THE MEDICAL BULLETIN OF
SISLI ETFAL HOSPITAL

DOI: 10.14744/SEMB.2024.02679
Med Bull Sisli Etfal Hosp 2025;59(1):89–97

Original Research

Impact of Nocturnal Enuresis on Health-Related Quality of Life in Children

Emre Aygun, Sibel Tugce Aygun, Yelda Turkmenoglu, Ahmet Irdem, Hasan Dursun

Department of Pediatrics, Prof. Dr. Cemil Tascioglu City Hospital, Istanbul, Türkiye

Abstract

Objectives: The primary aim of this study was to evaluate the effects of nocturnal enuresis (NE) on Health-Related Quality of Life (HRQoL) in children with a special emphasis on the domains of HRQoL.

Methods: This was a case-control study in which consecutive children with NE were recruited along with their parents. Age and sex-matched children without enuresis served as controls. Age-appropriate children and proxy versions of the German Quality of Life Questionnaire (KINDL) were used to evaluate HRQoL and its domains. The clinicodemographic characteristics and family data were collected. HRQoL and the domain scores were compared between the patients and the control subjects.

Results: 100 children (50 of whom are males) with enuresis along with their parents were included in the study. 100 children served as the control group. The mean age of the patients was 9.58±2.77 years, and was no different from that of the control group. 55% of the children were receiving treatment for NE. The most common treatment was the nighttime waking (40%). The most commonly used drug was desmopressin. The median score of the health-related quality of life was 78.8 [69.2–83.3] in children with NE versus 90 [86.7–91.7] in the control group ($p<0.001$). In all domains, the median scores were significantly lower in children with NE compared with the controls.

Conclusion: Turkish children with NE had a significantly lower HRQoL score compared with children without NE. All the domain scores were also significantly lower in children with NE compared with the control subjects.

Keywords: Child, nephrology, nocturnal enuresis, quality of life, surveys and questionnaires

Please cite this article as "Aygun E, Aygun ST, Turkmenoglu Y, Irdem A, Dursun H. Impact of Nocturnal Enuresis on Health-Related Quality of Life in Children. Med Bull Sisli Etfal Hosp 2025;59(1):89–97".

Nocturnal enuresis (NE) is the involuntary urine incontinence while asleep in a child who is more than five years old.[1] If the affected child has only nocturia and nocturnal bedwetting, then it is called monosymptomatic nocturnal enuresis. NE is a common occurrence during childhood, with a reported prevalence of up to 9.5% among schoolchildren.[2] The prevalence decreases as the child grows because of a 15% annual rate of spontaneous resolution. Studies performed in Turkey reported the prevalence rates of NE as from 9.5% to 12.9% among the 6-12-year-old children.[2] Alarm therapy, behavioral interventions, and pharmacological treatments are generally used for children without any benefit from water restriction and night awakening.[3]

Nocturnal enuresis negatively impacts not only the children but their parents as well. It has clearly been shown that NE can affect a child's self-esteem adversely.[4] In addition, particularly in older ages, NE can interfere with the healthy psychological development of the child as well as their school performance and interpersonal relations.[2,5,6] Moreover, sev-

Address for correspondence: Emre Aygun, MD. Department of Pediatrics, Prof. Dr. Cemil Tascioglu City Hospital, Istanbul, Türkiye
Phone: +90 530 207 16 63 **E-mail:** emreaygun88@gmail.com

Submitted Date: September 16, 2024 **Revised Date:** November 04, 2024 **Accepted Date:** November 25, 2024 **Available Online Date:** March 18, 2025

eral studies in the last decade have demonstrated that NE was negatively correlated with the health-related quality of life (HRQoL). A very recent systematic review evaluated the unfavorable effect of enuresis on HRQoL.[7] The authors revealed that HRQoL scores were significantly lower in most of the studies compared with healthy children. However, there were conflicting results regarding which subscales (domains) of quality of life were affected most. These differences can result from the differences in the age group of the studied children and the differences in the questionnaires used to evaluate HRQoL. Moreover, diverging results have been accrued regarding the effects of gender and age group on HRQoL in children with enuresis.[8–11]

Therefore, in a case-control design, we aimed to evaluate the impact of NE on HRQoL in children aged between 6 and 16 years, with a particular emphasis on the domains of HRQoL. One additional goal of the present study was to assess the effects of clinicodemographic characteristics, the treatment status of enuresis, and the family factors on HRQoL and its domains.

