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## Prevalence and Risk Factors of Nocturnal Enuresis in a Rural Area of Assiut Governorate

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### Abstract:

*Nocturnal enuresis is a common problem that can be troubling for children and their families. Nocturnal enuresis is the involuntary and undesirable wetting that occurs during sleep beyond the age of anticipated bladder control. Children are not considered enuretic until they have reached five years of age. Although comparison of studies are difficult because of variation in the definition of enuresis and in the age range of population studied, true geographical differences in prevalence and in natural history of enuresis seem to exist, arising from racial, cultural, or environmental factors. The literatures about the prevalence of enuresis in rural areas of Assiut governorate are limited. The aim of the study is to evaluate the prevalence of nocturnal enuresis among children aged 5-12 years old in a rural area of Assiut governorate, this is in addition to study risk factors associated with nocturnal enuresis among enuretic children in this rural area. A cross-sectional community-based study was carried out in Mankabad village. A total of 592 houses were visited. All eligible children (5-12 years) in the selected houses were included. The first house was selected randomly, and then every third house of the village was included. A well-designed questionnaire was used for data collection. The questionnaire sheet was developed to assess the prevalence and risk factors of nocturnal enuresis among children. This study included 1148 children distributed in 592 houses in Mankabad village. The prevalence of enuresis was found to be 17.8%. Diurnal as well as nocturnal enuresis occurs in 19.6% of the enuretic group. The most frequent cause of nocturnal enuresis expected by the mother was deep sleep (24.5%), followed by urinary tract infection (13.7%). As regards the dealing of the families with the problem of nocturnal enuresis, 15.7% mentioned that they consult others and about 29.4% consult a physician, 30.4% punish their children, while 24.4% do nothing. The prevalence of enuresis was insignificantly higher in males (51.9%) than females (48.1 %) ( $P= 0.209$ ). The mean age of enuretic children ( $5.9 \pm 2.1$ ) years is significantly lower than that of non-enuretic children ( $8.7 \pm 2.2$ ) years ( $P<0.001$ ). Birth order has no significant effect on the prevalence of enuresis. The prevalence of enuresis was significantly higher among children of illiterate fathers than among those of educated fathers ( $P=< 0.05$ ), also maternal education has the same effect ( $P= <0.05$ ). Enuresis history in the father and the mother is significantly associated with enuresis among children included in the study ( $P< 0.001$  for each). The prevalence of enuresis is significantly lower among children with high socioeconomic status (11.7%) than those of low socioeconomic status (32.4%) ( $P=0.001$ ). An insignificant difference was present between the enuretics and non-enuretics as regards presence or absence of family troubles. . The prevalence of enuresis is significantly associated with the presence of some urinary symptoms such as dysuria, stress incontinence, and urgency ( $P<0.001$  for each). Also, it is significantly associated with some bowel disorders as constipation and encopresis ( $P<0.001$  and  $< 0.001$ ).*

**Conclusions:** *The prevalence of NE in rural area of Assiut governorate is slightly higher than some other areas of the world. The low socioeconomic factors, low educational level and positive history of enuresis in the father or the mother may share in the problem. Urinary and GIT troubles may share in the pathogenesis of NE. The psychological factors were insignificantly sharing in the problem of NE but it may be a result of punishment and family comments.*

**Abbreviations:** NE: nocturnal enuresis, PNE: primary nocturnal enuresis, GIT: gastrointestinal tract, EEG: electroencephalogram.

### Introduction:

Nocturnal enuresis is a common problem, affecting an estimated 5 to 7 million children in the United States and occurring three times more often in boys than in girls.<sup>1</sup>

Nocturnal enuresis is a common problem that can be troubling for children and their families.<sup>2</sup> Nocturnal enuresis is the involuntary and undesirable wetting that occurs during sleep beyond the age of anticipated bladder control.<sup>3</sup>

Children are not considered enuretic until they have reached five years of age. Mentally disabled children should have reached a mental age of four years before they are considered enuretic. For the diagnosis of nocturnal enuresis to be established, a child five to six years old should have two or more bed-wetting episodes per month, and a child older than six years of age should have one or more wetting episode per month<sup>2</sup>.

