

# Impact of primary nocturnal enuresis on the quality of life in Egyptian mothers: a case-control study

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## Background

Only a few studies have reported the psychological state and the quality of life of mothers of children with nocturnal enuresis (NE) and, to the best of our knowledge, no studies have been carried out in Egypt despite the high prevalence of the disorder.

## Participants and methods

We conducted a case-control study comparing a group of 50 mothers of children with primary NE compared with 50 mothers of children without NE using Beck Depression Inventory, Beck Anxiety Inventory, and the PCASEE Questionnaire for quality of life. For mothers of children with NE, we also used the Pediatric Enuresis Model on Quality of Life – Short Form Questionnaire (PEMQOL Short Form).

## Results

Our study found that the severity of depression and anxiety was higher in mothers of children with NE. There was a statistically significant difference ( $P=0.04$ ) between the two groups as regards the affective domain of the PCASEE Questionnaire, which was higher in the mothers of children with NE. Our study found that the quality of life of mothers of children with NE (using the PEMQOL Questionnaire) was affected. There was a significant negative correlation between anxiety and the cognitive and social domains of the PCASEE and a significant positive correlation between anxiety and PEMQOL scores.

## Conclusion

Mothers of children with NE experience more severe depression and anxiety compared with mothers of children without NE. The severity of anxiety correlates significantly with quality-of-life measures.

## Keywords:

anxiety, depression, Egypt, mothers, nocturnal enuresis, quality of life

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## Introduction

Enuresis is defined as the repeated voiding of urine into bed or clothes at least twice a week for at least 3 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 Egyptian children, as it is in many other populations [2]. The prevalence of NE among children in one study conducted at Benha in Egypt was found to be 15.5% [3]. Another Egyptian study carried out in Assiut reported a prevalence of 17.8% among children aged 5–12 years old joining a primary school [4]. Another study by Al-Kot and Deeb [5] in the Menoufia Governorate of Egypt reported a prevalence rate of primary enuresis of 11.5%. Similar rates have been reported in other countries. In Saudi Arabia, the prevalence of NE among school-aged children was reported to be 15% [6]; in Turkey it was 14% [7]; and in Pakistan it was 10% [8]. In a study carried out in Wisconsin in the USA, a prevalence rate of 17.5% among children aged 5–12 years was reported [9].

It has been suggested that NE may have a negative impact on the child's self-perception, and the child may also experience low self-esteem and poor self-image because of feelings of shame and guilt, which might later lead to psychological and psychiatric problems [10]. Moreover, NE may have a negative impact not only on the child but also on the entire family, especially the mother, causing depression, anxiety, and affecting the quality of life [11].

Parents of children with NE may report a lot of psychological problems that may be due to loss of confidence in their parenting skills, with the washing of bed linen, changing bedclothes, and replacing mattresses, adding to the burden in terms of additional time, effort, and financial impact. With increasing age and maturity of the child, these drawbacks have a great effect on the tolerance of the parents, which often declines just as the parental expectations of the child's responsibility and self-control increase. Punishment will be a manifestation of parental frustration, which in turn will affect the child who themselves become frustrated and distressed and which can affect the entire child-parent relationship [12].

Although there are many studies about the psychological effects of NE in children, only a few studies have reported the psychological state and the quality of life of mothers of children with NE and how it might affect their mental, physical, emotional, and social state [13]. To the best of our knowledge, no studies have been carried out in Egypt despite the high prevalence of the disorder, where the nature of the culture puts great emphasis on the mother's responsibility in taking care of the children and placing on them the major burden of care. This might affect their quality of life and cause them to be more vulnerable to psychological distress, which may extend from normal sadness and fears to problems that are disabling, such as depression and anxiety that can interfere with their ability to cope.

### Participants and methods

We conducted a cross-sectional, observational, case-control study aiming to screen for psychological distress in mothers of children with NE and its impact on their quality of life, in comparison with mothers who have a child without any health problems.