Methods

Setting and Design

This study was a cross-sectional case-control study in which consecutive children, who had nocturnal enuresis diagnosis based on DSM-IV Turkish version, were included. An equal number of sex- and age-matched children without NE were recruited from the healthy child outpatient clinic as the control group. The study's primary aim was to evaluate the health-related quality of life and determine the factors affecting this condition. The study protocol was approved by the Ethics Committee (Approval #: 2017:759). The study aimed to explain the children and their parents in detail, and informed consent was obtained. The data collection phase of the study was conducted between December 2017 and June 2018.

Patients and Controls

Consecutive children aged between 6 and 16 years who applied to our hospital's outpatient Pediatric Nephrology clinic for NE were enrolled in the study. The parents of these children were also included to provide data regarding the demographics and other features of the study on children and to complete the relevant quality of life surveys. Only children who could never maintain nighttime dryness for more than six months (primary nocturnal enuresis) and had enuresis as their only symptom (monosymptomatic) were included. New-onset enuresis symptoms after a dry period of ≥6 months (secondary enuresis) and the presence of polysymptomatic enuresis were regarded as the exclusion criteria.[12] Age- and sex-matched healthy children without enuresis, together with their parents, were enrolled as the control group. The patients and their parents were instructed to fill in the study surveys during the study enrollment.

Data Collection

The questionnaire used in this study was composed of two parts. Part 1 consisted of items used to collect data regarding the clinical and demographic characteristics of the patients and their families. The second part of the questionnaire was used to determine the HRQoL and included the age-appropriate versions of KINDL surveys and their proxy versions (filled by the parents).

The investigators devised the data-collection questionnaire for data collection. The questionnaire was two pages long and composed of 24 questions. The questionnaire involved questions regarding the patient credentials, socioeconomic level, and the educational status of the parents, as well as questions regarding nocturnal enuresis and its treatment. Parents were requested to complete this questionnaire. A pediatric nephrologist thoroughly examined all children included in the study to exclude potential secondary organic causes of enuresis. Then, the children and their parents were instructed to complete the relevant HRQoL questionnaires, the details of which were summarized below.

To evaluate the HRQoL, the KINDL was used.[13] The questionnaires were completed by the patients and their parents in face-to-face interviews. The parents were asked to complete the questionnaire part that included the general assessment of the child's enuresis problem. Self-reported parts and family forms of the HRQoL questionnaire were instructed to be completed separately by the children and their parents, respectively.

German Quality of Life Questionnaire (KINDL)

Bullinger et al.[13] devised the German Quality of Life Questionnaire (KINDL) as a general-purpose questionnaire. This survey has been revised and reached its current form in the following years.[14,15] The validity and reliability study of a Turkish version of the questionnaire has been performed in children aged 8-12 and 13-18 years.[16,17]

The general-purpose health-related quality of life questionnaire for children (Kid-KINDL) uses different survey forms for various age groups: Kiddy-KINDL for small children (4-7 years), Kid-KINDL for children (8-12 years), and Kiddo-KINDL for adolescents (13-18 years). Each study participant was assessed by the self-report form filled out by the child per se and the parents' form filled out by their parents.

The self-report forms of children and adolescents are

composed of 6 additional items (questions) that were answered if the person had a chronic disease and 24 Likert-scaled items associated with six domains (dimensions). The self-report forms of small children involved six additional questions that were answered if the person had a chronic disease and 12 items in six dimensions. Parents' forms for children and adolescents also had the same number of items as the self-report forms. On the other hand, the self-report forms of small children had a sub-scale consisting of 22 extra items. Domains present in self-report and family forms were physical well-being, emotional well-being, self-esteem, family, friends, and everyday functioning. The parents' form of small children also included the "Kiddy Parents" subscale.

Each item in children and adolescents' self-report and parents' forms was scored between 1 and 5, whereas each item in small children's self-report forms was scored between 1 and 3. Item scores are summed up to yield domain scores as taking the reverse scoring items into account. Then, all domain scores are summed up to find the total score converted to the percent values to facilitate interpretation. The higher the HRQoL score was, the better the health-related quality of life was.

Statistical Analysis

Statistical analyses were performed using the Jamovi project (2020), Jamovi (Version 1.1.9.0) [Computer Software] (Retrieved from https://www.jamovi.org). Descriptive data derived from the study were presented as mean±standard deviation or median and interquartile range depending on the distribution of the continuous variables. Categorical variables were given as numbers and percentages. The Kolmogorov-Smirnov test performed the normality check of numerical variables. In comparing the two independent groups, independent samples t-test was used when the numerical variables were distributed normally.

In contrast, the Mann-Whitney U test was used when the numerical variables did not distribute normally. The Kruskal Wallis H test was used to compare more than two groups if the numerical variables did not distribute normally. In non-parametric tests, the differences between the groups were evaluated by the Dwass-Steel-Critchlow-Fligner test. The differences between the categorical variables were compared with the Pearson chi-square and the Fisher Freeman Halton Test in 2x2 tables and RxC tables, respectively.

