (n=43)	41 (95.3)	
	Others (n=11)	11 (100)	
Number of rooms	≤4 (n=44)	36 (81.8)	0.007*
	>4 (n=108)	103 (95.4)	
Number of bed rooms	≤2 (n=74)	68 (91.9)	0.849*
	>2 (n=78)	71 (91.0)	
Number of bathrooms	≤2 (n=43)	39 (90.7)	0.967*
	3 (n=70)	64 (91.4)	
	≥4 (n=39)	36 (92.3)	

* Chi-square test

** Fisher's exact test

Table 4: Association between child's age of toilet training and history of nocturnal enuresis.

Age at toilet training	Nocturnal enuresis		p-value
	No; (n=139) N (%)	Yes; (n=13) N (%)	
18 months (n=36)	31 (86.1)	5 (13.9)	0.221*
2 years (n=47)	42 (89.4)	5 (10.6)	
2.5 years (n=27)	24 (88.9)	3 (11.1)	
3 years (n=31)	31 (100)	0 (0)	
> 3 years (n=11)	11 (100)	0 (0)	

* Chi-square test

** Fisher's exact test

Table 5: Association between child's history of organic diseases/health problems and history of nocturnal enuresis.

Organic diseases and health problems		Nocturnal enuresis		p-value
		No (n=139) N (%)	Yes (n=13) N (%)	
Recurrent UTI	No (n=148)	139 (93.9)	9 (6.1)	<0.001**
	Yes (n=4)	0 (0.0)	4 (100)	
Congenital defects	No (n=146)	133 (91.1)	13 (8.9)	0.579**
	Yes (n=6)	6 (100)	0 (0.0)	
Sickle cell anaemia (n=3)	No	137 (91.9)	12 (8.1)	0.237**
	Yes	2 (66.7)	1 (33.3)	
Mental retardation	No (n=152)	139 (91.4)	13 (8.6)	NA
	Yes (n=0)	0 (0.0)	0 (0.0)	
Psychological problems	No (n=152)	139 (91.4)	13 (8.6)	NA
	Yes (n=0)	0 (0.0)	0 (0.0)	
Diabetes mellitus	No (n=152)	139 (91.4)	13 (8.6)	NA
	Yes (n=0)	0 (0.0)	0 (0.0)	
Head trauma	No (n=149)	136 (91.3)	13 (8.7)	0.763**
	Yes (n=3)	3 (100)	0 (0.0)	
Epilepsy	No (n=152)	139 (91.4)	13 (8.6)	NA
	Yes (n=0)	0 (0.0)	0 (0.0)	
Constipation	No (n=136)	125 (91.9)	11 (8.1)	0.409**
	Yes (n=16)	14 (87.5)	2 (12.5)	
Stool incontinence	Never (n=142)	134 (94.4)	8 (5.6)	<0.001**
	Sometimes (n=10)	5 (50.0)	5 (50.0)	
Allergic rhinitis	No (n=122)	112 (91.8)	10 (8.2)	0.493**
	Yes (n=30)	27 (90.0)	3 (10.0)	

NA: not applicable

* Chi-square test

** Fisher's exact test

As shown in table 4, there was no significant association between child's age of toilet training and history of nocturnal enuresis.

As illustrated in table 5, all children with history of recurrent urinary tract infection (UTI) compared to only 6.1% of those without such history had NE. This difference was statistically significant, $p < 0.001$. Half of children who reported stool incontinence sometimes compared to 5.6% of those who never had stool incontinence, had NE. This difference was statistically significant, $p < 0.001$. Other studied variables such as organic diseases and health problems were not significantly associated with NE.

