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ORIGINAL ARTICLE

Impact of toilet hygiene training program: results from 11- to 16-year-old secondary school Turkish children

Çağrı Çövener Özçelik · Eda Aktaş · Derya Çelik · Ayşe Ferda Ocakçı

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Abstract
Objectives The purpose of the study is to evaluate the effectiveness of toilet hygiene education in secondary school students.
Methods The study was quasi-experimental with a pre-test–post-test design and includes a control group. The study was conducted at a secondary school in Istanbul, Turkey with 100 students (50 students for experiment and 50 students for control). The experiment and control groups were in the same school population. Data were collected with the student information form and toilet hygiene evaluation form (THEF), which were developed by the researchers.
Results When we examined the toilet hygiene techniques used by the students, they indicated 58 % ($n = 58$) wiped perinea from front to back, 25 % ($n = 25$) back to front and 17 % ($n = 17$) randomly. It was found that 69 % ($n = 69$) of the students changed their underwear every 2–3 days; 80 % ($n = 80$) were trained by parents on toilet hygiene. Total THEF scores, which were obtained pre and post (shortly after) education, showed significant differences in the experiment group ($p = 0.000$). Total THEF scores obtained post education (shortly after and 1 month later) showed significant differences in the experiment group ($p = 0.009$).
Conclusions The toilet hygiene education program is found to be successful in secondary school students.

Keywords Health education · Health promotion · Toilet hygiene · Student

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Ç. Çövener Özçelik (✉)
Division of Nursing, Department of Pediatric Nursing, Faculty of Health Sciences, Marmara University, Tibbiye Caddesi No: 40 34668, Haydarpasa-Uskudar, Istanbul, Turkey
e-mail: ccovener@hotmail.com; ccovener@gmail.com

E. Aktaş
Division of Nursing, Department of Pediatric Nursing, Faculty of Health Sciences, Marmara University, Tibbiye Caddesi No: 40 81326, Haydarpasa-Uskudar, Istanbul, Turkey
e-mail: edanisan@gmail.com; edakaramanaktas@hotmail.com

D. Çelik
Kumburgaz Family Health Center, Istanbul, Turkey
e-mail: derya_celik_19@hotmail.com

A. F. Ocakçı
Koç University School of Nursing, Güzelbahçe Sokak No: 20, Nişantaşi, Istanbul 34365, Turkey
e-mail: afocakci@hotmail.com

Introduction

Toilet hygiene is one of the most important topics pertaining to body and environment hygiene. The level of awareness regarding body and environment hygiene can be seen as an indicator of community development (Ellidokuz and Aksakoğlu 2002; Neyzi and Ertuğrul 2010). Insufficient hygiene can cause dysentery, parasites, viral hepatitis, and many intestinal infections (Fitoz 2005). Infectious diseases are among the leading causes of death and morbidity throughout the world WHO (2013). These diseases develop due to the intrusion of harmful microorganisms into the body via the digestive system, skin, eyes, and other ways (Ellidokuz and Aksakoğlu 2002; Neyzi and Ertuğrul 2010). Children are among the groups that are most affected by such diseases. The risk of suffering from

infectious diseases increases at crowded places and schools in particular. Therefore, future improvements such as youth care prevention programs play an important role in preventing infectious and epidemic diseases which can occur at schools (Temel et al. 2006; Wieske et al. 2012). Toilet habits and toilet hygiene, which are among these improvements, should be formed during childhood and should be maintained through the life span. Considering that a large part of childhood is spent at school, continuing to perform toilet hygiene habits which are acquired at home within the school setting is of paramount importance (Ellidokuz and Aksakoğlu 2002; Neyzi and Ertuğrul 2010).

Limited use of toilets, lack or absence of hygiene products and materials, and unclean toilets and basins are among factors that cause children not to use the toilet during school time (Kistner 2009). School rules regarding the use of toilets (for example; being able to use the toilet during recess only) pose important difficulties for school-aged children. Rules of using the toilet serve to prevent the disruption of courses; however, these rules are not arranged according to children's developmental characteristics (Lundblad et al. 2010). Considering the motor skills of small school-aged children, in particular, more time is needed for children to attend to their own hygienic needs in the toilet.