We examined the correlation between HRQoL and other relevant study parameters. The correlations were analyzed with Pearson's correlation coefficient and the Point-Biserial correlation coefficient, and both variables were numerical, or one of them was ordinal, respectively.

Omega Reliability Analysis

When factor loadings were equal on a scale, coefficients alpha and omega gave comparable results. However, when factor loadings were not equal, it was advised to use the omega coefficient.[18] Since factor loadings were different, we thought that it would be more reasonable to use omega. We calculated the omega reliability coefficient for each age group on the Kiddy-KINDL scale. In the 6-8 age group, Omega value was 0.737; 9-12 age group Omega value was 0.939; 13-16 age group Omega value was 0.969. Figures were constructed via Jamovi module Flexplot. A p-value below 0.05 was accepted as statistically significant.

Helsinki Declaration

This study has been conducted in accordance with the Helsinki Declaration. All phases of the research adhered to ethical principles, with the utmost care given to human rights and the safety of participants.

Results

Baseline Characteristics of the Patients and Control Subjects

One hundred children (50 of whom were males) with enuresis, along with both of their parents, were included in the study. One hundred children (48 of whom were males), recruited from the healthy child outpatient clinic and did not have enuresis, along with their parents, served as the control group. The mean age of the patients was 9.58±2.77 years and was comparable to that of the control group. When we looked at the educational status of the patients and the controls, the only difference was that the patients had more primary school graduated fathers than the controls. There was no difference in terms of the mothers' education status between the groups. Both groups were also similar regarding monthly income and parents' vital and marital status. Six children in the patient group attended the kindergarten or daycare, whereas none in the control group did.

Fifty-nine percent of the patients had a family history of enuresis, whereas this value was only 10% in the control group ($p<0.001$).

The urgent need for a toilet was present in 72% of the children. On the other hand, only three children (3%) in control group described the urgent need for a toilet ($p<0.001$). Both groups again were comparable concerning the presence of comorbid conditions and other urinary tract disorders. The baseline demographic characteristics of the patients and control subjects are shown in Table 1.

Table 1. Baseline demographic characteristics of the patients and control subjects

	Group		p
	Patient n=100	**Control n=100**	
Age (years)	9.58±2.77	10.13±2.71	0.157***
Sex			
Male	50 (50)	48 (48)	0.777*
Female	50 (50)	52 (52)	
Father age	40±7.1	40.5±6.2	0,647***
Mother age	35.7±6.7	36.4±5.6	0.437***
Father's education status			
Primary school	29 (29)	12 (12)	0.027*
Secondary school	32 (32)	42 (42)	
High school	29 (29)	32 (32)	
University	10 (10)	14 (14)	
Mother's education status			
Primary school	45 (45)	28 (28)	0.067*
Secondary school	25 (25)	39 (39)	
High school	21 (21)	23 (23)	
University	9 (9)	10 (10)	
Monthly income			
<1600 TL	34 (34)	18 (18)	0.080*
1600-2000 TL	34 (34)	41 (41)	
2000-3000 TL	20 (20)	27 (27)	
>3000 TL	12 (12)	14 (14)	
Are parents alive?			
Both	98 (98)	99 (99)	0.999**
Only mother	1 (1)	1 (1)	
Only father	1 (1)	0 (0)	
Are parents divorced?			
Yes	5 (5)	3 (3)	0.721**
No	95 (95)	97 (97)	
Family history of enuresis			
Absent	41 (41)	90 (90)	<0.001**
Siblings	19 (19)	1 (1)	
Parents	15 (15)	2 (2)	
Uncles and aunts	12 (12)	4 (4)	
Cousins	13 (13)	3 (3)	
Urgent need for toilet			
Present	72 (72)	3 (3)	<0.001*
Absent	28 (28)	97 (97)	
Other urinary tract disorders			
Present	18 (18)	8 (8)	0.036*
Absent	82 (82)	92 (92)	
Other comorbid conditions			
Present	26 (26)	17 (17)	0.121*
Absent	74 (74)	83 (83)	
School attended			
Nursery school-Kindergarten	6 (6)	0 (0)	0.033**
Primary school	57 (57)	52 (52)	
Secondary school	25 (25)	28 (28)	
High school	12 (12)	20 (20)	

Descriptive statistics were presented as number (%) for categorical variables and mean±standard deviation for numerical variables. *. Pearson Chi-Square test was used. **. Fisher Freeman Halton Test was used. ***. Independent Samples t-test was used. IQR: Interquartile Range. Bold p values are statistically significant (p<0.05).