The International Children's Continence Society<sup>4</sup> has recommended the following standardizations for nocturnal enuresis classification:

- According to time of day: nocturnal and diurnal.
- According to presence of other symptoms: mono-symptomatic or poly-symptomatic.
- According to previous periods of dryness: primary enuresis: bed-wetting in a child who has never been dry, or secondary enuresis: bed-wetting in a child who has had at least six months of nighttime dryness.

Although comparison of studies are difficult because of variation in the definition of enuresis and in the age range of population studied, true geographical differences in prevalence and in natural history of enuresis seem to exist, arising from racial, cultural, or environmental factors.<sup>5</sup> The literature about the prevalence of enuresis in rural areas of Assiut governorate are limited.

The aim of the study is to evaluate the prevalence of nocturnal enuresis among children aged 5-12 years old in a rural area of Assiut governorate (Mankabad village), this is in addition to study risk factors associated with nocturnal enuresis among enuretic children in this rural area.

## Subjects and Methods:

A cross-sectional community-based study was carried out in Mankabad village (a village located 7 kilometers north to Assiut city). List of all houses of the village was obtained from the Rural Health Unit. A total of 592 houses were visited. All eligible children (5-12 years) in the selected houses were included. The first house was selected randomly, and then every third house of the village was included.

A well-designed questionnaire was used for data collection. The questionnaire sheet was developed to assess the prevalence and risk factors of nocturnal enuresis among children. The questionnaire includes the following:

- Socio-demographic data e.g. parent's education, socioeconomic status....etc
- Child characteristics: age, sex, birth order .....etc.

### Data collection technique:

A structured interview was conducted with the caregiver of children to collect the required data.

The socio-economic level of the child was calculated using the socio-economic score prepared by Abd El-Twab.<sup>6</sup> It contains four main variables, the educational level and job of both parents, the family income and the life style of the family. Each main variable involve a set of levels. The levels are weighted on a graded scale starting with number one and ending by a number corresponding to the rank of this level.

## Statistical Analysis:

Collected data was coded and verified prior to computerized data entry. The Statistical Package for Social Science (SPSS), version (9) was used for data entry and analysis. Descriptive statistics was calculated (e.g. frequency, percentage, mean and standard deviation). Quantitative continuous data was compared using Student t-test in case of comparisons, while qualitative variables were compared using chi-square test. A significant P-value was considered positive if less than 0.05.

## Results:

This study included 1148 children distributed in 592 houses in Mankabad village. Table I shows the prevalence, characters of nocturnal enuresis and behavior of the family against the problem. The prevalence of enuresis was found to be 17.8%. About 42.2% of enuretic children wet their bed three nights or less per week, whereas 31.3% of them wet their beds 4-5 nights per week while the rest of the group (26.5%) were daily wetted. The mean age at which non-enuretic children control their urination was  $4.3 \pm 1.9$  years. About 55% of enuretic children may urinate more than one time per night and about one fifth of them have diurnal enuresis. Diurnal as well as nocturnal enuresis occurs in 19.6% of the enuretic group. The amount of voided urine was reported to be large in one fourth of enuretic children and small in about 60% of them. Secondary type of enuresis was found among 20.5% of enuretic children. By asking the caregiver of children how to deal with the problem of nocturnal enuresis, 15.7% mentioned that they consult others and about 29.4% consult a physician, 30.4% punish their children, while 24.4% do nothing. The most frequent cause of nocturnal enuresis expected by the mother was deep sleep (24.5%), followed by urinary tract infection (13.7%).

