



## Effect of Toddlers' Daily Toilet Training Program Based on Developmentally Appropriate Practice Approach on Toilet Training Duration

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### Abstract

**Background:** One of the main responsibilities of the parents is training toddlers how to control urination. Developmentally Appropriate (DAP) Practice is a useful method of toilet training for children. Video modeling is an important tool for teaching new motor skills to both children and adults. The purpose of this study was to determine the effect of Toddlers' Daily Toilet Training (TDDT) based on DAP on duration of toilet training in toddlers.

**Methods:** This quasi-experimental field trial was conducted in healthcare centers of Isfahan, Iran, in 2018-2019. Overall, 130 pair of mothers and their 18-24 months old infants were recruited using multi-stage sampling. The subjects were then divided into a control (n=75) and an intervention (n=55) group by random assignment. At the beginning of the DAP-based approach, the subjects were assessed every 2-4 weeks in terms of readiness for toilet training by using the Child and Mother Readiness Assessment Checklist. After achieving 80% score in the checklist, the mothers in the intervention group participated in TDDT program, while the control group received no intervention. For both groups, another checklist was completed every two weeks to determine toilet training duration and time to achieve urination control. Data analysis was carried out in SPSS18 software using the independent t-tests, Chi-square test, and Mann-Whitney test at significance level of 0.05.

**Results:** The mean duration of daily urination control in the control group (43.6±22.58 days) was significantly longer than in the TDDT group (28.71±12.12 days) (P=0.02). The age of readiness in both group ranged from 21 to 27 months. The duration of urination control was significantly associated with the mother's level of education (P=0.04) but inversely related to the age of achieving readiness (P=0.03) and the mother's employment status (P=0.05).

**Conclusion:** Based on the results, the TDDT program using video modeling and the DAP approach is effective in shortening the duration of toilet training in toddlers.

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### Highlights:

#### What is current knowledge?

According to evidence, applying the developmentally appropriate practice approach (DAP) and video modeling is highly beneficial for educating young children such as accelerating learning various skills in a shorter period. However, no study has yet examined effectiveness of daily toilet training program using such methods.

#### What is new here?

Starting Child's toilet training in appropriate time was the key point of our intervention by using periodic toilet training readiness checklist, and the results demonstrate the effectiveness of the video-modeling training. Consistent with observational social learning theory, the new video modeling educational film, along with the DAP approach, could effectively shorten the duration of toilet training in toddlers.

### Introduction

Achieving urination control is one of the most important developmental stages for children and an important educational challenge for most parents (1). According to the principles of evolutionary psychology and recent studies, early childhood education plays an important role in child development (2). Early life experiences and the environment may either accelerate or slow down the subsequent development of the child (3). Therefore, the right to use education is a basic human right that individuals have according to their abilities to evolve appropriate to their norms, and it is the moral duty of the family and community to provide the facilities to achieve this right (4). Developmentally appropriate practice (DAP) is a useful approach for teaching children. Three basic pieces of information are required to be taught to children based on DAP: the process of

mental development and learning of the child, the individual differences and personal issues, and the cultural issues of the child and his/her family (5).

Teaching and training urination control for toddlers are among the main responsibilities of the parents (6). The parents' success in interacting with their children and teaching them to gain bladder control can facilitate children's active and successful education in the context of ethical and social issues, such as respecting social norms, understanding limitations, kindness, and altruism (7, 8). This is often the first real opportunity the child is given to independently manage an activity of daily living, one that no one can do for him/her (9). Not surprisingly, more abuse occurs during toilet training than during any other developmental step. Parents' expectations often exceed the child's abilities or understanding, and the child's frustrations and imperfect attempts at self-control easily lead to misunderstanding of the parents who take these actions as willful disobedience (7, 10). Therefore, parents' acquaintance with the developmental stages of the child, helps them to better understand their own expectations of their child and the needs of the child for DAP (11).

Although the achievement of voluntary urination control is a criterion for assessing the level of physical development of the child, psycho-social development and the cultural status of the families have a great impact on this trend (12). Although it may not be possible to accelerate voluntary urination control, this process may be slowed or disrupted with delaying or rushing toilet training, especially by unaware parents due to obsessions or setting strict regulations for their child (13). The spinal nerves are usually developed between 12 and 18 months, and after myelination of nerves, the child can gain voluntary control over bladder and bowel movement. On the other hand, the capacity of the bladder increases from 14 to 18 months, and the child can keep urine for about two hours (14). Therefore, mothers should not expect their children to be able to control their urine before that age (15).

