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EVALUATION OF THE EFFECTS OF THE TOILET TRAINING PROCESS ON THE CHILD'S QUALITY OF LIFE

Toilet training and quality of life

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ABSTRACT

Background: Toilet training is a significant developmental milestone for children. During the process of toilet training, voiding and defecation problems may develop, which have a major adverse impact on quality of life. The aim of this study was to assess the process to voiding and defecation problems and evaluate that these issues influenced the children's' quality of life.

Methods: The children included in the study were followed up at the Ankara University School of Medicine, Department of Social Pediatrics. Participants were surveyed via a questionnaire that included sociodemographic features, the toilet training process, and the pediatric quality of life inventory. The results were analyzed using IBM SPSS 11.5.

Results: The study included 177 children and their parents. There was no correlation between the parents' age, sociodemographic features and the timing of the start of toilet training. In the children included in the survey, voiding problems were found in 55.6% and defecation problems in 23.6%. Urinary retention during play and nocturnal enuresis were more frequent in the children trained at 25–36 months of age. The self-reported quality of life scores in children with voiding problems and with both voiding and defecation problems were lower than those in children who have not had any problems.

Conclusions: Even if the child has been toilet trained, it is essential to investigate daily urination and defecation habits at every follow-up visit, even if just briefly, and to discuss with families when a physician should be consulted.

Keywords: defecation problems, PedsQL, quality of life, toilet training, voiding disorder

INTRODUCTION

Toilet training is a process that enables the child to control the bladder and bowel throughout the day and night independently. This process is an important developmental milestone in a child's life and is significant for both parents and children. As a result of achieving developmental milestones in areas including language, movement, relationships, and self-care, each child learns independent toileting abilities during the transition from infancy to childhood (1).

Toilet training methods differ depending on the child's age and gender, the parents' socioeconomic status, and their cultural background. According to the American Academy of Pediatrics and the Canadian Pediatric Society, the process should just begin when the child is developmentally mature and shows signs of readiness (1, 2). It is reported in the guidelines that toilet training should be started at a physiologically and behaviorally appropriate time between 18 and 24 months (1, 2). Most children achieve both bladder and bowel control between 24 and 48 months (3).

Over time, various methods for toilet training have been developed, and several studies have been conducted to assess these methods. In these studies, a wide variety of disparities in the gender and race of the children, the sociodemographic features of the parents, and toilet training methods may be seen (4). A child-oriented approach to toilet training is a method based on the developmental readiness and willingness of the child for toilet training and is related to the child's developmental stage (1). Temporary setbacks that frequently occur during toilet training would be seen as a normal part of the process (5). Nocturnal enuresis and toilet refusal are the most common problems in toilet training. Some

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studies have revealed that children who are rewarded and punished during the toilet training process and who begin toilet training at an older age are more likely to experience nocturnal incontinence and urinary tract infections (4, 6) . On the other hand, toilet training is known to decrease the frequency of defecation in children, which can result in a variety of defecation issues as stool retention, constipation, and encopresis (7). It has been reported that defecation and voiding problems may be associated with starting toilet training earlier or later than the recommended time or difficulties experienced during the process (8).

Health-related quality of life is defined as the patient's subjective perception of their own health, and it is accepted that subjective perceptions are closely related to the psychosocial status of individuals (9). Previous studies have shown that issues during toilet training, such as enuresis, functional constipation, and encopresis, have a negative impact on children's everyday lives and impair their quality of life (10, 11).

The process of toilet training has been studied in terms of sociodemographic variables, training methods, training duration, training age, and upcoming challenges. However, to date, there has not been any research that demonstrates how the toilet training process affects a child's quality of life. Therefore, the aims of this study are to determine the multiple factors affecting toilet training, to evaluate the parents' training practices, to determine the relationship between the toilet training processes and voiding - defecation problems, and to evaluate the effects of these problems on the quality of life of children.

MATERIALS AND METHODS

The study was conducted in Ankara University School of Medicine, Social Pediatrics Department. Ankara University Faculty of Medicine Ethics Committee approved this study with decision number 11-619-17. All parents provided written informed consent.