Table II shows some demographic characters of enuretics and non-enuretics. The prevalence of enuresis was not significantly higher in males (51.9%) than females (48.1 %) ( $P= 0.209$ ). As the age of the child increases, the prevalence of enuresis is significantly decreased ( $P<0.001$ ), and the mean age of enuretic children ( $5.9 \pm 2.1$ ) years is significantly

Table I: Prevalence ,characters of nocturnal enuresis and behavior of the family against the problem

Item	Frequency (%)
<b>Prevalence of enuresis (n=1148):</b>	
- Enuretics	204(17.8)
- Non- enuretics	944 (82.2)
<b>Number of wet nights per week (n= 204):</b>	
- 3 nights or less	86 (42.2)
- 4 - 5 nights	64 (31.3)
- 6 - 7 nights	54 (26.5)
<b>Mean ± SD</b>	4.4 ± 1.8
<b>The age at which the child control his urination (944):</b>	
- 1.5 - <3 years	45(4.7)
- 3 - <4 years	144(15.3)
- 4 years	387 (40.9)
- >4 years	368 (39.1)
<b>Mean ± SD</b>	4.3 ± 1.9
<b>Does the child urinate &gt; 1 times per night (n =204):</b>	
- Yes	112 (54.9)
- No	92 (45.1)
<b>Diurnal enuresis (n =204):</b>	
- Yes	40 (19.6)
- No	164(80.4)
<b>Amount of voided urine(n =204):</b>	
- Large	50(24.5)
- Medium	32(15.7)
- Small	122 (59.8)
<b>Secondary enuresis (n =204):</b>	
- Yes	42 (20.5)
- No	162 (79.5)
<b>How to deal with the problem of nocturnal enuresis (n = 204):</b>	
- Consult others	32(15.7)
- Consult a physician	60(29.4)
- Punishment	62(30.4)
- No thing	50 (24.5)
<b>What are the causes of nocturnal enuresis (n =204):</b>	
- UT infection	28(13.7)
- Playing for long times	12(5.9)
- Deep sleep	50 (24.5)
- Do not know	78 (38.2)
- Others	36 (17.6)

Table II: Some demographic characters of enuretics and non-enuretics groups

Characteristics	Enuretics No. (R%)	Non enuretics No. (R%)	Total No. (C%)
<b>Sex:</b>			
- Male	106 (51.9)	426 (45.1)	532 (46.3)
- Female	98 (48.1)	518 (54.9)	616 (53.7)
<b>P – value</b>	0.209		1148 (100.0)
<b>Age groups:</b>			
- 5- 6 years	102 (50.0)	214 (22.7)	316 (27.5)
- 7 -8 years	48 (23.5)	290 (30.7)	338(28.6)
- 9 – 10 years	32 (15.7)	202 (21.3)	234 (20.4)
- 11- 12 years	22(10.8)	238 (25.3)	260(22.6)
<b>P – value</b>	<0.001		1148 (100.0)
<b>Mean age of child (± SD)</b>	5.9 ± 2.1	8.7 ± 2.2	8.5 ± 2.3
<b>P – value</b>	<0.001		
<b>Birth order:</b>			
- 1st – 2nd	110 (53.9)	496 (52.5)	606 (52.8)
- 3rd- 4th	76 (27.3)	308 (32.6)	384 (33.4)
- > 4th	18(8.8)	140(14.9)	158 (13.8)
<b>P – value</b>	0.251		1148 (100.0)