The peri-anal region is one of the warmest and most moist sites within the body since it is a closed area that has no contact with the outer environment. Various body excretions (sweat, urine, feces, etc.) accumulate between skin layers and folds, forming a suitable setting for microorganisms to reproduce and proliferate. Therefore, various infections such as fungus can easily occur and irritation and bad odor develops on the skin and mucosa. Peri-anal hygiene is of crucial importance due the characteristics of this region (Ulaş 1998). The cleanness of hands is very important since hands contact urine and feces during the performance of peri-anal hygiene. The first cleaning procedure following defecation should be performed and repeated using dry toilet paper until there is no visible stain and then using wet toilet paper while avoiding contact with the region and it is most appropriate to terminate the cleaning procedure by drying the region with toilet paper. In female children, cleaning must be performed from front to back since the urethra and the anus opening are close to each other. After performing this procedure, hands should be washed in an effective way (MEGEP 2007). The harmful microorganisms on hands and nails that are not well washed after using the toilet, in particular, can result in spreading many diseases including jaundice, typhoid, dysentery, and pinworm (Önsüz and Hıdıroğlu 2007).

Acquisition of such hygiene habits are very important for protecting and promoting children's health and are among the roles of pediatric nurses (Fritsch and Heckert 2007). The aims of pediatric nurses in means of protecting and promoting health include preventing diseases and helping children and their families in reaching maximum levels of health. To reach these aims, pediatric nurses may provide individual or group education and counseling for parents, children, and school teachers Çavuşoğlu (2008).

Therefore, the purpose of the study was to evaluate the effectiveness of toilet hygiene education in secondary school students. The hypothesis of the study was the experiment group participants will know appropriate toilet hygiene behaviors after receiving toilet hygiene education.

Methods

Study design

This quasi-experimental study had a pre-test–post-test design with a control group and was conducted in May–June 2012.

Setting and samples

The universe of the study consisted of 143 secondary school students because the school which the study was conducted had 143 secondary school students. The entire universe constituted the study sample and the experiment and control groups were determined using the simple random sample method. In statistics, a simple random sample is a subset of individuals (a sample) chosen from a larger set (a population). Each individual is chosen randomly and entirely by chance, such that each individual has the same probability of being chosen at any stage during the sampling process. The experiment and control groups were in the same school population (Karataş 2002). The experiment group included 73 students, whereas the control group included 70 students. However, we were able to reach 100 students (50 in the experiment and 50 in the control group) for the study. In Turkey some schools have part-time schooling. School in which the study was conducted was a part-time one. Because of that experiment group attended school until noon and, control group attended school until afternoon. Thus, the interaction between experiment and control group was avoided. The participants were selected using the following criterion: participants were (a) without any health problems related to the bladder and the urethra. Medical records of participants were inspected from school records.

Ethical considerations

The study was conducted after receiving approval from the institutional review board (Marmara University-IRB

22.05.2012-4) and the provincial education department of Turkey. After giving information about the purpose of study, guarantees for anonymity and credibility, and voluntary participation, written informed consents were obtained from all participants and their parents who agreed to participate in the study. Participants of the control group were afforded the same intervention program as the experiment group after completion of the study.

Measures

Data were collected using the student information form and the toilet hygiene evaluation form (THEF), which were developed by the researchers.

Student information form: The student information form, which was developed by the researchers according to the literature to identify sociodemograhic characteristics and ways of performing toilet hygiene, included 14 questions (12 open-ended and 2 close-ended questions) which evaluate sociodemographic data, toilet hygiene, toilet habits, and hand hygiene (Supplementary Appendix 1).

Toilet hygiene evaluation form: The form was developed by the researchers according to education materials and included ten multiple choice questions (Supplementary Appendix 2).

Data collection

Data were collected with the "student information form" and the "THEF." The forms were applied at baseline, immediately after the intervention and 1 month after the intervention in the experimental group (THEF). The forms were applied at baseline and after 1 month (only THEF) in the control group.

