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Impact of enuresis nocturna on health-related quality of life in children and their mothers

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Abstract *Objective:* Nocturnal enuresis (NE) is a common childhood disorder. As children age and NE persists, it may become more stressful for both them and their caregivers. The aim of the present study was to assess the impact of NE on the quality of life of children who were diagnosed with NE, and their mothers, and to compare the results with a healthy control group.

Subjects and method: Eighty-two children with NE, and their mothers, and 93 healthy children and their mothers were enrolled in the study. The sociodemographic data were evaluated. The Pediatric Quality of Life Inventory 4.0 Scales (PedsQL 4.0) were used to assess the children's health-related quality of life (HRQoL); and the World Health Organization Quality of Life Instrument; short form (WHOQOL-BREF) was used for the mothers' HRQoL.

Results: The PedsQL 4.0 mean scores for the children with NE group were as follows: total score, 68.74; physical health score, 72.79; psychosocial health score, 66.56. The scores for the children in the control group were as follows: total score, 80.98; physical health score, 81.11; psychosocial health score, 80.88. The WHOQOL-BREF scores for the mothers of the children with NE were as follows: physical health score, 67.90; psychosocial health score, 62.66; social relationships score, 60.90; environmental area score, 61.04. The WHOQOL-BREF scores for the mothers in the control group were as follows: physical health score, 75.96; psychosocial health score, 72.39; social relationships score, 72.18; environmental area score, 67.44.

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Conclusions: Nocturnal enuresis negatively affects the quality of life of both children and their mothers. Therefore, when physicians see children with enuresis, they should also be aware of the effect of NE on the mothers' quality of life.

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Introduction

Nocturnal enuresis (NE) is a frequently encountered disorder in the clinical practice of child psychiatry, and is thought to substantially influence the lives of the affected children and their families. Primary NE is defined as: unintentional bedwetting for at least two nights in a week, in three successive months, in children who are five years of age or are developmentally five years old. Secondary nocturnal enuresis (SNE) is bedwetting that develops after at least six months of consistent dryness [1,2]. The etiology is likely to be multifactorial [3]. Studies have reported that the prevalence of NE in children at five years of age is 20%; this decreases by 15% for each year of age, and drops to 6% in children of 11 years old [4,5]. However, researchers have found that family expectations regarding taking responsibility and self-control skills increase as the child grows older, and this situation increases the stress on the child [6]. It is thought that increased stress with age leads to unfavorable outcomes for the child's self-image and social development [7]. Moreover, studies have shown that parents might also feel under pressure, may question their parental skills and are at risk in terms of psychiatric problems due to disappointment [8]. Butler believed that additional washing, ridding the room of the smell, setting up alarm clocks and waking up several times during the night may lead the caregiver to feel angry and hostile toward the child and may cause punitive behaviors. The activities of extra waking up and additional washing have negative effects on the caregiver's quality of life (QoL) [9].

Since the second half of the 20th century, a new parameter: health-related quality of life (HRQoL), has arisen in health-related evaluations, along with the observation that individuals with similar clinical characteristics have a distinct perception of satisfaction with their lives and about disease-related wellbeing. Although QoL is generally summarized as how an individual perceives his or her status, within the context of cultural characteristics and values, HRQoL is defined as an individual's perception of the impact of a disease and/or treatment. HRQoL investigates the aspects of QoL influenced by diseases [10,11].

Only a few studies on NE have examined children's and parents' QoL together, and the results show that both QoL are negatively affected [12]. In the present study, the aim was to assess the QoL of children who had been diagnosed with NE, and their mothers. It was hypothesized that NE has negative effects on the QoL of both the children and their mothers.

Materials and methods

This case control study included 87 children between the ages of 8 and 12 years who had been diagnosed with NE, and

their mothers, and who presented to the Bakırköy Prof. Dr. Mazhar Osman Research and Training Hospital for Psychiatry, Neurology and Neurosurgery Child and Adolescent Psychiatry outpatient clinic between January 2012 and June 2013.