As evident in table 6, children who reported parental separation had NE compared to those without history of parental separation (33.3% versus 5.8%). This difference was statistically significant. Children who reports a history of changing home or school had higher prevalence of NE than those who did not change home or

school (17.5% versus 5.4%, $p < 0.0178$). School children who reported loss of admirable person had NE more than those who had not such history (26.9% versus 4.8%, $p < 0.001$). Children who reported acute psychological or social family problem had higher prevalence of NE compared to those without such history (35.7% versus 5.8%). This difference was statistically significant, $p < 0.001$. Children who reported nocturnal enuresis among siblings had significant higher rate of NE than those who did not report this history (20% versus 6.3%, $p = 0.025$). Histories of having new sibling, separation from mother for more than one month, hospitalization and surgery were not significantly associated with NE.

As shown in table 7, the habit of often eating chocolate during or after dinner was significantly associated with history of NE. NE was reported among 60% of them compared to only 4.8% of those

who never eat chocolate during or after dinner, $p < 0.001$. Similarly, the intake of fast foods was significantly associated with NE, $p < 0.001$. Habits of intake of beverages, coffee or tea during or after dinner were not significantly associated with history of NE. Less than half (46.2%) of enuretic children reported affection of self-confidence. None of the them reported affection on school performance and more than half of enuretic children (53.8%) did not report parental punishment while 23.1% reported punishment sometimes and only one child (7.7%) reported often parental

punishment. Among more than one-third (36.2%) of primary school children, mothers filled the questionnaire while among 40.8% of them, both parents shared in filling the questionnaire. All parents (100%) claimed that they want to treat their children by a specialist. Among children with a history of bedwetting, only parents of two children (4.1%) tried herbal and traditional medicine for treatment of bedwetting among their children and another 2 parents (4.1%) reported medical consultation. No treatment was prescribed for any cases.

Table 6: Association between child's familial/social risk factors and history of nocturnal enuresis.

Familial/social risk factors (in the past 6 years)	Nocturnal enuresis		p-value	
	No; (n=139)	Yes; (n=13)		
Having new sibling	No (n=55)	51 (92.7)	4 (7.3)	0.461**
	Yes (n=97)	88 (90.7)	9 (9.3)	
Parental separation	No (137)	129 (94.2)	8 (5.8)	<0.001*
	Yes (n=15)	10 (66.7)	5 (33.3)	
Separation from mother for more than one month	No (n=144)	133 (92.4)	11 (7.6)	0.141**
	Yes (n=8)	6 (75.0)	2 (25.0)	
Changing home or school	No (n=112)	106 (94.6)	6 (5.4)	0.018*
	Yes (n=40)	33 (82.5)	7 (17.5)	
Hospitalization	No (n=147)	134 (91.2)	13 (8.8)	0.636**
	Yes (n=5)	5 (100)	0 (12.8)	
Surgery	No (n=135)	123 (91.1)	12 (8.9)	0.559**
	Yes (n=17)	16 (94.1)	1 (5.9)	
Loss of admirable person	No (n=126)	120 (95.2)	6 (4.8)	<0.001*
	Yes (n=26)	19 (73.1)	7 (26.9)	
Acute psychological or social family problem	No (n=138)	130 (94.2)	8 (5.8)	<0.001
	Yes (n=14)	9 (64.3)	5 (35.7)	
Nocturnal enuresis among siblings	No (n=127)	119 (93.7)	8 (6.3)	0.025*
	Yes (n=25)	20 (80.0)	5 (20.0)	

* Chi-square test

** Fisher's exact test

Table 7: Association between child's habitual factors and history of nocturnal enuresis.

Habitual factors	Nocturnal enuresis		p-value	
	No; (n=139)	Yes; (n=13)		
Eating chocolate during or after dinner	Never (63)	60 (95.2)	3 (4.8)	<0.001*
	Sometimes (n=84)	77 (91.7)	7 (8.3)	
	Often (n=5)	2 (40.0)	3 (60.0)	
Beverage intake during or after dinner	Never (n=80)	72 (90.0)	8 (10.0)	0.818*
	Sometimes (n=65)	60 (92.3)	5 (7.7)	
	Often (n=4)	4 (100)	0 (0.0)	
Coffee intake during or after dinner	Never (n=145)	132 (91.0)	13 (9.0)	0.528**
	Sometimes (n=7)	7 (82.5)	0 (0.0)	
Tea intake during or after dinner	Never (n=135)	122 (90.4)	13 (9.6)	0.409*
	Sometimes (n=14)	14 (100)	0 (0.0)	
	Often (n=3)	3 (100)	0 (0.0)	
Intake of fast foods	Never (n=38)	37 (97.4)	1 (2.6)	<0.001*
	Sometimes (n=75)	74 (98.7)	1 (1.3)	
	Often (n=15)	10 (66.7)	5 (33.3)	
	Always (n=24)	18 (75.0)	6 (25.0)	