Intervention

After separating the experiment and control groups into 3 groups each, the student information form and the THEF were administered to the experiment and control groups before the education. Education was provided using the "Toilet hygiene education presentation" which was developed by the researchers for the experiment group in separate classrooms and the length of the education program was single course duration (40 min) by the researchers. "Toilet hygiene education presentation" contained these topics: (1) definition of hygiene, (2) hand washing, (3) importance of toilet hygiene, (4) perinea hygiene and (5) proper toilet using. The education was conducted in an interactive fashion. Immediately after the education, the experiment group's level of information on the topic was measured. No education was provided for the control group.

The efficacy of the education and behavioral change were evaluated 1 month after the education. Following the second evaluation, the same interactive education was provided for the control group. Brochures on the topic were distributed to students and school management after completing the post-tests (THEF) to avoid affecting the experiment and control groups and posters were hanged on the walls of school toilets (Fig. 1).

Data analysis

Number cruncher statistical system (NCSS) 2007 statistical software (Utah, USA) was used for statistical analyses. Results were obtained by performing definitive statistical methods (mean, standard deviation, and frequency), Chi-square test, Wilcoxon signed-rank test and repeated measures ANOVA test. The Chi-square test was used for homogeneity testing between the experiment and control groups. The Kolmogorov–Smirnov test was used to test variable distributions for normality. Wilcoxon signed-rank test was used for comparing scores baseline and after intervention. Repeated Measures ANOVA test was used to examine the interaction effect of group over time for the dependent variables, which were measured at baseline, immediately after intervention and 1 month after intervention. The results were evaluated at 95 % confidence level, and statistical significance was accepted as $p < 0.05$.

Results

Characteristics of the participants

Characteristics of the participants are shown in Table 1. Average values for general characteristics of the test group were as follows: mean age 13.10 ± 0.93 (12–15), 64 % of mothers were primary school graduates and 50 % of fathers were secondary and high school graduates.

Mean values for test variables of the control group were as follows: mean age 12.92 ± 1.04 (11–16), 70 % of mothers were primary school graduates and 44 % of fathers were secondary and high school graduates. Homogeneity of the test variables in the control group was identified ($p > 0.05$).

Toilet hygiene habits and toilet hygiene information

Table 2 shows the toilet hygiene habits of the participants and Table 3 shows the comparison of toilet hygiene information. It was observed that the toilet hygiene habits and toilet hygiene information of the participants in the experiment and control groups were not significantly different ($p > 0.05$). In the study, it was indicated that 69 %