Routine recommendations for toilet training are provided to parents starting from the 18-month age in the Social Pediatric Department. The study included children between the ages of 5-7 who scheduled a routine child health follow-up visit at the Social Pediatrics Department, who had completed toilet training, and who had had bladder and bowel control for at least six months. The study excluded children who had any organic or congenital pathology of the gastrointestinal and genitourinary systems, growth and developmental retardation, and who had not undergone toilet training for any reason. Chronic diseases like diabetes, heart diseases, neurological diseases, and neurological sequelae were also excluded from participation.

Measurements

The survey of sociodemographics and toilet training processes

The survey had three parts and 34 questions. There are 16 questions in the first part of the survey that assess the sociodemographic features of the parents and the child. Eight questions concerning the process of toilet training are included in the second part (time to start toilet training, time to complete toilet training, reasons for starting toilet training, toilet training methods, and problems occurred in the process). There are 10 questions about voiding and defecation problems in the third part. The questions in the third part were

developed by using the voiding dysfunction scores and the Rome IV criteria used to diagnose functional gastrointestinal system abnormalities in children (12, 13).

In order to rule out organic diseases in children who complained about urination and defecation, main laboratory tests (complete blood count, renal function tests, electrolytes, and urinalysis) were performed. Renal ultrasonography was planned to screen urinary system disorders if necessary. The children having organic disorders related with urination and defecation were excluded from the study at this time.

The Pediatric Quality of Life Inventory (PedsQL)

The Pediatric Quality of Life Inventory (PedsQL) developed by Varni et al (14). The PedsQL inventory is a brief, 23- item standardized survey evaluating a pediatric patient's health-related quality of life, which is quantified on a variety of functional domains (physical, emotional, social, and school function). Validity and reliability studies of PedsQL for 5-to 7-year old Turkish children was performed by Uneri et al (15).

Parents' proxy reports determined the degree to which each item had been a problem for each child during the previous month, using a 5-level scale: 0 = never a problem; 1 = almost never a problem; 2 = sometimes a problem; 3 = often a problem; and 4 = always a problem. Children's self-reports were simplified using a 3-level scale. Higher scores indicated better health related quality of life after the items were linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, and 4 = 0).

Statistical analysis

The results were analyzed using IBM SPSS 11.5 (SPSS Inc., Chicago, IL, USA). Numeric variables with normal distribution were given as mean +/- standard deviation, while numeric

variables that do not show normal distribution were given as median (minimum-maximum). The categorical variables were given as frequency (percentages). For two groups, the difference was evaluated with the Student-t test for numerical variables with a normal distribution and with the Mann-Whitney U test for numerical variables that did not have a normal distribution. For more than two groups, one-way analysis of variance was used for numerical variables with a normal distribution (ANOVA), the Kruskal-Wallis test does not have a normal distribution. Pearson Chi-Square and Fischer Exact Tests are used for categorical variables. The correlation between the scale sub-dimensions was determined by the intra-class correlation coefficient. A *p* value of 0.05 indicates statistical significance.

RESULTS

The study included a total of 177 children and their parents. The mean age of the children was 5.78 (± 0.82). The mothers had a mean age of 35.89 (± 5.14), while the fathers were on average 36.62 (± 5.22) years old. The sociodemographic features for the parents and children are shown in Table 1.

The first part of the survey asked parents' views on toilet training. According to 46.3% of the parents, toilet training would initiate between 19 and 24 months. However, toilet training was initiated between 19 and 24 months by 43.5% of the parents. Between the ages of 25 and 36 months, 48% of children successfully trained to use the toilet during the day. During toilet training, 79.1% of the children were cared by their mothers, 6.2% by caregivers, and 14.7% by their grandmothers.

There was no correlation between the parent's age and the time of the starting of toilet training. The Table 2 shows the association between sociodemographic features and age at the start of toilet training. The preference of working mothers was to delay toilet

training until 25-36 months. University-graduate parents and parents with a higher monthly income also started toilet training at 25–36 months ($p<0.05$).