Table III: The studied characters in enuretics and non enuretics groups

Characteristics	Enuretics No. (R%)	Non enuretics No. (R%)	Total No. (C%)
<b>Father education:</b>			
- Illiterate	58 (28.4)	146(15.5)	204 (17.8)
- Read and write / 1ry education	42(20.5)	216 (22.8)	258 (22.4)
- Secondary and higher education	104 (50.9)	582 (61.7)	686(59.8)
<b>P – value</b>	<0.05		1148 (100.0)
<b>Mother education:</b>			
- Illiterate	74 (36.3)	238(25.2)	312 (27.2)
- Read and write / 1ry education	50 (24.5)	218 (23.1)	268(23.3)
- Secondary and higher education	80 (39.2)	488 (51.7)	568 (49.5)
<b>P – value</b>	<0.05		1148 (100.0)
<b>Enuresis history in the father:</b>			
- Yes	8 (3.9)	8 (0.8)	16 (1.4)
- No	62 (30.4)	506 (23.1)	568 (49.5)
- Do not know	134(65.7)	430(51.7)	564 (49.1)
<b>P – value</b>	<0.001		1148 (100.0)
<b>Enuresis history in the mother:</b>			
- Yes	12 (5.9)	25 (2.7)	37 (3.3)
- No	72(35.3)	513 (54.4)	585(50.9)
- Do not know	120 (58.8)	406(43.0)	526 (45.8)
<b>P – value</b>	<0.001		1148(100.0)
<b>Socio-economic status:</b>			
- High	24 (11.7)	238(25.2)	262 (19.3)
- Middle	114 (55.9)	516 (54.7)	630 (58.4)
- Low	66 (32.4)	190(20.1)	256 (22.3)
<b>P – value</b>	<0.001		1148 (100.0)
<b>Family troubles:</b>			
- Yes	82(41.4)	71(7.6)	153(13.3)
- No	122(58.6)	873(92.4)	995(86.7)
<b>P – value</b>	<0.08		1148(100.0)

Table IV: Prevalence of some urinary and G.I.T. symptoms in enuretics and non-enuretics groups

Characteristics	Enuretics No. (R%)	Non enuretics No. (R%)	Total No. (C%)
<b>Dysuria:</b>			
- Yes	60 (29.5)	2 (0.2)	62 (5.4)
- No	144 (70.5)	942 (99.8)	1086(94.5)
<b>P – value</b>	<0.001		1148 (100.0)
<b>Presence of stress incontinence:</b>			
- Yes	76(37.2)	34(3.6)	110 (9.5)
- No	68 (33.3)	534 (56.6)	602 (52.5)
- Do not know	60 (29.4)	376(29.8)	436(37.9)
<b>p- value</b>	<0.001		1148(100.0)
<b>Urgency:</b>			
- Yes	88 (43.2)	27 (2.9)	115(10.0)
- No	74 (36.2)	844(89.4)	918 (80.0)
- Do not know	42 (20.6)	73 (7.7)	115(10.0)
<b>p- value</b>	<0.001		1148 (100.0)
<b>Constipation due to infrequent stools:</b>			
- Yes			
- No	42(20.6)	22 (2.3)	64 (5.6)
- Do not know	128 (62.7)	862 (91.3)	990 (86.2)
	34(16.7)	60(6.4)	94(8.2)
<b>p- value</b>	<0.001		1148 (100.0)
<b>Presence of encopresis:</b>			
- Yes	4(2.0)	0 (0.0)	4(0.3)
- No	200 (98.0)	944 (100.0)	1144 (99.7)
<b>P-value</b>	0.001		1148 (100.0)

Table V: Logistic regression analysis for variables related to nocturnal enuresis

Variables	Significance	Exp. (B)
- Socio-economic status	0.2817	0.7420
- Education of the father	0.1023	1.3926
- Age of the child	<0.001	1.7037
- Enuresis history in the father	<0.001	0.2211
- Enuresis history in the mother	<0.001	3.6369
- Stress incontinence	<0.05	1.4569
- Urgency	<0.001	3.2817
- Constipation due to hard stools	<0.05	0.3379

lower than that of non-enuretic children ( $8.7 \pm 2.2$ ) years ( $P < 0.001$ ). Birth order had no significant effect on the prevalence of enuresis.

Table III shows the studied characters in enuretics and non-enuretics. The prevalence of enuresis was significantly higher among children of illiterate fathers than among those of educated fathers ( $P < 0.05$ ), also maternal education had the same effect ( $P < 0.05$ ). Enuresis history in the father and the mother is significantly associated with enuresis among children included in the study ( $P < 0.001$  for each). The prevalence of enuresis is significantly lower among children with high socioeconomic status (11.7%) than those of low socioeconomic status (32.4%) ( $P = 0.001$ ). A non significant difference was present between the enuretics and non-enuretics as regards presence or absence of family troubles.