Based on different learning styles, there are several ways to teach children through visual, auditory, and kinetic/motor stimulates. Visual teaching involves looking at pictures. People under visual learning style have good memory and

can easily remember pictures. Surprisingly, 40% of children learn visually. In auditory learning style, also called ear learning, learners remember sound and music better. However, they do not enjoy reading, because these children are not incarnate, they only recall important facts they have heard before. Auditory learners, even over the years, remember people only by hearing their voice. In the motor learning style, children are in fact called kinetic learners and tend to understand things in depth. They carefully examine things and ask a lot of questions. Such children are easily taught by facts and experiences. If something is not properly conceived or proven to them, they will not be able to understand or recall it. However, such children can make great progress in art (16, 17).

For toddlers' toilet training, we used the video modeling approach that combines the advantages of all above mentioned methods. Social learning theorists have emphasized that modeling or displaying a skill is an important tool for teaching new motor skills to both children and adults (18). The visualization of a filmed skill is enough for the viewer to learn the sets required to perform that skill. In this way, people can learn the skill by observing other people performing a task or observing their results. This method was named as video modeling, which has many benefits including facilitating faster learning, generalizing diverse skills, saving time, simplicity, and the possibility of re-viewing and simultaneous practice (19).

To our knowledge, only two descriptive studies in Iran have been performed on toddlers' toilet training (1, 20). Therefore, So with regard to the lack of access to studies on scientific model for toddlers' potty training and the advantages of video modeling, the present study aimed to determine the effectiveness of a toddlers' daily toilet training (TDDT) program using a DAP-based video modeling approach on toilet training duration.

**Methods**

This quasi-experimental field trial was conducted in healthcare centers of Isfahan, Iran, from April 2018 to March 2019. Subjects were selected using multi-stage sampling and a minimum sample size of 55 was calculated for each group based on the sample size formula of the experimental studies:

$$N = \frac{2(Z_1 + Z_2)^2(2S^2)}{d^2} \quad N = \frac{(1.96 + 0.84)^2(2S^2)}{(0.53 S)^2} = 55$$

At first stage of sampling, according to their geographical distribution, health centers with the most daily referrals were selected from the North, South, East, West, and Central areas. Then, according to total coverage population, 21-24 pairs of mother/child (18 to 24 months) were selected from each center and randomly allocated into two groups of control (n=75) and TDDT group (n=55).

Inclusion criteria for mothers consisted of the followings: being the main caregiver of the child, no previous attempt to teach child urination control, and agreeing to allocate at least three months for their child toilet training. The inclusion criteria for children were being educable and having no physical or psychological problems that affect the educational process (such as hypospadias, epispadias, diabetes, diabetes insipidus, autism, etc.). Exclusion criteria were unwillingness to continue participating in the study, hospitalization of the child during the study, occurrence of an accident or illness and any change in the environment for mother or child during the study.

First, demographic information of the subjects were extracted from the information system of health centers. Based on the child's age, the mother's response to the 12-item toilet training readiness checklist, and the results of weekly interviews, mothers were called at the appropriate time to perform the intervention (teaching toilet training for children. The study tools included two researcher-made checklists along with an educational tools (educational video using the video modeling style) whose validity and reliability were confirmed by experts.

The Readiness Assessment Checklist consists of 13 Yes/No questions on the four domains of physical, cognitive, psychological, and parental readiness to determine readiness timing based on the DAP approach in both groups. The checklists were completed every two weeks. After achieving 80% score, the time appropriate for toilet training was recorded, and the intervention was initiated (9). The toddlers' achievement of urination control checklist was included nine items that were scored by using a 5-point Likert scale, ranging from score of 1 (never) to a score of 5 (always) in a period of 2-4 weeks.

The criterion for recording the time to achieve urinary control was to obtain a score of 4 or 5 from each of the nine items in the relevant checklist during two consecutive calls every two weeks (i.e. to obtain an overall score of 36 to 45 from the table). This process continued in both groups until all children achieved urinary control. A creative educational CD was also given to the intervention group containing a video clip on toilet training based on the one-day toilet training method.

