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Original Article

Determining effectiveness of a multi-component oral health education program model for preschool children

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Abstract

Aim: To develop a valid measurement tool that can evaluate oral and dental health knowledge and to create a program model of oral and dental health education by using different training methods that reinforce each other.

Material and Methods: The developed scale for validity and reliability study was applied to 163 kindergarten, first-grade, and second-grade students. The Scale Oral Health Knowledge for 5-8 Age Children was used in the evaluation of education. In the four-week training program, pre-test with scale, oral and dental health visual training presentations, parent education, healthy food package distribution, creative drama training, toothbrush and paste dissipation and post-test with scale were applied.

Results: The scale developed consisted of 10 items and the KR-20 reliability was calculated as 0.71 and the internal consistency coefficient was calculated as 0.70. In the results of the study, there was a significant difference in favor of the last test in the experimental group ($z = 4.46$, $p < 05$).

Conclusion: The Scale Oral Health Knowledge for 5-8 Age Children is a valid and reliable scale. The "Multi-Component Oral Health Education Programme" is an evaluable, necessary and effective program. In order to provide a permanent oral hygiene education, it is important to use training program preparation by a multidisciplinary team different training methods and materials that reinforce each other over a long period of time and to evaluate the adequacy of education.

Keywords: Dental health education; preschool; child; early intervention

INTRODUCTION

Oral health is an inseparable part of general health. According to the reports of the World Health Organization, tooth decay and periodontal diseases are acknowledged to be the most common diseases. They constitute a serious public health problem in developed and developing countries especially in the early childhood period. Their prevalence ranges between 28% and 82% biological, behavioral, and socioeconomic factors are risk factors in early childhood tooth decays (1,2).

Oral care forms the basis of having a healthy oral and dental structure. This type of care is closely related to the individual's behaviors regarding health, and the public's knowledge, behaviors, and attitudes toward health. It is extremely difficult to change the habits and behaviors of an adult. Therefore, it is a necessity that oral health education starts to be given during early childhood and may be even babyhood periods. In light of these, especially the oral health awareness of preschool children must be raised. Moreover, protection measures regarding oral health are most efficient during these periods. Health education organizations and interventions conducted to that end will have a direct effect on children's later oral health (3).

In numerous studies, the school period is emphasized to be an extremely effective stage regarding the development of an individual's beliefs, attitudes, and personal abilities.

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Preschool children should be primary targets while developing oral health education programs, and oral health education should last for life and be endorsed (4). The school curriculum should include a variety of activities related to oral and dental health and educators and parents should act together to promote healthy behaviors (5).

Oral health development programs should involve subjects related to diets and protective treatments in addition to oral hygiene habits. They should be carried out to infuse nutritional practices related to oral health such as consuming high-fiber food, healthy snacks, and the consumption of water, milk, fruit, and vegetables. Parents' motivation is crucial in increasing the success levels of these programs in improving oral health. These education programs necessitate the co-participation of the child and the parent during the early childhood period (6).

Creative drama is a process and an educative environment which enables students to learn about an experience, a concept, or specific subjects or themes from their classes by living, portraying and acting them. In this way, previous information is revised, questioned, and reinforced within new cognitive and affective patterns. Children experience their observations, experiences, emotions, and knowledge by acting them in this drama process Using visual and aural stimulus and real health materials in the applied oral health education program and having children gain them through demonstration, drama, and games will enable the education process to become more fun and permanent (7).

In this study, it is planned to develop aneducation program model that combines a variety of educational methods and materials that reinforce each other in order to gain desired oral and dental health behaviors and it is to assess the educational objectives, to investigate the success of the program with a standard measurement tool.

MATERIAL and METHODS

Our study was approved by the ethics committee of Karabuk University with the date of 26/01/2016 and with the decision number 2016/02.

Developing "The Oral Health Knowledge Scale for 5-8-Year-Old Children"

The scale was created for evaluating the effectiveness of the education program utilized in the study. During the developmental process of the scale, questions suitable for the achievements intended to be measured were created, they were illustrated, and a test form was prepared. After the illustration of this test form, specialist's opinions were consulted to in order to assess the questions on the form in terms of clarity, comprehensibility, suitability for the characteristics intended to be measured, and suitability for children's level of understanding etc. The evaluations were carefully examined by specialistand the questions were accordingly revised. The scale was given its final shape in accordance with experts' opinions. Strict attention was paid so that there would be no scientific errors in the options. Only one achievement was measured by each question. In this way, the questions were enabled to be suitable for the characteristic intended to be measured (8). Consequently, the test form was created with 17 multiple-choice questions, each measuring a different achievement. The correct answers were scored with "1" point, while the wrong answers were scored with "0" points; therefore, the maximum score to be obtained from the test was 17.

Test form for validity and reliability study was applied to 163 kindergarten, first-grade, and second-grade students. Item analyses were performed through data obtained from the pre-test application (Table 1).