#### Participants

Participants were recruited over a period of 3 months from February 2014 to May 2014, at Abu-El Rich Children's Hospital, Cairo University, Egypt. Inclusion criteria were mothers of children aged between 6 and 12 years old and children diagnosed with primary NE according to *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-IV). Exclusion criteria were mothers of children who had any other primary medical or psychiatric diagnosis (or any comorbid condition); mothers of children with secondary or diurnal enuresis; mothers of children whose age was below 6 or above 12 years; mothers who were providing care for a chronically ill child; mothers who have another child or family member who needs special healthcare; and mothers with known chronic health problems or psychiatric disorders of their own.

One hundred participants participated in the study and were divided into two groups: a group of 50 mothers of children with primary NE (group A), which was compared with a group of 50 mothers recruited from parents of children who were free from any psychiatric or medical health problems who were from the relatives and those accompanying the mother coming for consultation at Abu-El Rich outpatient clinics (group B).

Ethical approval for the study was granted by Al Kasr Al Ainy Faculty of Medicine Ethical Committee. The purpose of the study was explained to each participant, and informed consent was sought and obtained. Participants refusing to give consent were excluded. All group A participants included in the study fulfilled the general inclusion and exclusion criteria.

#### Tools

The following tools were applied to both groups: participant information sheet (for demographic data, family history, psychiatric, and medical history), Beck Depression

Inventory (BDI), Beck Anxiety Inventory (BAI), and the PCASEE Questionnaire for quality of life. For group of mothers of children with primary NE (case group), we added the Pediatric Enuresis Model on Quality of Life – Short Form Questionnaire (PEMQOL Short Form). In addition, clinical data concerning the child illness were collected from the mother, such as the frequency of NE, compliance of treatment, and duration of follow-up.

#### *The Beck Depression Inventory [14]*

This is a 21-item self-rating scale that assesses characteristic attitudes and symptoms of depression. For our study, we used the Arabic version of the BDI [15]. The questionnaire grades the severity of symptoms using a scoring from 0 to 63. The cutoff points proposed for the BDI are as follows: 0–13, minimum or nonexistent depression; 14–19, mild depression; 20–28 moderate depression; and 29 or more, severe depression. It has an acceptable degree of validity as it evaluates a wide variety of symptoms and attitudes associated with depression [16].

#### *The Beck Anxiety Inventory [17]*

BAI is a 21-item self-rating inventory that measures the severity of anxiety. The questionnaire grades the severity of symptoms using a score from 0 to 63. The Scores from 0 to 7 indicate a minimal level of anxiety, scores from 8 to 15 indicate mild anxiety, scores from 16 to 25 indicate moderate anxiety, and scores from 26 to 63 indicate severe anxiety. For our study, we used the Arabic version of the BAI [18].

#### *The PCASEE Questionnaire for quality of life [19]*

It is a rating scale for the assessment of health status and quality of life. It is an acronym for the following: P = physical, C = cognitive, A = affective, S = social, E = economic, E = ego. It is formed of six groups of questions to assess these six domains. For our study we used the Arabic version [20].

#### *The Pediatric Enuresis Model on Quality of Life – Short Form Questionnaire [21]*

We used an Arabic translation of the PEMQOL Short Form [21]. The original form was validated by Landgraf [22], in which parents were asked to rate the impact of enuresis on themselves and their family. They were asked to report on the degree to which they perceive that the condition has impacted on their child as well. It is made up of 16 questions: seven questions concerning the effect of enuresis on the child (child impact scale) and nine questions concerning its effect on the parents (family impact scale). For ease of interpretation, the raw scale scores are converted to a 0–100 continuum using a standard mathematical formula. A score more than 50 is considered as a significant effect on the psychological well-being.