* Chi-square test

** Fisher's exact test

DISCUSSION

Nocturnal enuresis is a common world-wide medical and psychological problem among school age children.^{13,14} Although seems to be ordinary, this disease is crucial to be diagnosed and treated as soon as possible, as it can result in some psychological consequences, such as low self-esteem.¹⁵ Low self-esteem is seen in various psychiatric disorders. There are concerns that low self-esteem, if present in enuretic children, might be an indicator of present and possible later psychological dysfunction. Social factors associated with nocturnal enuresis could lead to a child experiencing a feeling of failure, with lower self-esteem.¹⁶

In our study the overall frequency of nocturnal enuresis was 8.6%, a comparable rate to other reports in the literature.¹⁷⁻²¹ The frequency of reported nocturnal enuresis depends on its definition. In this study we included primary-school children with leakage of urine always or often at least once a week.

In one study conducted in the UK the overall prevalence of reported nocturnal enuresis was 18.9% but the value was reduced to 5.1% when the inclusion criteria were weekly incidences.¹⁷ Demographic studies report a prevalence of nocturnal enuresis in at least 5%–10% of 6- to 7-year-old children, most often boys, in Sweden.¹⁸ In Saudi Arabia, the overall frequency of nocturnal enuresis was reported as 15% between 6 and 11 years school children.²² Another study in north-west Turkey among primary-school children indicated that the rate of nocturnal enuresis prevalence was 8.9% overall.²³ In that study, primary nocturnal enuresis was defined as bed wetting at least once a week in a child who had never had night-time bladder control for 6 months or more.²⁰ A questionnaire survey in the United Arab Emirates reported a prevalence of 5.5% among 6–12-year-olds. The researchers suggested that the low rate observed could be due to the fact that the proportion of younger children in their sample was small, coupled with the use of questionnaires rather than interviews. It may be that the parents place less emphasis on the problem when a questionnaire is used.²¹

The high prevalence of primary nocturnal enuresis in the current study was consistent with results from other studies.^{22,24,25} However, the prevalence of 15.4% of secondary nocturnal enuresis in the present study is lower than 20.4% reported by Kalo²² and comparable with 16.8% reported by Al-Naqeeb.²⁵ This difference could be explained by the different criteria and age group used in these studies. A period of three months of dry was required to define secondary nocturnal enuresis in the study done by Al-Naqeeb²⁵ while a period of 6 months has been considered in Kalo study²² as well as in the current study.

Previous studies demonstrated that the prevalence of nocturnal enuresis tended to decrease with increasing age.^{2,20} In the present study, 40% of the children were wetting their bed at age 8 whereas 10.7% of them were wetting their bed at age 11. As nocturnal enuresis is mostly expected to improve spontaneously, its decrease with age is thought to be mostly due to spontaneous improvement.²⁰

Factors such as diet rich in fluid and fluid intake habits are contributing factors in nocturnal enuresis.²⁶ The diuretic activity of caffeine is well documented. The US Food and Drug Administration (FDA) regulations permit caffeine to be added at up to 6mg / fluid ounce (fl oz) of soft drinks. Most marketed soft drinks contain 2.5–5mg/fl oz. So, a typical 12-oz can contain 30–60 mg, with a maximum of 72 mg of caffeine per can. A pharmacologic

dose of caffeine is approximately 2 mg / kg. Thus, a 30 kg child receives a pharmacologic dose of caffeine in each 12 oz can of caffeinated soft drink. People aged 12 to 24 years consume most soft drinks, whereas those aged 6 to 11 years are a close second. Chocolate and Cocoa also contain caffeine. Most patients who have failed previous treatment, state that they have not been advised medically to give up caffeine or at least consume a moderate amount of caffeine.²⁶ In accordance with that, the current study proved that the habit of eating chocolate during or after dinner was significantly associated with nocturnal enuresis. However, coffee and tea intake during or after dinner were not significantly associated with NE, most probably due to low consumption of these substances at this young age.