In the control group, the mothers were told that her child was ready to begin toilet training and she could educate her child through traditional methods. In the intervention group, a session for introducing and discussion on video modeling were held in the health centers. Then, the mothers were asked to watch the video modeling film at home with their children when appropriate and practice the pattern presented as "One Day Toilet Training". After initiating toilet training in both groups, another checklist was completed individually every two weeks to

record toilet training duration and the time to achieve urination control (from the first attempt).

Descriptive statistics including mean and standard deviation were used to describe quantitative data, and frequency and percentage were used to describe qualitative variables. The Mann-Whitney U test and Chi-square test were used to compare quantitative and qualitative variables, respectively. The Spearman rank-order correlation coefficient was used to examine the correlation between quantitative variables. All analyses were done in the SPSS software (version 18). A p-value of less than 0.05 was considered statistically significant.

**Results**

Overall, 130 toddlers (66 females and 64 males) were enrolled in the study. The mean age of children at the beginning of the study was 24.7±2.6 months (age range: 18-31 months). Based on the results, the mean age of reaching readiness for toilet training process varied from 18 to 33 month, but the readiness timing did not differ significantly between the two groups (p=0.45). Most children in both groups had normal weight (Table 1).

Our study showed that the TDDT program was more significantly effective than the conventional verbal method for shortening duration of toddlers' toilet training and daily urination control (Table 2).

**Table 2: Duration of urination control training in the study groups**

Variables and Groups	Duration of training urination control (days)		Independent t-test	
	Mean	Standard deviation	t	P
Control (n=75)	43.60	22.58	4.84	<0.001
TDDT (n=55)	28.71	12.12		

The Spearman correlation coefficient showed that the age of achieving readiness had an inverse correlation with the duration of achieving urination control (P=0.03). There was no significant correlation between the time of achieving daily urination control and birth weight or age of urinary control of siblings. In addition, the duration of daily urination control was not significantly associated with the weight status of the subjects but was directly correlated to their birth rank. The duration of urinary control was significantly correlated to the mother's level of education (p=0.04) and was inversely correlated to the mother's employment status (r=-0.168 and P=0.05) (Table 3).

**Discussion**

Our results show the effectiveness of TDDT program in shortening the duration of urination control, which may be due to the principles and strategies of DAP approach (4). In our study, we used video modeling for the simultaneous education of mothers and children. Similar to our findings, previous studies also showed that video-modeling was able to significantly improve specific abilities (15). Children are more excited to see videos and capture the information contained in it, compared with traditional learning. Toileting skills consist of vocabulary and signs, bowel control, bladder control, etc. From the Piaget's point of view, toddlers are in the pre-functional stage, and using the video modeling method for toilet training could be a tangible solution that significantly improves this skill in the group that used the educational video compared to other groups. In study of Nurfajriyani and Lusmilasari (2016), the child's toilet skills score increased 6 times more than the previous within two weeks by presenting video modeling (21). Given the importance of using individuals' native culture-based educational method and environment in DAP, this educational film presented more proper, scientific, and practical visual model in our cultural context. In addition a checklist of readiness assessment was used to consider individual differences, after empowering mothers by training classes and post-conversation information support (4).

Untimely initiation of toilet training has a negative impact on the training process (22). This highlights the importance of determining the correct time of toilet training for toddlers (23). Since age of readiness to begin toilet training (readiness timing) and other demographic/contextual variables may influence the duration of urination control training, in this study, we homogenized these

**Table 3: Duration of urination control training in the study groups**

Variables	Duration of training urination control		
	r	P-value	
Age of readiness to begin education	-0.188†	*0.03	
Toddlers	Birth weight	-0.025†	0.78
	Weight status	-0.086‡	0.35
	Birth rank	0.186‡	*0.03
	Sister's mean ages of urination control (month)	-0.046†	0.77
Brother's mean ages of urination control (month)	0.076†	0.76	
Mothers' education level	0.178‡	*0.04	
Mothers' occupation status	-0.168‡	*0.05	

\* P-Value <0.05, † Pierson, ‡ Spearman

variables in both groups and conducted correlation analysis. There was no significant difference between the two groups in terms of children's characteristics, the mothers' characteristics, and siblings' age of urination control.