#### Statistical analysis

Statistical analyses and sample size calculations were conducted with SPSS, version 11.0.1 software (SPSS for Windows, 2001; SPSS Inc., Chicago, Illinois, USA). Continuous data were presented as mean  $\pm$  SD or median (range) and were compared by the use of Student's *t*-test

or Mann–Whitney *U*-test. Categorical data were presented as frequencies and proportions and were analyzed with the two-tailed  $\chi^2$ -test or Fisher's exact test. Scores of patients on the PCASEE were correlated to their background and clinical characteristics by Pearson's correlation. Multiple regression analysis was performed to study the influence of independent variables on the PCASEE while controlling the effect of other variables. A *P* value less than 0.05 was considered statistically significant.

## Results

### Sociodemographic and clinical characteristics

A total of 100 mothers were involved in the study and were divided into two groups: group A (*n* = 50) consisted of mothers of children with NE, and group B (*n* = 50) consisted of a control group of mothers of children without any health problems. Table 1 shows the sociodemographic and clinical characteristics of the two groups. There were no statistically significant differences between the two groups as regards age, literacy, marital status, family history of psychiatric illness, or past history of psychiatric illness. Our study showed that there is a statistically significant difference between the two groups as regards employment (*P* < 0.001).

### Anxiety and depression in mothers of children with nocturnal enuresis

Using the BDI, our study showed that 18% of the mothers of children with NE had severe depression compared with 12% of mothers of children with no NE (Fig. 1). As regards anxiety using the BAI, 54% of mothers of children with NE suffered severe anxiety symptoms in comparison with 38% in mothers with children with no NE (Fig. 2). However, there was no statistically significant difference between the two groups as regards both depression and anxiety scores (*P* = 0.3 for BDI, *P* = 0.4 for BAI).

**Table 1 Sociodemographic and clinical characteristics**

	Group A ( <i>n</i> = 50) [ <i>n</i> (%)]	Group B ( <i>n</i> = 50) [ <i>n</i> (%)]	<i>P</i> value
Age (mean ± SD) (years)	31.56 ± 3.36	31.46 ± 3.05	0.876
Literate/illiterate			1.0
Literate	36 (72)	35 (70)	
Illiterate	14 (28)	15 (30)	
Employment			< 0.001*
Employees	8 (16)	28 (56)	
Housewives	42 (84)	22 (44)	
Marital status			0.8
Married to the father of the child	45 (90)	43 (86)	
Divorced	4 (8)	5 (10)	
Widow	1 (2)	2 (4)	
Family history of psychiatric illness			0.4
Positive	8 (16)	4 (8)	
Negative	42 (84)	46 (92)	
Past history of psychiatric illness			1.0
Positive	1 (2)	0 (0)	
Negative	49 (98)	50 (100)	

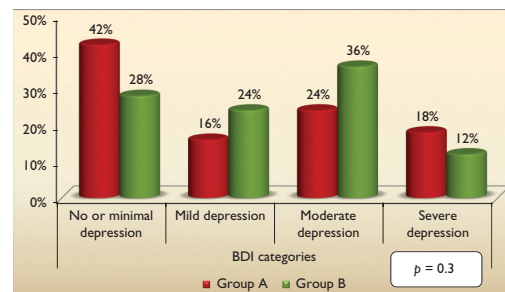
\**P* < 0.05, statistically significant.

### Quality of life in mothers of children with nocturnal enuresis

Our study showed that there is a statistically significant difference (*P* = 0.04) between the two groups as regards the affective domain of the PCASEE Questionnaire, which was higher (53.5 ± 23.3) in the group of mothers of children with NE than the control group (43.8 ± 22.2). However, there were no statistically significant differences between the two groups in the physical, cognitive, social, economic, and ego domains of the PCASEE Questionnaire (Table 2).