Table 1. Item difficulty index of the questions on the form and the upper-lower group T-test results

Item No	Item Difficulty Index	T-test Results		
	(pj)	t	df	p
1	0.975	1.43	74	.156
2	0.920	3.19	74	.002
3	0.988	1.00	74	.321
4	0.963	2.08	74	.040
5	0.908	3.88	74	.000
6	0.957	2.36	74	.021
7	0.939	2.36	74	.021
8	0.957	2.63	74	.010
9	0.380	4.63	74	.000
10	0.945	2.63	74	.010
11	0.926	3.14	74	.002
12	0.969	2.08	74	.040
13	0.798	5.19	74	.000
14	0.767	5.48	74	.000
15	0.957	2.63	74	.010
16	0.239	5.27	74	.000
17	0.988			

Item difficulty and discrimination indexes were calculated and the difference between the probabilities of the individuals in the upper and lower groups to answer the item correctly was examined. Based on the T-test results, the final form composed of 10 items and its KR-20 reliability was calculated to be 0.71. During the application of the scale, questions were presented to children who were asked to point to the correct illustration.

Developing and Applying "Multi-Component Education Programme"

The experimental and control groups were constituted by 110 students in total aged 5-6 years and studying at preschool institutions during the 2017-2018 school year. Significant differences were prevented from arising in numerical terms between the age and gender

characteristics of the children in the experimental and control groups and their families' income levels and mothers' educational background. Embodied within the 4-week education program directed to the children were the concept of microorganisms, oral flora, protective nutrition suggestions, tooth decay mechanism, protection methods (brushing teeth, and the concept of main meal and snacks), and the importance of regular dental exam. The pre-test with developed scale was applied to the children in the experimental and control groups during the first week. In the second week, a dental education program was performed verbally and visually by a dental specialist and healthy food kits were distributed. Toothbrushes and toothpaste were distributed to children following the creative drama education program on oral health during the third week. Drama activities on the subject matter of nature were performed to check its placebo effect on the control group. During the same week, parents were also provided with oral health education. During the fourth week, the post-test with developed scale was performed.

Embodied within the parent education program were issues such as the concept of microorganisms and flora, deciduous teeth, baby bottle tooth decays, protection of baby and child teeth, permanent dentition, types of food causing decay, proper brushing techniques, proper nutrition, the importance of regular dental exam, and oral health behaviors to set an example for children. The program's suitability for children's level of understanding and its scientific accuracy were assessed by three specialists. Recommended changes were made in accordance with the information obtained from these assessments. Following the education program, the families were given a seven-day tooth brushing chart that they would take notes after brushing their teeth together with their children, and they were briefed as to how to use the chart.

RESULTS

The differences between the pre-test and post-test scale scores obtained by the children in the experimental and control groups were analyzed with the Mann-Whitney U test. The U-test results of the groups' pre-test and post-test scores are given in Table 2, Based on the results, no significant difference was observed between the pre-test scores of the children in the experimental and control groups (U=1542, p>.05). But the difference between the post-test scores of the children in the experimental and control groups is significant and higher scores are distributed to the experimental group compared to the control group (U=1059, p<.05).

Table 2. Distribution of the pre-test and post-test scale scores in the experimental and control groups

Test	Group	n	$\bar{X}$	Standard deviation	Mean rank	U	p
Pre-test	Experimental	55	6.69	1.59	54.95	1542	.855
	Control	55	6.78	1.42	56.05		
Post-test	Experimental	55	7.87	1.21	54.95	1059	.005
	Control	55	7.15	1.32	56.05		

Table 3. The Wilcoxon signed-rank test results regarding the pre-test and post-test scores in the control and experimental group

	Pre-test – Post-test	n	Z	p
Experimental	Negative Ranks	5	4.46*	.000
	Positive Ranks	36		
	Ties	14		
Control	Negative Ranks	12	1.48*	.137
	Positive Ranks	24		
	Ties	19		

*Based on negative ranks

The difference between the pre-test and post-test scale scores obtained by control and the children participating in the education program was analyzed with the Wilcoxon signed-rank test. The obtained results are shown in Table 3. There is no significant difference between the pre-test and post-test scale scores obtained by the children in the control group (z=1.48, p>.05). But it can seen that there is a significant difference between the pre-test and post-test scale scores obtained by the children participating in the education program and this difference in scores is seen to be higher in the post-test results (z=4.46, p<.05).

DISCUSSION

Education is the process of deliberately changing the behavior of an individual through his or her own life and in the desired direction. Education is about gaining or changing existing behavior. It must be consciously acquired in a planned and programmed manner for a specific purpose

Determining the success of education is important. The realization of target behaviors and the existence of learning deficiencies, if any, should be determined. In addition, it is possible to identify issues that are learned incorrectly or not at all. In other words, not only the education is given, but also the evaluation of the education is very important (8). Thus, it will be possible to determine to what extent the education program achieves the objectives and whether it is sufficient. Therefore, there should be targets in oral and dental health education and there is a need for a standard assessment tool to evaluate these targets.