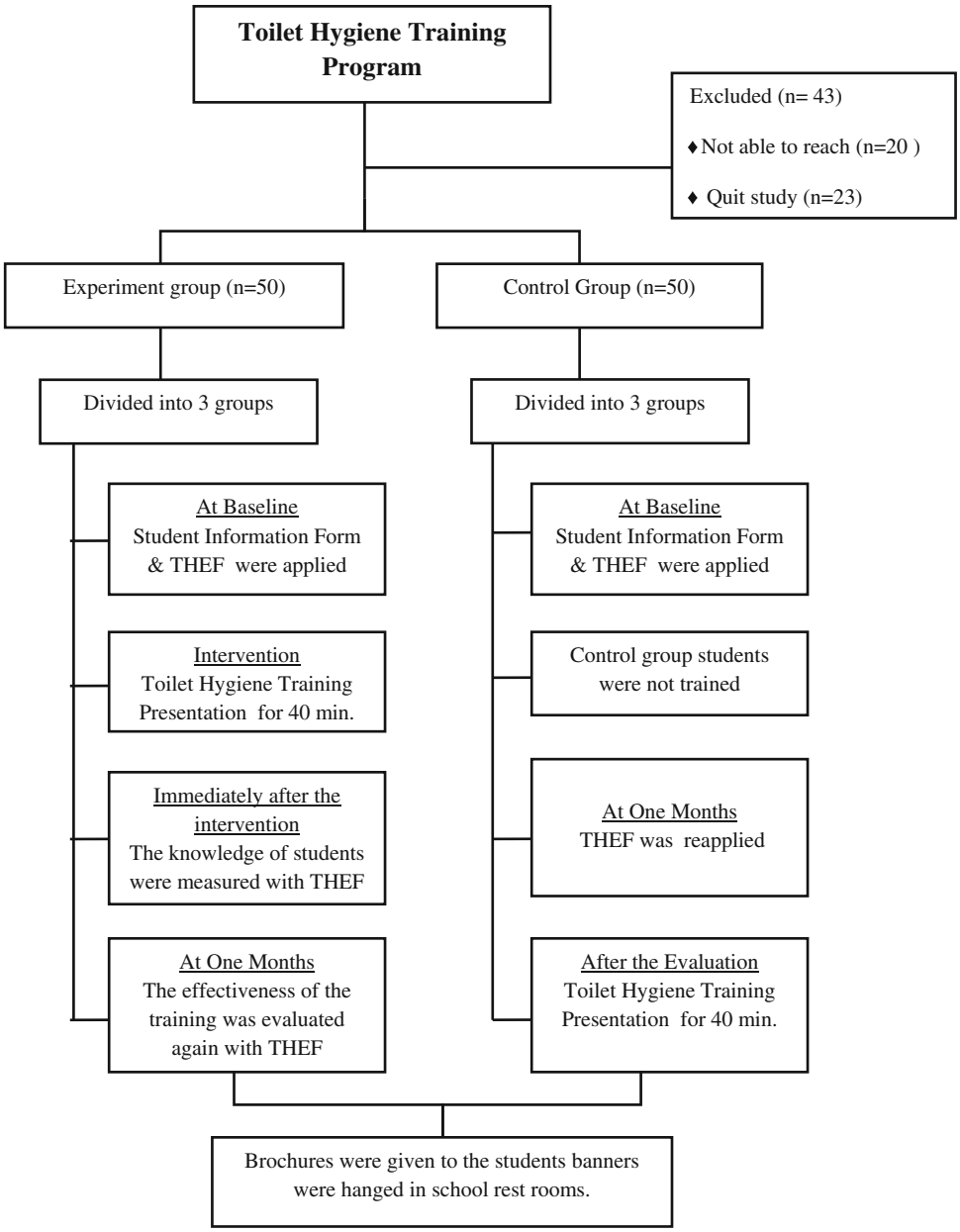

Fig. 1 Toilet hygiene training program for 11- to 16-year-old secondary school children, Turkey (May–June 2012)

($n = 69$) of the participants changed their underwear every 2–3 days and that 28 % ($n = 28$) changed their underwear everyday. Among the participants, 99 % ($n = 99$) reported that they washed their hands after using the toilet and only 25 % ($n = 25$) reported that they washed their hands before using the toilet. Also the 95 % ($n = 95$) of the participants indicated that they washed their hands with water and liquid soap.

The effect of toilet hygiene education

The evaluation form was administered to the experiment group before providing toilet hygiene education and immediately after the education. The mean pre-test score was 73 and was 92.2 immediately after the education. The difference between pre- and post-test was found to be significant ($z = -5.770$, $p = 0.000$). It was seen that the mean score one month after the education was 95.8 and that the difference was significant compared to pre-education ($z = -5.752$, $p = 0.000$). The difference between mean scores obtained immediately after the education and mean scores obtained one month after the education was also statistically significant ($z = -2.599$, $p = 0.009$) (Table 4).