The present results also showed that separated parent and loss of admirable person were important factor associated with nocturnal enuresis. Our results correspond with those of the studies in Taiwan and Turkey.^{2,27}

In this study, nocturnal enuresis among siblings was a significant risk factor for NE; this is similar to other studies.^{2,3,22,27-32}

In our study, there was no relationship between the nocturnal enuresis prevalence and the educational level of the mother while it is more reported among children of low educated fathers. The same finding has been reported by Tait et al.³² Spee-Van der Wekke found that the educational level of parents was not significantly related to the prevalence of nocturnal enuresis.³³ Similarly, Gunes et al reported no relationship between the nocturnal enuresis prevalence and the educational level of the father and mother.³⁴ In Turkey, Gumus et al. showed that the low educational level of parents was associated with nocturnal enuresis.³⁵ Ozden et al. also showed that low education level were significantly associated with nocturnal enuresis.² Moreover, we found that low socio-economic status of the family (manifested by low income and less number of rooms) was associated with nocturnal enuresis. Chiozza et al. found that the prevalence of nocturnal enuresis was higher in families of low socioeconomic class.³⁶

We found association between nocturnal enuresis and history of recurrent urinary tract infections [UTI] and stool incontinence in this study. Gunes et al in Turkey reported an association between RUTI and constipation with nocturnal enuresis.³⁴ Kajiwara et al. also found that children with a history of cystitis had a significantly higher rate of nocturnal enuresis than children without such a history.³⁷ Ozden et al found that recurrent UTI were significantly higher in enuretics when compared to non-enuretics.² The reason or this is not clear. However, it has been suggested that the strong contraction of the proximal urethra and pelvic floor muscles might cause UTI by leading to urethrovesical reflux of bacteria in the proximal urethra.²² Pelvic floor over activity and bladder dysfunction are thought to simultaneously cause over constriction of the anal sphincter resulting in constipation.³⁷ Inan et al also found that constipation was more frequent in enuretics.³⁸ In accordance with other investigators,³⁹ constipation in the present study was not associated with nocturnal enuresis. This finding indicates that parental reporting may be unreliable, since parents poorly recognize constipation in their children with nocturnal enuresis.⁴⁰

In other epidemiologic studies,^{2,20,38,41} poor school performance was significantly associated with nocturnal enuresis. In the current study, we failed to confirm such association.

In this study, 6 (46.2%) children used to receive physical punishment by their parents. This result was higher than the fourteen percent reported by Hazza et al³ and Bourquia et al who reported 15%.²⁸ However, it is lower than that reported by Taha et al (61.5%).⁴² This finding reflected the lack of education and awareness of the parents about their child's problem. This was also evident in the low percentage of enuretic patients who consult medical advice (4.1%). Wen et al reported only 6% of the 411 primary nocturnal enuresis children had sought professional help.³⁰

There are some limitations of our study. Questionnaires were filled in children's homes by their parents. This might raise questions about objectivity of results. Parents might have given false information their children's bedwetting, bowel habits, a reusability. The present study was limited to only one gender and one school. Furthermore, we did not consider the severity of nocturnal enuresis and related factors. Final limitation is the cross-sectional setting, which means that we cannot predict how these risk factors change the outcome through time.

In summary, the prevalence rates for nocturnal enuresis among primary school children at Al-Eskan region in Makkah Al-Mukarramah, KSA was comparable with other studies from Saudi Arabia and worldwide. The majority of cases were primary NE.

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