Table IV shows the prevalence of some urinary and G.I.T. symptoms in enuretics and non-enuretics. The prevalence of enuresis is significantly associated with the presence of some urinary symptoms such as dysuria, stress incontinence, and urgency ( $P < 0.001$  for each). Also, it is significantly associated with some bowel disorders as constipation and encopresis ( $P < 0.001$  and  $0.001$ ).

Table V shows logistic regression analysis for variables related to enuresis. By use of logistic regression analysis, the only significant variables associated with nocturnal enuresis were younger age of the child, presence of urgency, enuresis history in the mother and the father, presence of stress incontinence and constipation.

## Discussion:

Although nocturnal enuresis is a common problem in childhood and leads to much troubles for children and their families, and in spite of many advances concerning the etiology and pathogenesis of enuresis have been made during the last two decades much controversy remains.<sup>7</sup> The prevalence of enuresis varies widely in various countries.<sup>8</sup> These differences between countries may arise from factors such as cultural, racial, environmental, and socio-economic conditions. However, there may be also artifact, depending on different criteria and different age groups. The prevalence of enuresis in the present study was found to be 17.8% among children aged 5-12 years (table I). It is higher than some other studies as, the prevalence of enuresis in Anatolia (a city in Turkey) was reported to be 11.6% in school children.<sup>9</sup> Another study in Turkey showed that the overall incidence of NE was 12.4%,<sup>10</sup> and in the USA nocturnal enuresis was reported to be approximately 18% in 8-year-old children, 7% in 11-year-old children, 0.7% in 17-year-old adolescents and 14%

overall.<sup>11</sup> In Assiut city, the prevalence of enuresis among first rank primary school children (6-7 years old) was found to be 20.2%.<sup>12</sup> The prevalence of NE in rural area of Assiut governorate is slightly more than some other areas of the world. It may be explained by the risk factors present as the presence of history of nocturnal enuresis in fathers and mothers, where consanguineous marriage in our locality may hasten the genetic basis of this disease. Also, the low socioeconomic factors, low educational level may share in the problem.

While there are numerous theories outlining the specific cause or risk factors of NE, many etiologic factors are generally recognized and accepted. Conversely, many of these continue to be a cause for debate among practitioners.<sup>8</sup>

In this study, low educational level of parents and low socio-economic status was significantly associated with the presence of nocturnal enuresis among children under study (table III). Nearly similar results were reported from other parts of the world such as Turkey,<sup>8,9,10,13</sup> Jamaica,<sup>14</sup> Malaysia,<sup>15</sup> and Australia.<sup>16</sup> In the present study, presence of nocturnal enuresis among children under study was significantly associated with family history of enuresis among fathers and mothers (table III). It is well known that there is a greater incidence of PNE in children whose parents were enuretic compared to those families with no parental history. If both parents were bed-wetters, their children have a 77% chance of having NE; and if only one parent had been enuretic, the incidence drops to 43%.<sup>17</sup> Recent research describes a molecular genetic heterogeneity to primary nocturnal enuresis. This genetic link is consistent with the chromosomes 13q and 12q.<sup>18,19</sup> Identification and gene characterization for PNE could lead to a better understanding of the complexity of urination and NE and subsequent management and treatment.<sup>19</sup>

In the present study, significant differences were present between enuretic and non-enuretics as regards the presence of dysuria, stress incontinence and urgency. Also, the amount of voided urine was small in 59.8% of enuretic group and this may direct the attention to bladder instability and /or small bladder capacity (table IV). Studies attempting to establish bladder problems as the cause of nocturnal enuresis have been controversial. Extensive urodynamic testing has shown that bladder function falls within the normal range in children with nocturnal enuresis.<sup>20</sup> However, one investigator<sup>21</sup> found that while real bladder capacity is identical in children with and without nocturnal enuresis, functional bladder capacity (the volume at which the bladder empties itself) may be less in those with enuresis. Bed-wetting occurs when functional bladder capacity is reached.<sup>22</sup>