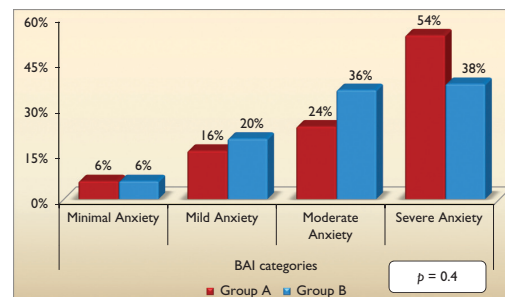
Using the PEMQOL Questionnaire, our study found that the quality of life of mothers of children with NE compared with that of the children with NE (where a mean score > 50 means a significant effect on the quality of life) showed that the quality of life of the mothers was

**Figure 1**



Beck Depression Inventory (BDI) scale of the mothers in groups A and B.

**Figure 2**



Beck Anxiety Inventory (BAI) scale of the mothers in groups A and B.

**Table 2 PCASEE Questionnaire for quality of life in both groups**

PCASEE questionnaire	Group A ( <i>n</i> = 50) (mean ± SD)	Group B ( <i>n</i> = 50) (mean ± SD)	<i>P</i> value
PCASEE total (%)	62.7 ± 15.9	59.1 ± 13.5	0.2
Physical (%)	63.6 ± 20.1	56.9 ± 18.0	0.1
Cognitive (%)	65.2 ± 23.5	64.6 ± 19.2	0.9
Affective (%)	53.5 ± 23.3	43.8 ± 22.2	0.04*
Social (%)	74.8 ± 18.7	72.8 ± 19.5	0.6
Economic (%)	60.3 ± 30.1	63.7 ± 25.6	0.5
Ego (%)	57.3 ± 21.9	54.3 ± 18.9	0.5

\**P* < 0.05, statistically significant.

affected, with a mean PEMQOL score of  $54.5 \pm 16.3$ , whereas the quality of life of their children was not significantly affected by the enuresis (mean PEMQOL score of  $39.7 \pm 18.3$ ). However, it is worth noting that both these results were obtained from the mothers' interview.

Our study showed that there was more affection in the quality of life of both mothers and children as the depression severity of the mother increases. There was a significant negative correlation between depression severity of mothers (using BDI) and PCASEE scores specifically for the overall PCASEE score and for the physical, cognitive, and social domains (Table 3). There was also a significant positive correlation between depression of the mothers (using BDI) and the quality of life of both mothers and children using the PEMQOL (Table 3).

Our study also showed that the quality of life of the mothers and their children becomes more affected as the anxiety of the mother increases. This was shown by a significant negative correlation between the anxiety of mothers (using BAI) and quality-of-life scores using the PCASEE specifically in the cognitive and social domains (Table 4). There was also a significant positive correlation between the severity of the anxiety of the mother and their quality of life using PEMQOL Questionnaire (Table 4). Our study also showed a significant positive correlation between the quality of life of the children with NE and the quality of life of their mothers using the PEMQOL Questionnaire ( $r = 0.719$ ,  $P < 0.001$ ). In other

**Table 3 Correlation between depression and quality of life using PCASEE and Pediatric Enuresis Model on Quality of Life QUESTIONNAIRES**

	BDI numerical
PCASEE total (%)	
<i>r</i>	-0.473
<i>P</i>	0.001*
Physical	
<i>r</i>	-0.338
<i>P</i>	0.016*
Cognitive	
<i>r</i>	-0.495
<i>P</i>	<0.001*
Affective	
<i>r</i>	-0.232
<i>P</i>	0.106*
Social	
<i>r</i>	-0.439
<i>P</i>	0.001*
Economic	
<i>r</i>	-0.216
<i>P</i>	0.133
Ego	
<i>r</i>	-0.168
<i>P</i>	0.243
PEMQOL	
Child mean score	
<i>r</i>	0.427
<i>P</i>	0.003*
Mother mean score	
<i>r</i>	0.475
<i>P</i>	0.001*

BDI, Beck Depression Inventory; PEMQOL, Pediatric Enuresis Model on Quality of Life.

\* $P < 0.05$ , statistically significant.