The second part of the survey asked parents about issues with the toilet-training process and also voiding and defecation problems (Table 3). In the children included in the survey, voiding problems were found 55.6% and defecation problems were found 23.6%. Constipation was found in 15.3%, urgency in 41.2%, urinary retention during play in 20.9%, nocturnal enuresis in 13.6%, and daytime wetting in 12.4% of the children. Voiding and defecation problems were present together in 20.2% of the children, and only 41% of the children did not have any problems.

Children who completed toilet training between 25 and 36 months showed significantly higher toilet refusal ($p=0.02$); however, this age was not found to be significant for training regression and going back to diapers.

Table 4 shows the association between the age of toilet training and voiding and defecation problems. Urinary retention during play and nocturnal enuresis were more frequent in the children who were toilet trained at 25–36 months of age ($p<0.05$). The findings of the logistic regression analysis for these variables indicate that children who start toilet training after the age of 2 years have a three-fold higher risk of urine retention during play and a four-fold higher risk of nocturnal enuresis (Table 5).

When the compatibility between the children's and parents' responses to the quality of life scale was evaluated, the intra-class correlation coefficients were found to be between 0.40 and 0.75, and the p values were found to be <0.05 , indicating a moderate-good level of agreement (Table 6). In other words, it was found that there was a correlation between the

scale scores and the responses to the questionnaire of the parents and children. Table 6 also shows the median scores of the sub-dimensions of quality of life scores.

The table 7 shows the median scores of children with voiding and defecation problems and children without problems. The self-report scale total scores in children with voiding problems and with both voiding-defecation problems were lower than children who have not any problems ($p=0.001$). The parent-report scale total scores also similar, but it is not statistically significant ($p=0.07$).

The self-report scores on all dimensions among children with voiding and defecation problems were significantly lower (*all* $p < 0.05$) except for school related functioning score ($p=0.44$). The parent-report scores on physical health, psychosocial health and emotional functioning were lower, however only the emotional functioning scores were statistically significant ($p=0.023$).

Univariate regression analysis showed that employment status of mothers and family income significantly influenced the psychosocial health summary scores and also scales total scores indirectly ($p < 0.05$). The other variables did not influence the scores (Table 8).

DISCUSSION

Toilet training is an important milestone for a child and parents. To date, numerous studies have focused on the process of toilet training with varied characteristics such as age, gender, sociodemographic variables, cultural habits, race, and region. In addition, studies evaluating the toilet training processes of children with functional diseases retrospectively are also included in the literature (4, 6, 16-19). However, there is no study that deals with this process as a whole, with the problems that arise after the process and the effect of

these problems on the quality of life. In this study, the toilet training process was evaluated to determine the factors affecting toilet training and the relationship between the process and voiding and defecation problems, as well as the effects of these problems on the quality of life of children.

The relationship between sociodemographic features and the age of starting toilet training has been evaluated in many studies. In the study of Horn *et al.*, it was observed that as the educational level of the parents increased, toilet training started at a later age (18). Tarhan *et al.* found that the age of starting toilet training increased as the level of education of the parents increased, especially the mothers (17). In this study, the preference of university-graduate parents was to start toilet training at 25–36 months, similar to other research. Koc *et al.* reported that working mothers began toilet training their children at later ages (16). Similarly, in this study, we found that working mothers preferred delaying toilet training until 25–36 months. In the study of Horn *et al.*, it was reported that parents with higher income started toilet training later (18). In our study, we found that parents with a higher monthly income started toilet training at 25–36 months. The impact of disposable diapers on the household budget can be used to explain the association between monthly income and starting early age of toilet training.

The prevalence of enuresis recorded in research ranges from 6–10%, with nocturnal enuresis prevalence in Turkish studies ranging from 11.5-12.9% (20-23). Since the age group was smaller than in other research, the frequency we observed 13.6% was consistent with the rates in those studies. Only 11.9% of children with enuresis requested medical support, according to a research in our country (24). We suggested that because parents did not believe these signs were a problem, nocturnal enuresis and other voiding issues were more

prevalent than expected. The prevalence of functional constipation ranged from 0.7% to 29% in a study on childhood constipation (25). Similar to this study, the prevalence of children with constipation was 15.7% in our study.