Children who wet the bed are often believed to have a reduced bladder capacity. This premise is based on the idea that the bladder is too small to hold all the urine that is produced at night. Urodynamic studies indicate that children with NE exhibit frequent uninhibited bladder contractions and a lower functional bladder capacity than their non-enuretic counterparts.<sup>23,24</sup> Conversely, another study revealed that bladder instability was found in only 15% of patients with isolated NE, when compared to 97% having both diurnal and nocturnal enuresis.<sup>25</sup> Rushton<sup>26</sup> noted that, upon reviewing many of the studies citing abnormal urodynamic findings in children with NE, it appears that many have included patients with noticeable daytime voiding abnormalities (including urgency, frequency, and diurnal enuresis) or with other neurologic or urologic abnormalities including urinary tract infection.<sup>27</sup> Norgaard and colleagues<sup>28,29</sup> published findings that sleep cystometries failed to equate NE with unstable bladder contractions or a reduction in bladder capacity.

Diurnal incontinence may range from a small spot of urine in the underwear, a constant leakage of urine, or a complete loss of bladder control. Diurnal incontinence may or may not be associated with other symptoms indicative of urgency and/or frequency.<sup>30</sup>

In the present study, there were significant differences between enuretic and non-enuretics as regards the presence of constipation (table IV). Constipation and/or encopresis (fecal incontinence) is a significant factor relating to nocturnal enuresis and incontinence in general. One study shows that between 10% and 25% of enuretics also suffer from encopresis. While nocturnal enuresis happens at night, encopresis most often occurs during the day. When the rectum is distended from constipation, it presses on the bladder wall and produces outflow obstruction that may lead to bladder instability.<sup>31</sup> Loening-Baucke<sup>32</sup> found that 34% of children with constipation and/or encopresis had nighttime wetting. Following the treatment and resolution of the constipation, the percentage of those still wetting the bed decreased to 12%. Needless to say, constipation issues should be addressed in conjunction with managing NE.

The role of sleep disorders in enuresis has long been controversial.<sup>17</sup> In the present study, deep sleep occurs in 24.5% of enuretic group (table I). Many parents will describe their child with NE as being a "deep sleeper" and are confident that the inability to awaken to a full bladder is the cause of the bed-wetting.<sup>7</sup> Wille<sup>33</sup> discussed an alteration in arousal from sleep in response to the sensation of a full bladder. He explained further that enuretics sleep normally but suffer from an arousal disorder. Others,

however, have argued that this finding is an observation bias and that, if parents were to wake their children without enuresis, they would find them equally difficult to arouse. To test this hypothesis, careful observation, monitoring of multiple parameters, sleep EEG monitoring and urodynamic testing are necessary. Bed-wetting occurred during the deep sleep stages or when transitioning from one sleep stage to another. This presumption was based on the theory that the enuretic demonstrates a lack of inhibitory cerebral control of reflex voiding during deep sleep.<sup>3</sup> Obstructive sleep apnea syndrome (OSAS) is a prevalent and potentially serious problem. Occasionally NE is an associated issue. Several case studies have reported the cessation of NE with the surgical removal of the obstructing lesion (adenotonsillectomy) or treatment with continuous positive airway pressure.<sup>34</sup>

In the present study, family troubles occur in 41.4% of the enuretic group but the difference was not significant between the enuretic and non-enuretic groups (table III). The question of whether psychological disturbances are a causative factor for NE is yet another controversial topic.<sup>35</sup> It was reported that most enuretic children are well-adjusted and belong to a loving family.<sup>35</sup> Jalkut et al,<sup>3</sup> stated that achieving nocturnal urinary control is a normal part of a child development and may be delayed by non-organic internal and external factors. Enuresis therefore can be thought of as a maturational arrest. Disturbances as stress and social pressures have been associated with delayed development. Enuresis, in its own entity, can result in psychological, individual and interpersonal distress. Children with NE are labeled, teased and sometimes punished. The shame and embarrassment they feel may be exhibited in behaviors that may cause some to think that there is a psychological factor. The onset of secondary NE may be brought about by an emotional or psychological disturbances as divorce, death in the family, illness, emotional or physical trauma or the birth of a new sibling.<sup>36</sup>