In our study, the KR-20 reliability and internal consistency of "The Oral Health Knowledge Scale for 5-8-Year-Old Children" was calculated to be 0.71 and 0.70 respectively. The scale was concluded to be a valid data collection tool. It is recommended to be used determine the basic oral and dental health knowledge level of children and to assess oral health education programs. In the literature, a tool for measuring and evaluating oral and dental health information has not been found. Our scale is important as it is first tool measuring and evaluating oral and dental health knowledge.

In many oral health education studies, randomized controlled groups are compared with the evaluation method (9,10). However, there is no tool to measure the current knowledge level of children before education. The scale has been developed with pictures for preschool children to respond independently. This is one of the striking parts of the study.

Early childhood period is a developmental stage spanning a timeframe from birth to eight years in which the brain development is at its peak (11). Studies have shown that the richer the stimuli in the environment, the sooner the child will develop and learn (11-13). This is only possible with a healthy family environment and adequate preschool education. From this point of view, it is important to use correctly selected training materials and training techniques in the preparation of the content of the training program. The education program prepared in the study was prepared by a team consisting of child development, periodontology and educational sciences experts, and it was effective on the success of the education.

The fact that there was a significant difference between the post-test scores of the experimental and control groups in favor of the former even though no difference was detected between the pre-test scores of the children in both groups reveals the positive impact of the education program. Nevertheless, in order to associate the high scores obtained by the students in the post-test with the education program, the difference between the pre-test and post-test scores of the students in both groups was also analyzed and found to be significant, which supported the effectiveness of the program.

Considering that research conducted in Turkey configured versatile program support area families could not be found. In addition, in order to make this education permanent, it was aimed to strengthen the children's learning by receiving support from their families.

Family is the basic learning environment in which the child can socialize for the first time. (12-15). In order for children to be prepared for the community they will live in, they need to receive productive education to organize and support them in family and school. In the studies conducted, it also proves that the knowledge and attitude of the family is effective on the habits of the child in oral health (16-18). When we look at the results of the study, it can be said that one of the parameters in the effectiveness of the education given is the oral hygiene trainings given to the families.

Children need to receive an efficient education in order to be prepared for the community in which they live. This is possible through structured formal education programs in preschool institutions (19-22). In a study carried out by Sammons et al. (2008), it was revealed that even though it spans a shorter period of time, preschool education has an impact on success almost as much as primary school education (23). Our training program spread over a certain period of time contributed to the success of the program.

Inefficient early childhood education may also have permanent and costly effects on both families and societies. In order to improve this shortcoming, dentists should cooperate with in an interdisciplinary approach. In education programs organized at schools, health officials, program planners, school principals, teachers, and dental health professionals should collaboratively deal with developing, applying, and assessing oral health education programs for preschool children and their parents (25, 26). In our study, a significant difference was determined between the post-test scores of the children in the experimental and control groups. In addition, the fact that the children in the experimental group receiving the education program obtained significantly higher scores led to the conclusion that the applied program had a positive effect on the children's knowledge on oral health.

Suitable education techniques should be utilized in order to fulfill educational purposes, among which are

enabling children to gain desired behaviors, habits, and attitudes. Family-based structure of the applied education program and utilizing various education techniques simultaneously are the main factors in enhancing the effectiveness of the program. Seminars are organized for children and their families and demonstrations about the issues of toothpaste, toothbrush, and proper brushing are performed within the scope of education programs given to preschool children (27). However, the number of studies in which the education process utilizing these techniques simultaneously is extended over a specific time period and assessed is extremely low. Moreover, no studies were found to utilize the efficiency of drama on learning in oral health education programs. Drama is one of the educational techniques contributing greatly to preschool education (28). Drama has been used in health education primarily with a view to gaining experience, informing about gained behaviors, demonstrating how to cope with undesired situations, and materializing abstract concepts (22).

In a study carried out by Özsoy, creative drama method was applied in primary school mathematics classes and observed to have a positive effect on students' success levels. Students stated during interviews that they both had fun and learned (29). In another study carried out by Yeliz et al., drama method was used in values education and the classes utilizing this method were concluded to be relatively more effective in raising awareness and creating behavioral changes (30).

CONCLUSION

We recommend that all field experts who are in contact with the 5-8 age group use the oral and dental health information test developed in the study and found to be valid and reliable.

The training program applied and evaluated was found to be successful. We believe that this program will be implemented in schools and will contribute to the prevention of oral and dental diseases which are a common public health problem.

The effectiveness of the education program in our study was obtained through an organized presentation of the education by a multidisciplinary team, the primary aim of providing experiences by practicing and experiencing, the main objective of making families besides children a part of the educational process, consolidation of the education at home, providing the education through demonstrations and visuals, the educational structure embodying the factors that have an impact on oral health and enabling children to learn by having fun with creative drama techniques.

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