The relationship between the age of the onset of toilet training and urination issues has been questioned in many studies. It was shown in a Belgian study that children who do not have urinary symptoms frequently start toilet training before they become 18 months old (4). It was shown that daytime bladder control was achieved later and that daytime bladder control difficulties were more common in those who were trained to use the toilet after 24 months (26). Enuresis has been found to be three times more likely in children who start toilet training before the age of 18 to 24 months (27). Murillo *et al.* found no relationship between the age of starting toilet training and lower urinary tract dysfunction or constipation (28). Carvalho *et al.* also found no differences between the groups regarding the onset age of toilet training and occurrence of nocturnal enuresis (29). In our study, urinary retention during play and nocturnal enuresis were more frequent in the children who were toilet trained at 25–36 months of age. The children who start toilet training after the age of 2 years have a three-fold higher risk of urinary retention during play and a four-fold higher risk of nocturnal enuresis. Our findings show that ages 18 to 24 months are the optimal time for beginning toilet training when it comes to voiding problems.

Like other features of the toilet training process, its effects on voiding and defecation problems also vary between studies. However, these problems are also caused by physiological delays, as in the cases of bladder-sphincter maturation and prolonged infantile bladder behavior; psychosocial and environmental factors; and nutritional and dietary

properties (12, 30). Because of all these factors, an independent assessment could not be done, thus the outcomes of different studies may differ.

Like organic diseases, functional disorders could have an impact on a child's quality of life. Numerous different studies in this area have been conducted recently. In one study, children with urinary symptoms were completed the school performance test and the PedsQL scale, and it was found that 55% of the participants on the school performance test performed below average (10). The most impacted subscales in the study by Jonson Ring *et al.* on the effect of bladder dysfunction on daily life were social relationships and self-confidence (31). In the study by Bachmann *et al.*, it was discovered that the health-related quality of life of children with chronic diseases was similar to that of children who complained of enuresis and daytime incontinence (32). The results of a study showed that enuretic children's families had a worse quality of life than other families, and the school performance of those children was lower (33). All subscale and total scores were lower in children with voiding problems in the current study, with the exception of the emotional functioning subscale score.

In the Wang *et al.* study, the functional constipation group had worse overall and subscale scores on the quality of life scale than the healthy controls (34). Children with constipation scored worse on quality of life measures than healthy controls, according to a Sri Lankan study (35). In a study by Youssef *et al.*, children with constipation scored lower on the quality of life score than groups with gastroesophageal reflux disease and inflammatory bowel disease as well as healthy controls (36). Vriesman *et al.* reviewed quality of life in children with functional constipation and they found pooled total health related quality of life scores of children with functional constipation were found to be lower compared with

healthy reference samples. In our study, children with defecation problems had lower total and subscale scores except for school-related functionality scores.

The strength of the study is that it covers all aspects of the toilet training process and evaluates the quality of life. The study has some limitations, including as its retrospective nature and the evaluation's dependence on parents' statements.

Voiding and defecation problems have a negative impact on children's quality of life and psychological well-being, so there should be more emphasis on child health monitoring. Each child in this study is followed up regularly from infancy, and many of the "healthy" children really have problems that have significant impacts on their quality of life. Since the parents do not consider that these problems are indicators of a disorder, physicians might not evaluate them. In addition, physicians do not particularly question urinary retention, urinary incontinence, nocturnal enuresis, and bowel habits after children begin to relieve their toilet needs independently. These complaints, however, are pretty common, especially within a few years after toilet training, and can escalate to issues that impact a child's entire life.

CONCLUSION

Even among healthy children who were believed to have completed toilet training successfully, significant urination and defecation difficulties were observed. It was noticed that children who had problems in these areas had lower quality-of-life scores than those who did not. In conclusion, even if the child has been toilet trained, it is essential to investigate daily urination and defecation habits at every follow-up visit, even if just briefly, and to discuss with families when a physician should be consulted. It is essential for

pediatricians to inform and educate about toilet training, a process that can have bad impacts on a child's quality of life, and to provide adequate information and support.

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Conflict of interests

The authors declare no conflict of interest.