The children had to meet the DSM-IV-TR diagnostic criteria for NE, which was confirmed with a clinical interview, and should have had no other chronic disease. Only mothers were included as caregivers because in Turkey mothers provide most care given to children. The maternal education level was used as a marker of socioeconomic status. Five children and their mothers were excluded, as they had not completely filled out the forms; therefore, 82 children and their mothers were analyzed in the study group. Participants in the control group were recruited by house visits; approximately 200 houses were visited and all eligible families were informed about the study procedures. Only those who volunteered were enrolled in the study. A total of 93 healthy children who were matched for age, gender, and parents' education level and socioeconomic status were selected as a control group. Children who had any chronic disease or positive NE diagnosis were excluded from the study.

The Pediatric Quality of Life Inventory 4.0 (PedsQL 4.0) self-report form for children aged between 8 and 12 years was used to assess the children's HRQoL [13]. The scale consists of child self-report and parent proxy report forms. The caregiver completes the parent proxy report form, and the child completes the child self-report form at the same time but separately. The scale includes a total of 23 items. The total scale score (TSS), physical health summary score (PHSS), and psychosocial health summary score (PshSS) were calculated [14]. Items were scored between 0 and 100: 0 (100) = never a problem; 1 = (75) almost never; 2 = (50) sometimes; 3 = (25) almost always; and 4 = (0) always. Higher PedsQL scores indicate better HRQoL. The original PedsQL scale does not have any cut off points. However, Huang et al. proposed cut off points for children with special healthcare needs (CSHCN), moderate and major chronic conditions [15]. The cut off scores proposed by Huang et al. for CSHCN, moderate and major chronic conditions were 83, 79 and 77, respectively. For the Turkish version of PedsQL there are not any established cut off points. In the present study, the Turkish version of the PedsQL was used; the internal consistency of the child self-report was determined as 0.86 and that of parent proxy report as 0.88 [10]. The scale consists of questions such as the following: "My energy is low. I feel angry. I can't do what my peers do. I cannot go to school because I do not feel well." The PedsQL was chosen to evaluate the QoL because there is no enuresis-specific scale in Turkish for evaluating QoL.

For assessing the mothers' HRQoL, the World Health Organization Quality of Life Instrument; short form (WHOQOL-BREF) was used [16]. There are 26 questions in the WHOQOL-BREF scale and four domains evaluating: physical health, psychosocial health, social relationships and environmental area. Items are rated on a five-point (1–5) Likert-type scale. After the raw scores are calculated, they are converted to transformed scores (0–100). Higher WHOQOL-BREF scores indicate better HRQoL. In the present study, the Turkish version of the WHOQOL-BREF was used, and its internal consistency for subscales was determined to be between 0.53 and 0.83 [17]. The scale consists of questions such as "How much do you enjoy your life? Do you earn enough money for your needs? Do you sleep well? How much you like yourself? Are you satisfied with your friends' support?"

The sociodemographic data form including the socio-demographic information was prepared to obtain socio-demographic characteristics of the children and their parents, as well as the type and frequency of enuresis.

The Statistical Package for Social Sciences, Windows version 16.0 (SPSS Inc., Chicago [IL], US) was used for statistical analysis. An independent sample *t*-test was used to analyze the variables that showed normal distribution. Variables that did not show normal distribution were analyzed with the Mann–Whitney *U* test. The Chi-squared test was used to compare categorical variables. Correlation between continuous variables was assessed with Pearson's correlation analysis, whereas the correlation between classified discrete data was analyzed with Spearman's correlation analysis. The results were evaluated within a confidence interval of 95% and at a significance level of $P < 0.05$. With this number of cases and controls, the present study has 80% power with alpha 0.05 to detect a difference between groups of 6.0 points on the Child's PedsQL total score.

The study was approved by the Ethics Committee of Bakırköy Prof. Dr. Mazhar Osman Research and Training Hospital for Psychiatry, Neurology and Neurosurgery, Istanbul, Turkey. All children and their mothers were informed about the study, and their informed consent was obtained.