The pre-test evaluation score of the control group was found to be 80.8; whereas the mean score obtained one

Table 1 Characteristics of secondary school children and homogeneity between groups, Turkey (May–June 2012)

Characteristics	Experiment group		Control group		Total		χ^2; p*
	n	%	*n*	%	*n*	%	
Sex							
Female	32	64.0	24	48.0	56	56.0	$\chi^2 = 2.59$, $p = 0.10$
Male	18	36.0	26	52.0	44	44.0	
Age							
11–13	34	68.0	35	70.0	69	69.0	$\chi^2 = 0.04$, $p = 0.82$
14–16	16	32.0	15	30.0	31	31.0	
Grade							
6	18	36.0	15	30.0	33	33.0	$\chi^2 = 1.53$, $p = 0.46$
7	16	32.0	22	44.0	38	38.0	
8	16	32.0	13	26.0	29	29.0	
Education status of mothers							
Literate	3	6.0	2	4.0	5	5.0	$\chi^2 = 5.53$, $p = 0.23$
Primary graduates	32	64.0	35	70.0	67	67.0	
Secondary graduates	8	16.0	3	6.0	11	11.0	
High graduates	4	8.0	9	18.0	13	13.0	
Graduate	0	0.0	0	0.0	0	0.0	
Illiterate	3	6.0	1	2.0	4	4.0	
Education status of fathers							
Literate	1	2.0	0	0.0	1	1.0	$\chi^2 = 2.76$, $p = 0.73$
Primary graduates	21	42.0	25	50.0	46	46.0	
Secondary graduates	13	26.0	12	24.0	25	25.0	
High graduates	12	24.0	10	20.0	22	22.0	
Graduate	3	6.0	2	4.0	5	5.0	
Illiterate	0	0.0	1	2.0	1	1.0	

χ^2 Chi-square test

* $p < 0.05$

Table 2 Comparison of secondary school children about toilet hygiene and habits, Turkey (May–June 2012)

			Experiment group		Control group		Total		χ^2; p*
			n	%	*n*	%	*n*	%	
Going to the toilette	Can you go to the toilet when you need to?	Yes	36	72.0	43	86.0	79	79.0	
		No Toilets are too dirty	11	78.6	3	42.9	14	66.7	$\chi^2 = 2.95$
		Teacher doesn't let me	3	21.4	4	57.1	7	33.3	$p = 0.08$
Toilette hygiene habits	How do you usually perform toilet hygiene?	Wet wipe/toilet paper	6	12.0	9	18.0	15	15.0	$\chi^2 = 0.91$
		Only water/water and soap	31	62.0	27	54.0	58	58.0	$p = 0.63$
		Dry toilette paper	13	26.0	14	28.0	27	27.0	
	When do you clean your perineal area?	After every urination	14	28.0	12	24.0	26	26.0	$\chi^2 = 2.43$
		After every defecation	6	12.0	12	24.0	18	18.0	$p = 0.29$
		Both of urination and defecation	30	60.0	26	52.0	56	56.0	
		Total	50	100.0	50	100.0	100	100.0	

χ^2 Chi-square test

* $p < 0.05$

Table 3 Comparison of secondary school children's knowledge about toilet hygiene, Turkey (May–June 2012)

				Experiment group		Control group		Total		χ^2; p*
				n	%	*n*	%	*n*	%	
Toilette hygiene education	Did you receive toilette hygiene education before?	No		5	10	12	24	17	17	$\chi^2 = 3.47$ $p = 0.06$
		Yes[a] (form whom?)	Yes	45	90	38	76	83	83	
			Health care team members (nurse, etc)	13	26	5	10	18	18	
			Parents	44	88	36	72	80	80	
			Books	6	12	5	10	11	11	
			Newspaper	5	10	1	2	6	6	
			Teacher	22	44	17	34	39	39	
			TV	12	24	5	10	17	17	
			Internet	13	26	3	6	16	16	
			Friends	3	6	1	2	4	4	
			Other	2	4	0	0	2	2	

χ^2 Chi square test

* $p < 0.05$

[a] Chosen more than one option

Table 4 Comparison of toilet hygiene evaluation form total points in experimental and control groups, Turkey (May–June 2012)

		Min–max	Mean ± SD	z[a]	p*
Experiment group ($n = 50$)	Baseline	10–100	73 ± 18.322	−5.770	0.000
	Immediately after intervention	50–100	92.2 ± 9.957		
	Baseline	10–100	73 ± 18.322	−5.752	0.000
	After intervention (at 1 month)	72–100	95.8 ± 6.727		
	Immediately after intervention	50–100	92.2 ± 9.957	−2.599	0.009
	After intervention (at 1 month)	70–100	95.8 ± 6.727		
Control group ($n = 50$)	Before intervention	20–100	80.8 ± 15.758	−1.348	1.178
	After intervention (at 1 month)	50–100	83.6 ± 12.577		

* $p < 0.05$

[a] Wilcoxon signed-rank test

month after the education was determined to be 83.6. The difference between the two mean scores was not statistically significant ($z = -1.348$, $p = 1.178$) (Table 4).