## Conclusions:

The prevalence of NE in rural area of Assiut governorate is slightly higher than some other areas of the world. It may be explained by the risk factors present as the presence of history of nocturnal enuresis in fathers and mothers, where consanguineous marriage in our locality may hasten the genetic basis of this disease. Also, the low socioeconomic factors, low educational level may share in the problem. Urinary and GIT troubles may share in the pathogenesis of NE. The psychological factors were insignificantly sharing in

the problem of NE but it may be a result of punishment and family comments.

### Recommendations:

The genetic basis of NE should be furtherly studied in our community. Also, urodynamic studies as well as

GIT evaluation should be in mind during management of a child with NE. Education of families as regards the problem of NE and for seeking medical advice is essential.

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### References:

1. Miller K. Concomitant non-pharmacologic therapy in the treatment of primary nocturnal enuresis. *Clin Pediatr (Phil)* (Spec. no.)1993: 32-7.
2. Thiedke CC. Nocturnal enuresis. *American Family Physician* 2003.
3. Jalkut MW, Kernab SE, Churchill BM. Enuresis. *Pediatr Clin Noth Am* 2001; 48: 1461-88.
4. Van Gool JD, Djurhuus JC, Watanabe H, Stenberg A, Lettgen B. Experience and current status of research in the patho-physiology of nocturnal enuresis. II. *Scan J Urol Nephrol* 1999; Suppl, 202: 8-11.
5. Readett DR, Bamigbade T, Serjeant GR. Nocturnal enuresis in normal Jamaican children: implication for therapy. *West Indian Med J* 1991; 40: 181-84.
6. Abd Al-Twab A. Family socio-economic status scale , Revised edition , MD. Thesis in educational basics ,faculty of education; Assiut University 2004.
7. Neves T, Helta J, Cnattingius S, et al. (1999): Depth of sleep and sleep habits among enuretic and incontinent children. *Acta Paediatrica* 1999; 88: 748-52.
8. Oge O, Kocak I, Gemalmaz H. Enuresis: point prevalence and associated factors among Turkish children. *Turk J Pediatr* 2001; 43: 38-43.
9. Gumus B, Vurgun N, Lekili M. Prevalence of nocturnal enuresis and accompanying factors in children aged 7-11 years in Turkey. *Acta Paediatrica* 1999; 88: 1369-72.
10. Gur E, Turhan P, Can G, Akkus S, Sever L, Guzeloz S, Cifcili S, Arvas A. Enuresis: prevalence, risk factors and urinary pathology among school children in Istanbul, Turkey. *Pediatr Int* 2004; 46(1): 58-63.
11. Foxman B, Valdez RB, Brook RH. (1986): Childhood enuresis: Prevalence, perceived impact, and prescribed treatment. *Pediatrics* 1986; 77: 482-87.
12. Abdel Latif AM, Osman E, Abdelaziz I, Shaker S, Nageib N. Pattern of Primary Nocturnal Enuresis in Primary School Children (First Rank) in Assiut City. *African Newspaper of Urology* 2004; 10 (1): 22-29.
13. Delvin JB. Prevalence and risk factors for childhood nocturnal enuresis. *Ir Med J* 1991; 84: 118-20.
14. Readett DR, Bamigbade T, Serjeant JR. Nocturnal enuresis in normal Jamaican children: implication for therapy. *West Indian Med J* 1991; 40: 181-84.
15. Kanaheswari Y. Epidemiology of childhood nocturnal enuresis in Malaysia. *J Paediatr Child Health*. 2003; 39(2): 118-23.