Results

The mean age \pm standard deviation (SD) of the sample was 9.63 ± 1.31 years, which consisted of 49 (59.8%) boys and 33 (40.2%) girls. The mean age of the control group was 9.54 ± 1.23 years, and 51 (54.8%) of the children in the control group were boys. No significant differences were found between the patients and the control group in terms of age, gender and maternal education. The mean age \pm SD at the completion of toilet training was 27.84 ± 11.16 months in the NE group and 25.56 ± 7.28 months in the control group; no statistically significant difference was found between the groups ($P = 0.17$). In the children with NE, the type of enuresis was primary in 67 (81.7%) and secondary in 15 (18.3%). Regarding the frequency of enuresis: 37 (45.1%) of the children wet the bed every night; 17 (20.7%) wet the bed five–six nights in a week; and 28 (34.2%) wet the bed two–four nights a week. The sociodemographic and clinical features of the study population are summarized in Table 1. A direct family history (mother, father and siblings) of enuresis was present in 67 (81.7%) of the children with NE. When the mothers were asked how they behaved when their children wet the bed, 46 (56.1%) of them reported anger, 24 (29.3%) reported tolerance, 10 (12.2%) reported disregard and 2 (2.4%) reported punishment.

The total and subscale PedsQL 4.0 scores were significantly lower in children with NE compared to the control group. Likewise, the scores for the proxy report forms of PedsQL 4.0, in which the mothers evaluated the QoL of their children, were significantly lower for the mothers of children with NE versus the control group. The scale scores and the results of statistical analysis of the study and control groups are shown in Table 2. When the scale scores were compared according to gender, only the PHSS was significantly higher in boys versus girls ($P = 0.013$), whereas no significant difference was found between genders in terms of the parent proxy report scores in the study group. In the analysis of the control group according to gender, the TSS ($P = 0.019$) and the PHSS ($P = 0.042$) were significantly higher in girls versus boys. When the

Table 1 Sociodemographic and clinical characteristics of participants.

Variable		Enuretic group <i>n</i> (%)	Healthy control group <i>n</i> (%)	<i>P</i> -value
Gender	Male	49 (59.8)	51 (54.8)	0.61
Mean age (\pm SD years)		9.63 (\pm 1.31)	9.54 (\pm 1.23)	0.64
Maternal education status	Primary school graduate	52 (63.4)	53 (57.0)	
	Secondary school graduate	15 (18.3)	17 (18.3)	
	High school graduate	12 (14.6)	15 (6.1)	
	University graduate	3 (3.7)	8 (8.6)	
Family status	Nuclear	65 (79.3)	78 (83.9)	
	Extended	13 (15.9)	14 (15.19)	
	Fragmented	4 (4.9)	1 (1.1)	
Frequency of enuresis in a week	7 days	37 (45.1)		
	5-6 days	17 (20.7)		
	3-4 days	18 (22.0)		
	2 days	10 (12.2)		
Severity of enuresis	Wets bed and linings	74 (90.2)		
	Wets pyjamas	7 (8.5)		
	Wets only underwear	1 (1.2)		

Table 2 PedsQL scale scores and the results of statistical analysis of the study and control groups.

Scale scores	Enuretic group mean \pm SD (n = 82)	Control group mean \pm SD (n = 93)	P-value
PedsQL-C total	68.74 \pm 15.89	80.98 \pm 11.16	<0.001
PedsQL-C physical health	72.79 \pm 18.17	81.11 \pm 12.77	0.002
PedsQL-C psychosocial health	66.56 \pm 18.46	80.88 \pm 12.09	<0.001
PedsQL-P total	65.47 \pm 15.52	78.23 \pm 12.22	<0.001
PedsQL-P physical health	68.01 \pm 18.79	76.58 \pm 16.30	0.001
PedsQL-C psychosocial health	63.65 \pm 16.95	79.11 \pm 12.51	<0.001

PedsQL-C, Pediatric Quality of Life Inventory Child Version;
PedsQL-P, Pediatric Quality of Life Inventory Parent Version.

study and control groups were compared in terms of scale scores according to gender, the child and caregiver form scores for the girls in the study group were significantly lower compared to that of the control group. For the boys, except for the PHSS, the child and caregiver form scores were significantly lower in the study group versus the control group. The scale scores and the results of statistical analysis of the study and control groups are shown in [Table 3](#).