Characteristics of Enuresis in the Patient Group

All of the children had NE. None had daytime bedwetting. Twenty-eight of the children (28%) with enuresis reported that they had an urgent need for the toilet. The majority of the children had only one daily episode of enuresis (46%). Thirty-four percent and twenty percent of the children had two and ≥3 episodes of enuresis in one day, respectively. In all the patients included, the enuresis type was nocturnal. A little more than half of the patients (55%) were receiving treatment for enuresis at the time of the enrollment. The most common form of treatment was the nighttime periodic waking of the child (40% of the treated children). Thirty-three children (33%) were receiving a kind of pharmacotherapy. The most commonly used drug was desmopressin. The features of enuresis in the patient group are summarized in Table 2.

Health Related Quality of Life and Its Domains

The median score of HRQoL was 78.8 [69.2–83.3] in children with enuresis. This value was significantly lower compared with that of the control group (90 [86.7–91.7], p<0.001). In all six domains, the median scores were significantly lower in children with NE compared with the control subjects (Table 3 and Fig. 1).

We compared HRQoL according to several features of the patient group. Males and females had comparable median HRQoL scores. Similarly, the presence and absence of an urgent need for a toilet did not affect median total HRQoL scores. However, there was a significant difference among children in different daily numbers on enuresis. Paradoxically, the median total HRQoL score was significantly higher in children with two daily enuresis episodes than in children with only one enuresis episode (p=0.003).

Interestingly, there was no difference in HRQoL scores between the children with and without enuresis treatment (p=0.315). However, there appeared to be a significant difference in the median total HRQoL scores regarding the type of enuresis treatment. The lowest score was seen in imipramine treatment. Both children who were woken at night and receiving desmopressin treatment had significantly higher median HRQoL scores than children receiving imipramine. The lowest median HRQoL scores were seen in adolescents attending high school. Children attending nursery school-Kindergarten, primary school, and secondary school had significantly higher median HRQoL scores than adolescents attending high school. Tables 4 and 5 demonstrated the median HRQoL scores according to those mentioned above and other demographic and treatment features and post hoc pairwise comparisons of the significant results, respectively.

Table 2. Characteristics of the enuresis in the patient group

Parameters	Status	n (%)
Urgent need for toilet	Present	72 (72)
	Absent	28 (28)
The daily number of bedwetting		
	1	46 (46)
	2	34 (34)
	≥3	20 (20)
Treatment status for enuresis	Not receiving	45 (45)
	Receiving	55 (55)
Type of enuresis treatment	Waking at night	22 (22)
	Imipramine	3 (3)
	Oxybutynin	7 (7)
	Alarm therapy	7 (7)
	Desmopressin	16 (16)
	None	45 (45)
Duration of treatment	No treatment	45 (45)
	0-6 months	21 (21)
	6-12 months	18 (18)
	More than 1 year	16 (16)

Descriptive statistics were presented as number (%) for categorical variables.

Table 3. Scores of health-related quality of life and its 6 domains in patients and controls

	Group		p*
	Patient n=100	Control n=100	
Health-related Quality of Life	78.8 [69.2–83.3]	90 [86.7–91.7]	<0.001
Physical well-being	75 [65–80]	90 [85–90]	<0.001
Emotional well-being	70 [65–80]	90 [80–90]	<0.001
Self-esteem	75 [62.5–85]	90 [80–90]	<0.001
Family	80 [70–90]	90 [85–100]	<0.001
Friends	85 [75–90]	90 [80–95]	0.002
Everyday functioning (school-nursery school/ kindergarten)	80 [65–90]	90 [80–100]	<0.001

Descriptive statistics were presented as median [IQR. *. Mann-Whitney U test was used. IQR: Interquartile Range. Bold p values are statistically significant (p<0.05).

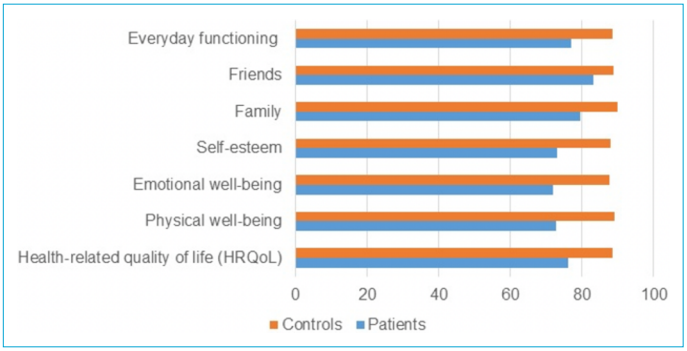

Figure 1. Clustered bar-chart showing scores median total health-related quality of life and 6 domains of patients and control subjects.