In a large cross-sectional study in Tehran, the mean age of toilet training initiation ranged from two months to 5 years (mean age: 23 months) The mean age of reaching readiness for toilet training varied from 18 to 33 month. (20). The procedures used in toilet training were "spoken and persuaded, repeated reminders, encouragement, punishment, and the use of various teaching aids. Fear of toilet, stinging with parents, and fear of the appearance of urine and feces were among other things that the participants referred to (1). In line with our findings, a previous study in 2016 reported that the video-modeling approach was more effective than the usual verbal technique for toilet training (21).

Video modeling and video self-modeling were used to evaluate the acquisition of a cognitive-motor skill in a population of mentally retarded children, and results showed that video modeling was more useful for teaching some skills to mentally retarded children (24). However, video modeling has been less widely used in self-help education for toddlers (17, 18).

Our results showed that the age of readiness was inversely related to duration of urination control training. The results of previous studies showed that intensive training before the child is 27 months old not only does not accelerate the achievement of urinary control but also prolongs the training period. However, the sooner the training begins after 27 months, the sooner it ends. In other words, after 27 months, the start time of training is directly correlated with the time of completion (25). Also we found no significant correlation between the duration of urination control training and birth weight or weight status. Studies have shown that the duration of urination control training was directly related to children's birth rank. This means that first child in the family is trained in a shorter time than other children. This can be due to the sensitivity that mothers have towards their first child. In general, parents who give toilet training to their first child have lower expectations than parents with more than one child (20). However, a study in Turkey reported that being the first child is correlated with late education (26). This difference could be due to the cultural differences between the Iranian and Turkish societies. There was no significant association between the duration of urination control training and the age of urination control of siblings. In the present study, the duration of toilet training was inversely related to the mother's employment status. Given that working mothers spend less time with their children during the day, the multiplicity of caregivers and their behavioral differences in education can disrupt the learning process. Moreover, the duration of urination control training was negatively correlated with the mother's education level. A higher level of education increases mother's awareness and improves maternal performance (27).

## Conclusion

The new video modeling based approach of toilet training could effectively shorten the duration of toilet training in toddlers.

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## Ethical statement

The research received approval from the ethics committee of Isfahan University of Medical Sciences (ethical code: IR.MUI.REC.1395.3.737). The participants were ensured about the confidentiality of their personal information.

## Conflict of interest

The authors declare that there is no conflict of interest and the results of this study do not conflict with the interests of particular persons or organization.

## Author contributions

This study, suggested and done by Azam Tangestani, and was directed and supervised by Parvaneh Khorasani in all stages including proposal development, conducting the project and extracting the relevant article, in addition to valuable professional consultation of Maryam Maroufi as an advisor.

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Table 1: Distribution of demographic variables and homogeneity tests in the study groups

Variables and groups	Control group (n=75)		TDDT (n=55)		P-value
	Mean± SD	N (%)	Mean± SD	N (%)	
Age of readiness to begin toilet training (month)	24.64±2.93		24.98±2.26		0.45*
Birth weight (g)	3078±546.30		2985±492.1		0.32*
Current weight (g)	11716±1405		11454±1380		0.30*
Gender	Female	40(0.53)	26(47.3)		0.49‡
	Male	35(46.7)	29(52.7)		
Constipation	Yes	14(18.7)	9(16.4)		0.73‡
	No	61(81.3)	46(83.6)		
Weight For age (based on national standards)	Underweight	17(23.9)	8(15.4)		0.37‡
	Normal weight	46(64.8)	38(73.1)		
	Overweight	8(11.3)	6(11.5)		
Birth rank	First	38(50.7)	32(59.3)		0.40†
	Second	30(40)	17(31.5)		
	Third	7(9.3)	4(7.4)		
	Fourth	0(0)	1(1.9)		
Sisters' mean ages of urination control (month)	23.38±2.56		23.80±3.91		0.67*
Brothers' mean age of urination control (month)	24.60±3.84		22.33±8.12		0.44*
Mothers' age (year)	33.89±4.96		33.11±4.92		0.38*
Mothers' employment status	Employed	15(20)	18(32.7)		0.10‡
	Housewife	60(80)	37(67.3)		
Mothers' education level	≤Diploma	10(13.3)	5(9.1)		0.4†
	Undergraduate	32(42.7)	19(34.5)		
	Graduate degrees	33(44)	31(56.4)		

TDDT: Toddlers' Daily Toilet Training, SD: standard deviation

Statistical Tests: \*t: independent t-test, ‡χ<sup>2</sup>(chi-square test, †Z: Mann-Whitney U test**How to Cite:**

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