Mothers' self-reported QoL was evaluated using the WHOQOL-BREF. The scale and subscale scores of the mothers of the children with NE were significantly lower compared to the control group. The results of the WHOQOL-BREF scale are shown in [Table 4](#). When the WHOQOL-BREF scores for the study group were evaluated according to the children's gender, no significant difference was found. Likewise, there was no significant difference between genders in terms of the WHOQOL-BREF scores of the control group. When the mothers of the girls in the study and control groups were compared, the WHOQOL-BREF social communication subscale scores of the mothers of girls in the study group were significantly lower ($P = 0.049$) compared to that in the control group. For the mothers of the boys, all subscale scores, except for the environment area scores, were statistically significantly lower in the study group versus the control group.

When the children's self-perceived QoL were analyzed by classifying the behavior of the mothers as anger/punishment and tolerance/disregard, the PedsQL 4.0 scale physical health subscale scores (68.71 ± 1.88 vs 78.55 ± 1.57 ; $P = 0.017$) and the total scores (65.48 ± 15.69 vs 73.33 ± 15.25 ; $P = 0.027$) were significantly lower in children who had been scolded or punished, compared to those who had been tolerated and disregarded. When the WHOQOL-BREF scale scores and PedsQL 4.0 proxy report scores were analyzed according to the mothers' behaviors, no significant difference was found between the study and control groups.

Table 3 Gender comparisons of PedsQL scores.

Scale scores	Enuretic girls mean \pm SD (n = 33)	Enuretic boys mean \pm SD (n = 49)	P-value	Enuretic girls mean \pm SD (n = 33)	Enuretic boys mean \pm SD (n = 49)	P-value	Control girls mean \pm SD (n = 42)	Control boys mean \pm SD (n = 51)	P-value
PedsQL-C total	65.49 \pm 18.04	70.95 \pm 14.05	0.129	65.49 \pm 18.04	70.93 \pm 14.05	<0.001	83.87 \pm 9.06	78.60 \pm 12.21	0.004
PedsQL-C physical health	66.74 \pm 19.25	76.87 \pm 16.37	0.013	66.74 \pm 19.25	76.87 \pm 16.37	<0.001	84.37 \pm 10.10	78.43 \pm 14.14	0.712
PedsQL-C psychosocial health	64.77 \pm 20.21	67.77 \pm 16.82	0.564	64.77 \pm 20.21	67.77 \pm 16.52	<0.001	83.61 \pm 10.21	78.63 \pm 13.12	0.001
PedsQL-P total	65.34 \pm 17.63	65.56 \pm 14.11	0.951	65.34 \pm 17.63	65.56 \pm 14.11	0.001	80.39 \pm 11.66	76.44 \pm 12.49	<0.001
PedsQL-P physical health	66.54 \pm 18.94	69.01 \pm 18.81	0.563	66.54 \pm 18.94	69.01 \pm 18.81	0.006	77.82 \pm 15.87	75.55 \pm 16.73	0.069
PedsQL-P psychosocial health	64.68 \pm 19.49	62.96 \pm 15.18	0.656	64.68 \pm 19.49	62.96 \pm 15.18	<0.001	81.75 \pm 11.53	76.93 \pm 12.98	<0.001

PedsQL-C, Pediatric Quality of Life Inventory Child Version; PedsQL-P, Pediatric Quality of Life Inventory Parent Version.

Table 4 Comparison of enuretic children's mothers WHOQOL-BREF scores with healthy control group.

WHOQOL-BREF scale scores	Enuretic group mean \pm SD (n = 82)	Control group mean \pm SD (n = 93)	P-value
Physical health	67.90 \pm 18.97	75.96 \pm 13.71	0.002
Psychosocial health	62.66 \pm 18.41	72.39 \pm 16.07	0.001
Social relationships	60.90 \pm 23.98	72.18 \pm 22.47	0.001
Environmental area	61.04 \pm 17.81	67.44 \pm 15.99	0.013

WHOQOL-BREF, World Health Organization Quality of Life Instrument, short form.