**Table 4 Correlation between anxiety and quality of life using PCASEE and Pediatric Enuresis Model on Quality of Life Questionnaires**

	BAI numerical
PCASEE total (%)	
<i>r</i>	-0.298
<i>P</i>	0.036*
Physical	
<i>r</i>	-0.112
<i>P</i>	0.441
Cognitive	
<i>r</i>	-0.283
<i>P</i>	0.047*
Affective	
<i>r</i>	-0.265
<i>P</i>	0.063
Social	
<i>r</i>	-0.280
<i>P</i>	0.049*
Economic	
<i>r</i>	-0.218
<i>P</i>	0.129
Ego	
<i>r</i>	-0.126
<i>P</i>	0.383
PEMQOL	
Child mean score	
<i>r</i>	0.030
<i>P</i>	0.846
Mother mean score	
<i>r</i>	0.336
<i>P</i>	0.024*

BAI, Beck Anxiety Inventory; PEMQOL, Pediatric Enuresis Model on Quality of Life.

\* $P < 0.05$ , statistically significant.

words, the impact on the quality of life of the mothers was reflected on the quality of life of their children.

Table 5 shows that there was a significant positive correlation between the frequency of NE per week and the anxiety of the mothers, i.e. as the frequency of NE increased, the anxiety of the mothers increased. On the other hand, there was no significant correlation between the compliance of the mothers on treatment and the duration of their follow-up at the clinic with the anxiety of the mothers.

## Discussion

Although there have been many studies conducted on the psychological effects of NE in children, only a few studies have been reported that assess the psychological state and the quality of life of mothers and how it might affect their mental, physical, emotional, and social state. This is important because maternal attitudes and behaviors and their quality of life can play a crucial role in the success of treatment and managing the child with NE [13]. Our study aimed to assess the impact on the quality of life in a sample of Egyptian mothers of the children with primary NE and to assess the severity of anxiety and depression.

## Sociodemographic and clinical characteristics

As regards the mothers' literacy and employment, our results showed that 72% of mothers of children with NE were literate (can at least read and write), whereas 28% were illiterate, which might be explained by the fact that there is more awareness among literate mothers (who had

**Table 5 Correlation of the depression, anxiety, and quality of life of both mothers and children with clinical data.**

	Frequency of nocturnal enuresis per week	Compliance (months)	Duration of follow-up (months)
BDI numerical			
<i>r</i>	0.173	−0.150	−0.031
<i>P</i>	0.228	0.308	0.833
BAI numerical			
<i>r</i>	0.442	−0.035	−0.234
<i>P</i>	0.001*	0.815	0.110
PCASEE total (%)			
<i>r</i>	−0.147	0.055	0.095
<i>P</i>	0.307	0.708	0.519
Physical (%)			
<i>r</i>	−0.080	0.096	−0.015
<i>P</i>	0.582	0.516	0.920
Cognitive (%)			
<i>r</i>	−0.239	0.175	0.071
<i>P</i>	0.095	0.235	0.632
Affective (%)			
<i>r</i>	−0.030	0.053	0.033
<i>P</i>	0.836	0.718	0.821
Social (%)			
<i>r</i>	−0.234	0.200	0.084
<i>P</i>	0.103	0.172	0.570
Economic (%)			
<i>r</i>	−0.059	−0.128	0.165
<i>P</i>	0.683	0.388	0.262
Ego (%)			
<i>r</i>	−0.065	−0.031	0.044
<i>P</i>	0.653	0.834	0.767
Child mean score			
<i>r</i>	0.054	0.135	−0.066
<i>P</i>	0.727	0.388	0.676
Mother mean score			
<i>r</i>	0.143	0.065	−0.052
<i>P</i>	0.347	0.681	0.742

BAI, Beck Anxiety Inventory; BDI, Beck Depression Inventory.