16. Bower WF, Moore, KH, Shepherd RB. (1996): The epidemiology of childhood enuresis in Australia. *Br J Urology*. 78: 602-606.
17. Bakwin, H. The genetics of enuresis. In I. Kolvin, R.C. MacKeith, and S.R.C. Meadow (Eds.), *Bladder control and enuresis*. London: W. Heineman Medical Book 1996: 73-77.
18. Arnell H, Hjalmas K, Jagervall M, Lackgren G, Stenberg A, Bengtsson B, Wassen C, Emahazion T, Anneren G, Sundvall M, Dahl, N. The genetics of primary nocturnal enuresis: Inheritance and suggestion of a second major gene on chromosome 12q. *Journal of Medical Genetics* 1997; 34(5): 360-65.
19. Eiberg H. Nocturnal enuresis is linked to a specific gene. *Scandinavian Journal of Urology and Nephrology* 1995;(Suppl.) 173: 15-16.
20. Djuruus JC. Definitions of subtypes of enuresis. *Scan J Urol Nephrol* 1999; Suppl 202: 5-7.
21. Yeung, CK; Cchiu, HN, Sit FK. Bladder dysfunction in children with refractory 1999.
22. Norgaard JP, Rittig S, Sjurhuus JC. Nocturnal enuresis: An approach to treatment based on pathogenesis. *Journal of Pediatrics* 1989; 114 (4 pt. 2): 705-10.
23. Persson-Junemann C, Seemann O, Kohrmann KU, Junemann KP, Alken P. Comparison of urodynamic findings and response to oxybutynin in nocturnal enuresis. *European Urology* 1993; 24(1): 92-96.
24. Robert M, Averous M, Besset A, Carlander B, Billiard M, Guiter J, Grasset D. (1993). Sleep polygraph studies using cystometry in twenty patients with enuresis. *European Urology* 1993; 24(1): 97-102.
25. Whitside CG, Arnold EP. Persistent primary enuresis. Urodynamic assessment *British Medical Journal* 1975; 1(5954): 364-67.
26. Rushton HG. Wetting and functional voiding disorders. *Urologic Clinics of North America* 1995; 22(1): 5-93.
27. McGuire EJ, Savashino JA. Urodynamic studies in enuresis and the non-neurogenic bladder. *Journal of Urology* 1984; 132(2): 299-302.
28. Norgaard JP, Hansen JH, Nielsen JB, Rittig S, Djurhuus JC. Nocturnal studies in enuretics. A polygraphic study of sleep-EEG and bladder activity. *Scandinavian Journal of Urology and Nephrology* 1989; 125: 73-78.
29. Norgaard JP, Hansen JH, Wildschlotz G, Sorenson S, Rittig S, Djurhuus JC. Sleep cystometries in children with nocturnal enuresis. *Journal of Urology* 1989; 141(5): 1156-59.
30. Sher P, Reinberg Y. Successful treatment of giggle incontinence with methylphenidate. *Journal of Urology* 1996; 156(2 pt. 2): 656-58.

31. Brading AF, Turner WH. The unstable bladder: Towards a common mechanism. *British Journal of Urology* 1984; 73(1): 3-8.
32. Loening-Baucke V. Urinary incontinence and urinary tract infection and their resolution with treatment of chronic constipation of childhood. *Pediatrics* 1997; 100(2): 228-32.
33. Wille S. Nocturnal enuresis :sleep disturbance and behavioural patterns. *Acta Paediatrica* 1994; (83): 72-4.
34. Everaent K, Pevernagie D, Oosterlinck W. Nocturnal enuresis provoked by an obstructive sleep apnea syndrome .*Journal of Urology* 1995; 153(4): 1236.
35. Alon US. Nocturnal enuresis.*Pediatric Nephrology* 1995; 9(3): 94-103.
36. Ilyas M, Jerkins G. Management of nocturnal childhood enuresis: Anew challenge. *Pediatric Annals* 1996; 25(5): 258-64.