Table 4. Comparison of the scores of HRQoL in patients with enuresis according to demographic characteristics and enuresis features

	Health related quality of life (HRQoL)	p
Sex		
Male (n=50)	77.5 [71.7–83.3]	0.687**
Female (n=50)	79.2 [67.5–83.3]	
Urgent need for toilet		
Present (n=72)	78.8 [71.3–83.8]	0.431**
Absent (n=28)	78.8 [67.1–81.3]	
Daily number of bedwetting		
1 (n=46)	75 [65–80]	0.004*
2 (n=34)	80.4 [75.8–85]	
≥3 (n=20)	81.7 [67.5–90]	
Other urinary tract disorders		
Present (n=18)	78.8 [65–81.7]	0.167**
Absent (n=82)	78.8 [71.7–84.2]	
Other comorbid conditions		
Present (n=26)	76.7 [65–84.2]	0.550**
Absent (n=74)	79.2 [72.5–83.3]	
Type of enuresis treatment		
Waking at night (n=22)	80 [75–82.5]	0.029*
Imipramine (n=3)	51.7 [51.7–55.8]	
Oxybutynin (n=7)	66.7 [56.7–81.7]	
Alarm (n=7)	71.7 [60–81.7]	
Desmopressin (n=16)	79.2 [71.7–83.3]	
None (n=45)	79.2 [69.2–85.8]	
Treatment status for enuresis		
Not receiving treatment (n=45)	79.2 [69.2–85.8]	0.315**
Receiving treatment (n=55)	78.3 [69.2–82.5]	
Family history of enuresis		
None (n=41)	79.2 [72.5–83.3]	0.465*
Siblings (n=19)	75.8 [68.3–83.3]	
Parents (n=15)	75.8 [60–83.3]	
Uncles and aunts (n=12)	80 [75.8–92.5]	
Cousins (n=13)	80.8 [65–82.5]	
Father's education status		
Primary school (n=29)	75.8 [65.8–83.3]	0.643*
Secondary school (n=32)	78.8 [66.7–82.9]	
High school (n=29)	79.2 [72.5–83.3]	
University (n=10)	79.2 [76.7–83.3]	
Mother's education status		
Primary school (n=45)	78.3 [68.3–82.5]	0.408*
Secondary school (n=25)	79.2 [65–85.8]	
High school (n=21)	78.3 [70.8–81.7]	
University (n=9)	81.7 [76.7–86.7]	
Monthly income		
<1600 TL (n=34)	75.4 [65.8–83.3]	0.591*
1600-2000 TL (n=34)	79.2 [66.7–82.5]	
2000-3000 TL (n=20)	80 [75.4–84.6]	
>3000 TL (n=12)	77.5 [76.7–82.5]	
School attended		
Nursery school-Kindergarten (n=6)	88.3 [81.7–93.3]	<0.001*
Primary school (n=57)	80.8 [78.3–85]	
Secondary school (n=25)	72.5 [65.8–76.7]	
High school (n=12)	57.9 [52.5–62.1]	

Descriptive statistics were presented as median [IQR]. *Kruskal-Wallis H test was used. **Mann-Whitney U test was used. IQR: Interquartile Range. Bold p values are statistically significant (p<0.05).

Table 5. Post-hoc pairwise comparisons for Table 4

Daily number of bedwetting – Total HRQoL		p
Once	Twice	0.003
Type of enuresis treatment – Total HRQoL		
Waking at night (n=22)	Imipramine (n=3)	0.004
Imipramine (n=3)	Desmopressin (n=16)	0.007
Imipramine (n=3)	None (n=45)	0.005
School attended – Total HRQoL		
Nursery school-Kindergarten	Secondary school	0.005
Primary school	Secondary school	<0.001
Nursery school-Kindergarten	High school	0.004
Primary school	High school	<0.001
Secondary school	High school	<0.001

HRQoL: Health-related Quality of Life.

Correlation Analyses

We examined the correlation between HRQoL and domain scores with other parameters. HRQoL showed a significant negative correlation with both mother and father ages. As the age of the parents increased, the score of HRQoL decreased. Similarly, the HRQoL domains of physical well-being, emotional well-being, self-esteem, family and friends, and everyday functioning showed a significant negative correlation with parent ages. Everyday functioning also showed a significant positive correlation with the mother's and father's education status. As the parents' education status increased, the score of everyday functioning increased.