\**P* < 0.05, statistically significant.

higher levels of education) about the disorder in their children that led them to seek medical advice. This finding is consistent with a study conducted by Cher *et al.* [23] in Taiwan that showed a greater prevalence rate in children with parents of high educational levels. However, this finding is inconsistent with the results of the study conducted by Al-Kot and Deeb [5] in Egypt and the study conducted by Gumus *et al.* [7] in Turkey, which both showed that NE had been related to low levels of parental education. The difference in results between the study by Al-Kot and colleagues and this study (although both were carried out in Egypt) could be attributed to methodological differences. Al-Kot and Deeb had a larger sample size that involved 106 children with NE, whereas our study looked at the mothers. In addition, they collected their sample from a wider catchment area that included three different schools from both urban and rural areas of Menoufia Governorate, unlike our study in which the sample was collected from a single outpatient clinic at a large urban teaching hospital in Cairo. Al-Kot and Deeb divided the mothers of children with NE into two groups, low educational

level (mothers educated until primary school or less) and high educational level (mothers educated until secondary school or more), and reported low parental education in those mothers who were educated until primary school. This classification was different from the current study in which mothers were divided into literate (at least they can read and write) and illiterate mothers.

In our current study, 84% of mothers were housewives. This finding can be attributed to the location of the study. It was conducted in the outpatient clinic of Abo-El Rich Hospital during the morning time, which encouraged more mothers working as housewives to bring their children for consultation. This finding was consistent with the results of a study conducted by Ozkan *et al.* [24] and by Al-Kot and Deeb [5], who showed that the employed mothers had less enuretic children than housewives, which they related to the higher educational level of the employed mothers. This explanation was not consistent with the current study in which NE was higher in children of both literate mothers and housewives, suggesting that only using literacy may not be an accurate proxy measure for education.

#### Depression and anxiety

Our study showed no statistically significant difference as regards depression in mothers of both groups. This finding might be because both groups might be sharing similar stressors, such as marital problems and financial difficulties in the family, especially as our study did not specifically investigate for the causes of depression in the two groups. However, the severity of depression was higher in mothers of children with NE, where 18% of the mothers showed severe depression compared with 12% in the control group, which might be related to the added burden of the disease of their children. This finding was consistent with the results of Tanriverdi *et al.* [25] but different from the studies of Egemen *et al.* [13] and Evrim *et al.* [26], who found a statistically significant difference between the two groups as regards depression. These differences might be related to methodological issues, as Evrim and colleagues and Egemen and colleagues excluded important confounding factors from their studies such as mothers who had children younger than 2 years old and the mothers whose husbands died within 3 years. In addition, Evrim and colleagues excluded mothers who were separated or had marital problems with their husbands. Also the difference in the results might be attributed to the smaller sample size in the study by Egemen and colleagues (28 mothers of enuretic children vs. 38 mothers of nonenuretic children).

This study also showed that 94% of mothers of both enuretic and nonenuretic children had anxiety on BAI. However, there was no significant difference between both groups as regards anxiety, which might be related to one of the limitations of our study of not excluding confounding factors that might lead to anxiety (financial, marital problems or others); the severity of anxiety was higher in mothers of enuretic children, where 54% of them showed severe anxiety with a mean BAI score



of 26.5 compared with the other group of mothers of nonenuretic children (38%) with a mean BAI score of 23.6. This replicated the results obtained by Ng and Wong [27] who found that most of the parents of enuretic children were worried about their children's disease. They attributed their results to the mothers of enuretic children being anxious that the NE was abnormal and might indicate kidney and bladder diseases, psychological or behavioral problems, neurological abnormalities, or some unknown pathological causes. They were also feeling anxious of losing confidence in their parenting skills and of parent-child relationship. They felt ashamed, angry, and had negative feelings toward their children. The mothers in the study by Ng and Wong were more worried about the etiology of NE, yet the mothers of the current study were more worried about the severity, impact of the disease on their children, and the failure of treatment.