Discussion

The results of the present study suggest that NE negatively affects the QoL of children with NE, and their mothers. There are limited number of papers on NE and QoL. In Japan, Naitoh et al. conducted a study with 139 children with NE, and their mothers, and found that compared to the control group, the perceived QoL in the children with NE was significantly lower only in the family subscale [18]. In the present study, the QoL scores of the children with NE were lower in all QoL aspects. There is information that children with NE: have lower self-image; might be afraid that someone will find out and everyone will know that they wet the bed; might be afraid of being humiliated; might experience social withdrawal [7,19,20]. Van Tijen et al. stated that NE is the third leading stressor for children, following divorce and arguments between parents [21].

In the present study, when the mothers' QoL was evaluated via the WHOQOL-BREF, the QoL scores of the mothers in the study group were significantly lower in all subscales compared to the control group. In 2008, Egemen et al. evaluated the QoL in mothers of children with NE, and reported that the mothers' QoL was significantly lower in two subscales (bodily pain and role emotional) [22]. Naitoh et al. evaluated the QoL of mothers of children with NE and reported significantly lower QoL in only the vitality subscale, compared to the controls [18]. In another study that evaluated the QoL in mothers of children with NE, the self-perceived QoL of mothers of children with NE was lower than that of the healthy controls in all aspects except for social functionality [23]. In the present study, the significantly lower self-perceived maternal QoL in the mothers of children with NE compared to the control group can be explained by the use of a different scale.

Although no study in the literature has compared self-perceived QoL between children with NE according to gender, conflicting results were observed in studies that investigated the relation between self-perceived QoL and gender. Although the study that used PedsQL 4.0 in children with cerebral palsy determined no significant difference between the genders, Deshpande et al. found lower self-perceived QoL in girls versus boys among children with urinary incontinence [24,25]. In the present study, only

PedsQL 4.0 PHSS was significantly higher in boys compared to girls. In the control group, the total and physical health subscale scores were significantly higher in girls versus boys. Considering these two conditions, NE might have a more unfavorable effect on girls, particularly in the physical health aspect.

In the literature, no information was found about the effect of mothers' reactions on QoL. In the present study, when children who were scolded or punished were compared with children who were tolerated or disregarded, the total and physical health scores of self-perceived QoL of the children who were scolded or punished were significantly lower compared to the children who were tolerated or disregarded. This might be because the children may be afraid of being scolded or punished and, thus, are more stressed than the tolerated or disregarded group.

Natale et al. conducted a study on children with urinary incontinence and voiding postponement, and reported that the self-reported QoL scores were higher than the QoL scores of the proxy reports [26]. In the present study, although the QoL scores of the self-reports and proxy reports differed, the mothers gave lower scores for their children, which is inconsistent with the results from Naitoh et al. [18]. Although the scores given by the children were different from the scores given by the mothers, a significant positive correlation was observed. This might be interpreted in the way that the child and the mother influence each other in terms of QoL; thus, mothers' and children's perceptions of QoL should be evaluated separately [27].

Egemen et al. conducted a study in 2008, which indicated that the severity of enuresis and maternal age were not correlated with the mother's QoL scores [22]. In the present study, there was also no significant correlation between the severity of enuresis and QoL scores; however, a significant positive correlation was determined between maternal age and self-reported PHSS, TSS and PsHSS. Whereas, similar to the report by Egemen et al., no significant correlation was determined between maternal QoL scores and maternal age.

Although the present study has several strengths such as the moderate number of participants and a control group, it also has several limitations. First, the present study was conducted at a single center, which limits the generalizability of the results. Second, a structured interview for further psychiatric comorbidity was not used. Third, a generic scale to evaluate mothers' and children's QoL was used, which might also limit the findings. Another limitation is that the controls were not selected randomly and, thus, might have been biased.

In conclusion, the present study determined that NE unfavorably affects the QoL perception of the child and the mother. Therefore, when a child is admitted to a physician with enuresis complaints, it should be considered that the mother could be unfavorably influenced by this process and thus, she may need to be encouraged and should be involved in the treatment.

Conflict of interest

None declared.

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None sought.

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