Discussion

The most important findings of the present study were as follows: (i) Turkish children with nocturnal enuresis had a significantly lower HRQoL score compared with children without enuresis. All domain scores, including physical well-being, emotional well-being, self-esteem, family and friends, and everyday functioning, were significantly lower in children with NE than those in the control subjects. (ii) Being under treatment for NE was not associated with higher HRQoL scores. (iii) There was no gender difference in the HRQoL scores, and the scores tended to decrease as the age of the children increased. (iv) The HRQoL and all domains showed a negative correlation with both parent ages.

Nocturnal enuresis is considerably common; one in every ten school-aged children suffers from the disorder.[2] Most, but not all,[19,20] previous studies have reported that the presence of NE is associated with a worse HRQoL.[4,10,11,21,22] In a recent systematic review, Collis and colleagues evaluated the studies that investigated the impact of enuresis on the HRQoL in children.[7] The authors have concluded

that due to the differences in patient populations and data collection tools, the results of the evaluated studies were inconsistent regarding which subscale of the HRQoL was affected most. Kilicoglu et al.[10] have found that NE had a negative impact on all domains of HRQoL.

On the other hand, Naitoh et al.[21] have used the Kid-KINDL questionnaire to evaluate the HRQoL and revealed that the treatment of NE did not improve self-esteem, peer relations, and school domains. Iscan and Ozkayin,[11] in a case-control study, have shown that the most affected domains of the HRQoL that KINDL measured were self-esteem, emotional well-being, and relationships with family and friends. Our results agreed with most previous studies that those children with NE had significantly lower HRQoL scores than control subjects. Moreover, the scores of all six domains of HRQoL were significantly lower in enuretic children than those in their healthy counterparts.

Some of the previous studies have detected gender differences in the HRQoL in enuretic children. Generally, girls tended to have lower HRQoL scores compared with boys.[10,20] On the other hand, some other studies have not shown a gender difference in this regard.[9,11] In the same vein, our results did not show a gender difference concerning the HRQoL scores.

Few studies examined the association of age and HRQoL in children with nocturnal enuresis to the best of our knowledge. Theunis et al.[8] studied the self-image of children with enuresis. Older children (10-12 years old) compared to younger ones had lower self-esteem and perceived competence. In contrast to the findings of the latter study, Ring and colleagues found that children with enuresis over 9.25 years old had significantly higher HRQoL scores than children below 9.25 years old.[9] Our results showed a gradual decrease in the HRQoL score as the age increased. Children attending nursery school-Kindergarten had the highest HRQoL score, whereas children attending high school had the lowest (p=0.004). We think that this difference might be due to several factors, including the increased socialization of the child and the heightened awareness, among others.

Several previous studies showed that enuresis treatment could significantly improve HRQoL.[21,23,24] Although our study was not an intervention study, our results showed that enuretic children receiving and not receiving treatment had comparable scores of HRQoL. Since we did not know the pretreatment scores of HRQoL of these children, we have not been able to conclude that the treatment of enuresis is not associated with improvements in quality of life. These treated children might have had shallow HRQoL scores before the commencement of enuresis treatment, and current scores might reflect their improved level.

Imipramine is a tricyclic antidepressant medication recommended in enuretic patients who fail to respond to other therapies such as alarm therapy and desmopressin. It is believed to act through an increasing antidiuretic hormone secretion and sleep structure modification. However, the use of imipramine can cause several troublesome adverse effects such as anxiety, dizziness, drowsiness.[25] In our cohort, three children were on imipramine treatment, and their median total HRQoL scores were the lowest among all treatment modalities. Indeed, this might be due to the low number of patients using the drug. The highest HRQoL scores were attained with desmopressin treatment and periodic waking at night (not alarm therapy).

Our analyses showed that the HRQoL and all domains showed a significant negative correlation with both mother and father ages. As the parent age increased, the HRQoL significantly decreased. This might, in part, be due to the relatively closer interest of younger parents compared with elder parents. The improvement is not directly related to the type of medical treatment and interventions, as supported by the absence of any relationship between medical treatment and HRQoL in the present study. We may expect that these elderly parents might have similar experiences of NE with their former children considering the high rate of familial predisposition. Such experiences may lead to a decreased interest of the parent in their latter children with NE. So, the possible closer interest of the younger parents might translate into more intimate care, including the search for medical and psychological help that consequently affects the HRQoL of the offspring. On top of those, the lowest HRQoL score was found in families with enuretic children and families with a family income of 1600 TL or less. In addition, a statistically significant difference was found between the total HRQoL of enuretic and healthy children according to the income levels of the families. On the other hand, when the enuretic children were evaluated among themselves, no effect of family income on total HRQoL was found.