In the Egyptian study conducted by Al-Kot and Deeb [5], 61.4% of parents were disturbed by NE, considering it as a big issue and worried about the problem, although only 31% only were seen by a physician and most of children were not treated. This result was consistent with the result of the current study, which may be related to the same Egyptian culture and the similar socioeconomic level with shared stresses as economic burden, marital problems, and the higher responsibility of the mothers toward their children.

Although the studies by Evrim *et al.* [26] and Tanriverdi *et al.* [25] showed no statistically significant difference in state-anxiety scores, these studies showed a higher score in the enuretic group, which is similar to the current study. Although there are some cultural differences between the Turkish and Egyptian cultures, these studies attributed their results mainly to the child's enuresis as a risk factor for the mother's pathology and the relation between the mother and the enuretic child, as both these cultures assign to the mother the main responsibility of looking after the children in general and where the mothers sense of responsibility becomes aggravated when pathology occurs in her children, making the mothers more prone to anxiety.

#### Quality-of-life measures

This study demonstrated that NE does not affect the quality of life for the majority enuretic children (as reported by mothers), where 60% of enuretic children had a score less than 50 with a total mean score of 39.5 on PEMQOL Short Form Questionnaire. This result may be explained by mothers underreporting the children's anxiety either because they do not want to appear as bad mothers or they do not recognize their child's anxiety or they try normalize it. Mothers also hide their feelings of worry and depression in front of their children in order not to increase their worries and affect their psychological well-being. This finding is consistent with the results of a study conducted by Karnicnik *et al.* [28] in Slovenian children, who found that primary NE does not lower the quality of life for the majority of children, although it influences children's lives, especially in their relationships with friends. Some similarities in results between the study by Karnicnik and colleagues and the current

study might be explained from the fact that the children in the study by Karnicnik and colleagues answered the questionnaire at home with the help of their parents, and in the current study it was the mothers who answered the questionnaire for the child scale.

Joinson *et al.* [29] found that the majority of children (90.9%) did not feel pushed away by their friends, nor were they teased by them (95.4%). Furthermore, 84.1% of children did not feel impeded by their disorder to make new friendships, as they only talked about their bedwetting problems to their closest friends from whom they do not expect a negative response. They tended to hide their problems from other friends because they were afraid to be labeled or treated differently [29].

This is different from the study in Turkey by Üçer and Gümüş [30], which used a pediatric quality-of-life questionnaire and which found that children with NE were unhappy and had an impaired quality of life and sleep quality because of bedwetting and that such an uncomfortable situation progressed as age increased. These differences may be related to the difference in sample size between that study (which included 101 enuretic children) and the current study. Differences may also be due to the questionnaires used to assess the quality of life, which were different in the two studies and also because they excluded enuretic children who had received medication for NE before the study [30].

Our study was different from the findings of Merhi *et al.* [31] conducted on a Lebanese sample using the PEMQOL Short Form Questionnaire. They showed that 82.4% of children had a score more than 50 and that their quality of life was affected by NE. They also showed that more than 80% of children were psychologically affected compared with only 40% of enuretic children in the current study who had a score of more than 50. This difference in results between the study by Merhi and colleagues and the current study may be related to the sample size where Merhi and colleagues conducted their study on 379 children with NE [31].

As regards the quality of life of mothers, the results of the current study showed that NE had a significant effect on the quality of life of the mothers of enuretic children on the PEMQOL Short Form Questionnaire. It showed that 60% of mothers of children with NE had a mean score greater than 50. This might be related to the higher responsibility that mothers take on compared with other family members in managing their child's illness. They reported that NE had affected their social life, reporting that they are unable to invite people to their homes because of the bad odor and that relatives and friends were unable to understand the disease and talked about it frequently, which made the mother feel ashamed and which led to an increase in the physical burden on the mother owing to repeated washing and changing of the linens. Some of the mothers reported being worried about worsening of the condition with the progression of the disease and with treatment failure.