The interaction between the experiment and control groups was investigated. It was observed that the difference between two groups before and one month after the education was significant ($F = 37.96$, $p < 0.001$). The test scores of the experiment group were determined to be higher. There was no interaction between the experiment and control groups.

Discussion

It was determined that 69 % ($n = 69$) of the participants were aged between 11 and 13 years (Table 1). It was thought that the participants in this age group would easily transform accurate toilet hygiene behaviors into habits since they have an increased willingness to learn and they have increased levels of peer interaction and that they would easily understand the importance of toilet hygiene since they have developed the ability for abstract thinking.

In the study, 21 % ($n = 21$) of the participants reported that they could not use the toilet when they needed to and 66.7 % ($n = 14$) of them stated the dirtiness of the toilets as the most important cause of this situation (Table 2). In a study by Vernon et al. (2003), it was reported that 62 % of male and 35 % of female in the UK and 28 % of the children in Sweden avoided using the toilet because the school toilets stank and were not clean. The lack of products and materials which are necessary for toilet hygiene

as well as the dirtiness of the toilets and sinks can be regarded as causes for not using school toilets. In addition, retention of urine and feces for long periods can cause various health problems (urinary tract infections, vesicourethral reflux, urinary and/or fecal incontinence, etc.) (Kistner 2009).

In the study, it was determined that 58 % ($n = 58$) of the participants performed toilet hygiene using water/water and soap, 27 % ($n = 27$) using dry toilet paper, and 15 % ($n = 15$) using wet wipe/toilet paper (Table 2). Water and toilet paper must be used for perineal cleansing after defecation. Using toilet paper mostly prevents the contact between hands and feces; thus, protects the individual from infections caused by enteric microorganisms (Soydaş 2007). In a study by Soydas (2007), the rate of performing cleansing with water was found to be 27.4 %, and the rate of using toilet paper was 52.6 %. In a study by Çetinkaya et al. (2005), the rate of using toilet paper was found to be 82.7 % among students; whereas Yilmaz and Özkan (2009) found that 74.7 % of students used toilet paper. Wrong toilet hygiene practices may have resulted from insufficient toilet paper supplies at schools; insufficient toilet hygiene education provided by parents or disrupted development of toilet hygiene behaviors.

In the study, it was indicated that 69 % ($n = 69$) of the participants changed their underwear every 2–3 days and that 28 % ($n = 28$) changed their underwear everyday. In a study by Altinsoy (2008), it was determined that 53.7 % of the participants changed their underwear every 2–3 days; whereas Yilmaz and Özkan (2009) found that 67.8 % and Soydaş (2007) found that 38 % of the participants changed their underwear every 2–3 days. The results obtained in these studies are in parallel with our study findings. To prevent infections and bad odor and to maintain general hygiene of the body, underwear should be changed everyday. In the light of our study results, it was thought that the majority of participants may be vulnerable to infections since they do not change their underwear everyday. Therefore, during adolescence in particular, health education provided for students is very important. The reason for the low rate of participants who change their underwear on a daily basis may be related to lack of knowledge on hygiene and to insufficient hygiene habits.

Among the participants, 99 % ($n = 99$) reported that they washed their hands after using the toilet; whereas only 25 % ($n = 25$) reported that they also washed their hands before using the toilet. Daily hand washing behavior plays an important role in disease protection. It has been stated that all individuals should wash their hands with soap and clean water before and after using the toilet (Kalinci 2006; Bilici and Buzgan 2008). In this study, the participants mostly wash their hands after using the toilet and previous studies support this finding. The frequency of hand washing after using the toilet was found to be 98 % in Çetinkaya et al. (2005)'s study, 99 % in Kaya et al. (2006)'s study, and 83.2 % in Soydaş (2007)'s study. In a study by Örsal et al. (2002), it was determined that 9 % had the habit of washing hands before using the toilet. The low rate of hand washing before using the toilet may be due to children's lack of knowledge on hand hygiene or to thinking that one's hands are already clean before using the toilet.