Previous studies focused on how the quality of life of children with bedwetting can be improved. Kilicoglu et al.[10] showed the scolding or punishment by the mothers causes a significant reduction in the quality of life in these children. Such behaviors may cause a stressful condition associated with poor quality of life. Therefore, a supportive paternal attitude that tolerates and disregards enuretic events is essential to improve the quality of life of enuretic children.[26] Although we did not analyze the association between the treatment outcome and HRQoL scores in this study, several authors reported the improvement in the quality of life secondary to the successful medical treatment.[26,27]

Iscan and Ozkayın[11] also showed higher HRQoL scores in children with total or partial response to treatment. Therefore, even partial responsibility for NE may be regarded as an adequate level for improving the quality of life in these children.[28] So, these findings should be considered during the treatment process of the enuretic children.

Some limitations of this study should be mentioned. First, we included only patients with monosymptomatic primary nocturnal enuresis. Thus, our findings cannot be generalized to children who have other enuresis types, such as polysymptomatic, secondary, and diurnal enuresis. Second, some of our results might have been affected by the small number of children in each subgroup. Our paradoxical finding that children with a higher number of daily bedwetting had a higher HRQoL can be an example of this issue. The cause-and-effect relationships between the clinical variables and the degree of HRQoL could not be analyzed due to the study's cross-sectional design. The absence of such causal associations was the other limitation. Lastly, but not least, we have not evaluated the internal validity of the survey responses. This may also have had an impact on our results.

Conclusion

This present study found that compared with children without NE, children with NE had a significantly lower HRQoL. All domain scores, including physical well-being, emotional well-being, self-esteem, family and friends, and everyday functioning, were significantly lower in NE children. There was no gender difference in HRQoL scores, and the scores decreased as the age of the children increased.

Disclosures

Ethics Committee Approval: This study was approved by the Okmeydanı Training and Research Hospital Ethics Committee (date: 21.11.2017, number: 759).

Peer-review: Externally peer-reviewed.

Conflict of Interest: The authors declared that they have no conflict of interest.

Funding: There is no funding source.

Authorship Contributions: Concept – E.A.; Design – E.A.; Supervision – S.T.A.; Materials – E.A.; Data collection &/or processing – H.D.; Analysis and/or interpretation – A.I.; Literature search – Y.T.; Writing – E.A.; Critical review – H.D.

Use of AI for Writing Assistance: No Artificial Intelligence (AI) supported echnologies, including Large Language Models (LLMs), chatbots, or image generators such as ChatGPT, were used in the preparation of this work.

Informed Consent: Informed consents were obtained from all individual participants included in the study.

References

1. Haid B, Tekgül S. Primary and secondary enuresis: pathophysiology, diagnosis, and treatment. Eur Urol Focus 2017;3:198–206. [CrossRef]
2. Sarici H, Telli O, Ozgur BC, Demirbas A, Ozgur S, Karagoz MA. Prevalence of nocturnal enuresis and its influence on quality of life in school-aged children. J Pediatr Urol 2016;12:159. [CrossRef]
3. Gözüküçük A, Kılıç M, Çakıroğlu B. Desmopressin versus desmopressin + oxybutynin in the treatment of children with nocturnal enuresis. J Pediatr Urol 2021;17:451. [CrossRef]
4. Kanaheswari Y, Poulsaeman V, Chandran V. Self-esteem in 6- to 16-year-olds with monosymptomatic nocturnal enuresis. J Paediatr Child Health 2012;48:e178–82. [CrossRef]
5. Gulisano M, Domini C, Capelli M, Pellico A, Rizzo R. Importance of neuropsychiatric evaluation in children with primary monosymptomatic enuresis. J Pediatr Urol 2017;13:36. [CrossRef]
6. Butler R, Heron J. An exploration of children's views of bed-wetting at 9 years. Child Care Health Dev 2008;34:65–70. [CrossRef]
7. Collis D, Kennedy-Behr A, Kearney L. The impact of bowel and bladder problems on children's quality of life and their parents: a scoping review. Child Care Health Dev 2019;45:1–14. [CrossRef]
8. Theunis M, Van Hoecke E, Paesbrugge S, Hoebeke P, Vande Walle J. Self-image and performance in children with nocturnal enuresis. Eur Urol 2002;41:660–7. [CrossRef]
9. Jönson Ring I, Nevéus T, Markström A, Arnrup K, Bazargani F. Nocturnal enuresis impaired children's quality of life and friendships. Acta Paediatr 2017;106:806–11. [CrossRef]
10. Kilicoglu AG, Mutlu C, Bahali MK, Adaletli H, Gunes H, Duman HM, et al. Impact of enuresis nocturna on health-related quality of life in children and their mothers. J Pediatr Urol 2014;10:1261–6. [CrossRef]
11. Iscan B, Ozkayın N. Evaluation of health-related quality of life and affecting factors in child with enuresis. J Pediatr Urol 2020;16:195. [CrossRef]
12. Haid B, Tekgül S. Primary and secondary enuresis: pathophysiology, diagnosis, and treatment. Eur Urol Focus 2017;3:198–206. [CrossRef]
13. Bullinger M, Mackensen S, Kirchberger I. KINDL – ein fragebogen zur gesundheitsbezogenen lebensqualität von kindern. Zeitschrift Gesundheitspsychol [Article in German] 1994;2: 64–7.
14. Ravens-Sieberer U, Bullinger M. Assessing health-related quality of life in chronically ill children with the German KINDL: first psychometric and content analytical results. Qual Life Res 1998;7:399–407. [CrossRef]
15. Ravens-Sieberer U, Bullinger M. News from the KINDL-Questionnaire a new version for adolescents. Qual Life Res 1998;7:653–4. [CrossRef]
16. Eser E, Yüksel H, Baydur H. KID-KINDL yaşam kalitesi ölçeği çocuk formu Türkçe sürümü geçerlilik ve güvenirlik sonuçları (Poster Bildiri). 1. Sağlıkta Yaşam Kalitesi Sempozyumu Program ve Özet Kitabı 2004;79.
17. Eser E, Yüksel H, Baydur H. kıddo-KINDL (KINDL ergen formu)