Although in our study the quality of life of mothers of the children with NE was negatively affected by the disease on

the PEMQOL Short Form Questionnaire, there was no statistically significant difference between the two groups on the PCASEE scale for quality of life in general. These differences in results between the two questionnaires may be because of the fact that PEMQOL questionnaire has much more specific questions and focused on the quality of life of mothers related to NE. There was a statistically significant difference between the two groups as regards the affective domain, which was surprisingly more affected in the mothers of nonenuretic children. This might be related to the presence of other confounding factors, which were not excluded from the study sample that might affect the mother. No statistically significant difference was found as regards the physical, cognitive, social, ego, and economic domains on PCASEE scale for quality of life, although the mean scores of the economic domain were lower in the mother of the enuretic children (60.3) compared with the other group (63.7). This may be related to the increased financial burden of NE especially as that most of the mothers of enuretic children were housewives who were not employed compared with the other group.

Our findings were consistent with the results of Evrim *et al.* [26], who found that the quality of life of mothers was negatively affected by having a child with NE, with an increased burden of responsibility for these mothers compared with the other families in the Turkish community, which is similar to the burden for Egyptian mothers in the current study. Similar to our results, the study conducted by Egemen *et al.* [13] revealed that the quality of life of mothers was negatively affected by having a child with monosymptomatic NE, with a significant difference in the quality of life between mothers of enuretic and nonenuretic children as regards bodily pain and emotional roles. Their findings showed that the emotional subscale cross-examines feelings or physical sensations, which might be related to anxiety or depression. Depression, anxiety, and behavioral-emotional control might lead to the detection of lower scores in this subscale. However, in this study the physical burden for mothers of enuretic children was higher. This was clearly manifested in physical complaints, which was rationalized by Egemen and colleagues to be related to the extra daily work load such as washing bed linens, changing bedclothes, and replacing mattresses, especially as the study excluded mothers of children with organic diseases.

However, our findings were different from the results of the Lebanese study by Merhi *et al.* [31] using the PEMQOL Questionnaire, which showed that only 28% of parents had a score above 50 and only less than 30% of parents were psychologically affected by enuresis. This difference in results could be explained by Merhi and colleagues reporting that a large number of parents did not consider NE as a major problem and tended to deal with it by simply letting their child wear diapers with some parents even considering it to be a normal phase of development that is common in the family and which will stop spontaneously as the child grows older, putting in consideration the difference in sample size between both studies where Merhi *et al.* [31] conducted their study on a larger sample of 379 children.

In the study by Equit *et al.* [32], the overall quality of life of mothers of enuretic children was not impaired. Only the psychological domain scores were significantly reduced, such as 'positive feelings'. Incontinence in children was associated with increased levels of anxiety or depression in mothers.

Our study showed that the anxiety of mothers of children with NE increased by increased frequency of NE. This might be due to the increased fear and worry of their mothers about the disease and that there might be no improvement and failure of treatment. There also might be fear of shame from their children's enuresis and how it might affect their children's life and self-image, especially in the family and school environment where the children may be teased by their friends. This was similar to the results of the Turkish study by Evrim *et al.* [26], who found that the mothers of children with severe enuresis had significantly higher state-anxiety scores. Meanwhile, it was different from the results of Egemen *et al.* [13], who found that there was no correlation between the severity of the disease and the anxiety of the mothers.

#### Limitations

There were several limitations to our study. First, from our findings, we could not infer any causality between NE and depression and anxiety in mothers with children with NE because of the cross-sectional nature of our study, which only shows association. A longitudinal study in which the effects of confounders are controlled for can help address these issues. Second, in our study, we did not exclude other confounders that might affect the severity of depression and anxiety, as well as the quality of life of mothers. Controlling for these confounding effects in future research will help address this point. Finally, in our study we used the PEMQOL scale where mothers answered some questions on behalf of their children, which can reflect more the mother's perception rather than that of the child.

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#### Conflicts of interest

There are no conflicts of interest.

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