Author contributions

YEK, SB, ST, FO have given substantial contributions to the conception or the design of the manuscript, SKK and EGO to acquisition, analysis and interpretation of the data. All authors have participated to drafting the manuscript, YEK and FO revised it critically. All authors read and approved the final version of the manuscript.

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Table 1. Sociodemographic features for the children and parents

	N=177 n	%
Gender of children		
Girl	92	52
Boy	85	48
Area of living		
Urban	163	92.1
Suburban	14	7.9
Income		
≤ 4000 TL	109	61.6
>4000 TL	68	38.4
Educational level of mothers		
University or higher	76	43
Not a university graduate	101	57
Educational level of fathers		
University or higher	85	48
Not a university graduate	92	52
Employment status of mothers		
Employed	72	40.7
Unemployed	105	59.3
Employment status of mothers		
Employed	172	97.2
Unemployed	5	2.8
The number of kids living at home		
1	52	29.4
2	102	57.6
≥3	23	13

Abbreviations: TL: Turkish lira

Table 2. Sociodemographic factors and the age at the start of toilet training*

	The age at the start of toilet training								P value
	<18 months		18-24 months		25-36 months		37-48 months		
	n	%	n	%	n	%	n	%	
Employment status of mothers									
Employed	5	7.1	23	32.9	38	54.3	4	5.7	0.036
Unemployed	12	11.5	53	51	35	33.7	4	3.8	
Employment status of fathers									
Employed	18	10.6	75	44.1	69	40.6	8	4.7	0.358
Unemployed	0	0	1	20	4	80	0	0	
Educational level of mothers									
University or higher	7	9.2	23	30.3	42	55.3	4	5.3	0.010
Not a university graduate	11	10.9	54	53.5	32	31.7	4	4	
Educational level of fathers									
University or higher	8	9.4	28	32.9	44	51.8	5	5.9	0.025
Not a university graduate	10	11	49	53.8	29	31.9	3	3.3	
Income									
≤ 4000 TL	9	8.3	57	52.3	41	37.6	2	1.8	0.004
>4000 TL	8	12.7	17	27	32	50.8	6	9.5	
Mothers' health status									
Healthy	16	10.3	67	42.9	65	41.7	8	5.1	0.95
Have one or more health issues	2	9.5	10	47.6	9	42.9	0	0	
Fathers' health status									
Healthy	17	10.6	73	45.3	64	39.8	7	4.3	0.33
Have one or more health issues	1	6.7	4	26.7	9	60	1	6.7	
Area of living									
Urban	17	10.4	68	41.8	70	42.9	8	4.9	0.20
Suburban	1	7.1	9	64.3	4	28.6	0	0	
Gender of child									
Girl	9	9.8	40	43.5	40	43.5	3	3.2	0.84
Boy	9	10.6	37	43.5	34	40	5	5.9	
Prime caretaker									
Mother	16	11.4	61	43.6	58	41.4	5	3.6	0.75
Grandmother	2	7.7	11	42.3	11	42.3	2	7.7	
Caregiver	0	0	5	45.5	5	45.5	1	9	

*Chi-square test.

Table 3. The issues with the toilet training process

	n	%
Toileting refusal	52	29.4
Toilet training regression	25	14.1
Going back to diapers	14	7.9
Voiding problems	99	55.6
Defecation problems	42	23.6
Voiding and defecation problems	36	20.2

**The same patient could have multiple problems.*

Table 4. The association between the age of toilet training and voiding-defecation problems*

	The age at the start of toilet training				p-value
	<18 months n (%)	18-24 months n (%)	25-36 months n (%)	37-48 months n (%)	
Constipation	2 (7,4)	10 (37)	14 (51,9)	1 (3,7)	0,78
Stool retention during play	3 (18,8)	5 (31,2)	5 (31,2)	3 (18,8)	0,03
Urgency	10 (13,7)	27 (37)	33 (45,2)	3 (4,1)	0,38
Urinary retention during play	3 (8,1)	9 (24,3)	20 (54,1)	5 (13,5)	0,003
Nocturnal enuresis	1 (4,2)	5 (20,8)	16 (66,7)	2 (8,3)	0,02
Urinary incontinence	5 (22,7)	6 (27,3)	11 (50)	0 (0)	0,08
Frequent urination	2 (11,1)	8 (44,4)	7 (38,9)	1 (5,6)	0,97
Daytime wetting	0 (0)	5 (45,5)	6 (54,5)	0 (0)	0,80

*Chi-square test.