yaşam kalitesi ölçeği Türkçe sürümü geçerlilik ve güvenirlik sonuçları (Poster Bildiri). 1. Sağlıkta Yaşam Kalitesi Sempozyumu Program ve Özet Kitabı 2004;78.
18. Yurdugül H. The comparison of reliability coefficients in parallel, tau-equivalent, and congeneric measurements. Ankara Univ J Fac Educ Sci 2006;39:15–37.
19. Ertan P, Yilmaz O, Caglayan M, Sogut A, Aslan S, Yuksel H. Relationship of sleep quality and quality of life in children with monosymptomatic enuresis. Child Care Health Dev 2009;35:469–74. [CrossRef]
20. Van Herzeele C, Dhondt K, Roels SP, Raes A, Groen LA, Hoebeke P, et al. Neuropsychological functioning related to specific characteristics of nocturnal enuresis. J Pediatr Urol 2015;11:208. [CrossRef]
21. Naitoh Y, Kawauchi A, Soh J, Kaomi K, Miki T. Health related quality of life for monosymptomatic enuretic children and their mothers. J Urol 2012;188:1910–4. [CrossRef]
22. Nascimento Fagundes S, Azevedo Soster L, Lebl AS, Rodrigues Pereira RP,Tanaka C, Fernando Pereira R, et al. Impact of a multidisciplinary evaluation in pediatric patients with nocturnal monosymptomatic enuresis. Pediatr Nephrol 2016;31:1295–303. [CrossRef]
23. Fagundes SN, Lebl AS, Azevedo Soster L, Sousa e Silva GJ, Mattos Silvares EF, Koch VH. Monosymptomatic nocturnal enuresis in pediatric patients: multidisciplinary assessment and effects of therapeutic intervention. Pediatr Nephrol 2017;32:843–51. [CrossRef]
24. Brownrigg N, Braga LH, Rickard M, Farrokhyar F, Easterbrook B, Dekirmendjian A, et al. The impact of a bladder training video versus standard urotherapy on quality of life of children with bladder and bowel dysfunction: a randomized controlled trial. J Pediatr Urol 2017;13:374. [CrossRef]
25. Walker RA. Nocturnal enuresis. Prim Care Clin Off Pract 2019;46:243–8. [CrossRef]
26. Huang HM, Wei J, Sharma S, Bao Y, Li F, Song JW, et al. Prevalence and risk factors of nocturnal enuresis among children ages 5-12 years in Xi'an, China: a cross-sectional study. BMC Pediatr 2020;20:305. [CrossRef]
27. Fagundes SN, Lebl AS, Azevedo Soster L, Sousa E Silva GJ, Silvares EF, Koch VH. Monosymptomatic nocturnal enuresis in pediatric patients: multidisciplinary assessment and effects of therapeutic intervention. Pediatr Nephrol 2017;32:843–51. [CrossRef]
28. Sousa E Silva GJ, Sammour SNF, Ferraro AA, Koch VHK. Study of the profile of behavioral problems and quality of life indexes in a pediatric cohort of monosymptomatic enuresis. J Pediatr (Rio J) 2019;95:188–93. [CrossRef]