In the study, it was determined that 95 % ($n = 95$) of the participants washed their hands with water and liquid soap. In a study by Kaya et al. (2006), it was found that approximately all the students (98.2 %) washed their hands with water and liquid soap or soap bars. This result is in parallel with our findings. According to the results, the participants wash their hands with appropriate material. However, washing hands with appropriate material may not indicate that the participants exhibit the right hand washing behavior. In a study by Curtis and Cairncross (2003), it was determined that washing hands with soap decreased the risk of diarrhea by 42–44 % and prevented one million deaths due to diarrhea. Therefore, using the appropriate hand washing material is of crucial importance.

Among the participants, 83 % ($n = 83$) reported that they received toilet hygiene education (Table 3). It was observed that 80 % ($n = 80$) of these participants received toilet hygiene education from their parents, 39 % ($n = 39$) from their teachers, and 18 % ($n = 18$) received education provided by health personnel. It is seen that the participants received basic hygiene education mostly from their families. Therefore, it is important for school nurses to arrange health education programs for families on a regular basis. In addition, it would be beneficial to draw attention to such topics via media (public spots, newspaper, etc.).

When we evaluated the efficacy of the toilet hygiene education, we observed that the mean score obtained by the experiment group was 73 before the education, 92.2 immediately after the education, and 95.8, 1 month following the education. The difference between pre- and post-test mean scores was found to be statistically significant ($p = 0.000$) (Table 4). This difference demonstrates the efficacy of the education program. An evaluation was carried out 1 month after the education to evaluate the continuity of education efficacy in the experiment group. The high mean scores obtained 1 month after the education indicate that the education was not forgotten. It is assumed that the use materials such as posters, etc. without interactive education programs is insufficient to draw attention to this topic and that the importance of the topic should be stressed by an expert. The high efficacy of the interactive education provided by the researchers for the experiment group supports the accuracy of this assumption. In addition, it is thought that reinforcing such education programs using

assistive materials (posters, brochures, etc.) would increase the continuance of education effects.

In the study, it was determined that toilet hygiene education is efficient in secondary school students and the research hypothesis was confirmed. The results of the present study showed that toilet hygiene education should be provided for every age group as well as for young children. In addition, it is thought that the permanency of knowledge and behaviors regarding toilet hygiene can be increased by providing such education programs on a regular basis.

Strengths and limitations

The strength of the study is the participation of 70 % of the students in the education sessions and administration of data collection forms with no missing data.

Due to limitations in time and finances, the study was conducted in only one school. We were unable to communicate with 20 students who were planned to be included in the study. Additionally, 23 students were excluded from the study sample since they quit the study.

Implications

We think that improvements which can be implemented at settings that include a large number of children such as schools would contribute to the prevention of contagious and epidemic diseases. In the light of our study results, we recommend the following:

- Appropriate hand washing areas (such as age appropriate sized basins and taps) should be provided in toilets.
- Provision of hygiene materials (toilet paper, soap, trash bin, etc.) in the toilets.
- Cleaning toilets and basins according to hygiene rules on a regular basis.
- Including toilet and hand hygiene in health education and hygiene habits education programs provided by pediatric nurses at schools and maintaining the continuity of such education programs.
- Supporting students' toilet hygiene practices with club activities, which can be generated by students during the education year and promoting active participation in these activities.
- Placing brochures and posters which would reinforce toilet hygiene in appropriate areas at schools.
- Basic education on toilet hygiene is primarily provided by families. Therefore, pediatric nurses can provide hygiene education for families at schools.
- Giving messages on the importance of toilet hygiene using media organs.
- Employing pediatric nurses who have bachelor's and master's degrees at schools.

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