Table 5. The effects of starting toilet training at > 2 years old age instead of < 2 years of age

Variables	β	S.E	p-value	Odds ratio	95% C.I. for Exp (β)	
					lower	higher
Nocturnal enuresis	1.428	0.499	0.004	4.172	1.569	11.096
Urinary retention during play	1.110	0.391	0.005	3.034	1.410	6.529

Table 6. The median of the childrens' parent-report and self-report quality of life scores and correlation between children's and parents' quality of life scores

Variables	Correlation coefficient	95 % C.I.		p-value
		Lower	Upper	
Physical health summary scores	0.42	0.207	0.574	<0.001
Psychosocial health summary scores	0.70	0.525	0.801	<0.001
Scale total scores	0.64	0.412	0.769	<0.001
	Children self-report	Parent-report		
Physical health summary scores	87.50 (37.50-100)	79.68 (9.38-100)		
Psychosocial health summary scores	76.66 (36.67-100)	66.66 (26.67-100)		
Scale total scores	78.26 (41.30-100)	71.19 (34.78-100)		

Table 7. Voiding and defecation problems and median quality of life scores*

	Do not have any problems (N=73)	Voiding problems only (N=63)	Defecation problems only (N=6)	Voiding and defecation problems together (N=36)	p value
Scale total scores					
Self-report	80,4(41,3-100)	78,2(47,8-100)	83,7(65,2-93,5)	66,3(47,8-93,5)	0,001
Parent-report	76(37,5-100)	70,6(38-100)	65,2(44,5-93,5)	64,1(34,8-95,6)	0,07
Physical health summary scores					
Self-report	87,5(37,5-100)	87,5(37,5-100)	90,6(75-100)	75(37,5-100)	0,003
Parent-report	84,3(9,38-100)	78,1(15,6-100)	84,3(43,7-100)	68,7(18,7-100)	0,12
Emotional functioning subscale scores					
Self-report	70(40-100)	80(30-100)	80(50-100)	60(30-90)	0,003
Parent-report	70(25-100)	65(20-100)	62,5(50-85)	55(10-95)	0,023
Social functioning subscale scores					
Self-report	90(30-100)	90(40-100)	75(50-90)	70(30-100)	0,004
Parent-report	80(20-100)	70(30-100)	55(40-100)	65(35-100)	0,10
School related functioning scores					
Self-report	80(30-100)	70(40-100)	80(50-100)	70(20-100)	0,44
Parent-report	72,5(30-100)	60(10-100)	50(30-95)	70(25-90)	0,39
Psychosocial health summary scores					
Self-report	80(43,3-100)	76,6(36,6-100)	78,3(53,3-96,6)	66,6(36,6-93,3)	0,003
Parent-report	70(41,6-100)	66,6(26,6-100)	54,1(43,3-93,3)	64,1(38,3-95)	0,07

* One-way ANOVA

Table 8. Factors influencing self-reported quality of life scores

	Unstandardized Coefficients (B)	95 % C.I.		Standardized Coefficient (β)	P-value
		Lower	Upper		
Psychosocial health summary scores					
Employment status of fathers	2.839	-3.974	9.652	0.063	0.412
Employment status of mothers	5.513	0.819	10.208	0.179	0.022
Educational level of fathers	3.864	-5.075	12.802	0.136	0.395
Educational level of mothers	3.101	-4.617	10.819	0.108	0.429
Caregiver	2.108	-6.673	10.889	0.036	0.636
Income	9.475	3.164	15.786	0.266	0.005
Physical health summary scores					
The number of kids living at home	-1.585	-4.874	1.704	-0.072	0.343
Income	4.632	-1.860	11.125	0.130	0.338
Caregiver	4.323	-4.511	13.158	0.074	0.614