A step to infant oral health promotion intervention among parents

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Abstract

Aim Providing oral health care to children from infant to toddler age can be achieved by educating and informing parents about their children's oral health. The aims of this study were to determine the basic knowledge of oral health and to evaluate the efficacy of an infant oral health education programme among parents in Turkey.

Methods Study Design: One hundred and fifty parents of infants between 3 and 12 months of age attending the well-baby clinic, Dr. Behcet Uz Children's Hospital (Izmir, Turkey), participated in the study. A pre-test questionnaire was administered to each parent to assess their infant oral health knowledge. The educational intervention was in the form of a 30-minute interactive explanation of a PowerPoint presentation. The parents completed a post-test after the education in the same session (a questionnaire was administered).

Results The range of correct answers on the pre-test was 7–20 of 26 with a mean of 13.7 (SD=2.76). The range of correct answers on the post-test was 12–26 of 26 with a mean of 21.2 (SD=3.34). The difference of correct responses between before and after education was found to be statistically significant ($p<0.01$).

Conclusion Under the conditions of this study, educational presentation improved parents' knowledge on infant oral health care and provided anticipatory guidance.

KEYWORDS Anticipatory guidance, Infant oral health care, Oral health education, Oral health knowledge.

Introduction

Dental caries is the most common chronic infectious disease of childhood, which, if not prevented, can progress through lifespan. Early childhood caries (ECC) is the occurrence of one or more noncavitated or cavitated lesions, missing teeth due to caries or filled tooth surfaces in any primary tooth in a child 71 months of age or younger. In children up to 3 years of age, any sign of smooth-surface caries (noncavitated or cavitated) is described as severe ECC (S-ECC) [AAPD, 2005a]. When ECC treatment is neglected, this affects the quality of life with symptoms and conditions such as pain, discomfort, abscesses, chewing difficulties, malnutrition, reduced growth and development, poor speech and premature tooth loss with its sequelae of aesthetic dissatisfaction, low self-esteem and restriction of communication [Filstrup et al., 2003]. ECC affects children up to 6 year-old in the United States, England, Brazil and Australia with a prevalence of 27%, 23.5%, 27%, and 80%, respectively [Dye and Thornton-Evans, 2010; Davies et al., 2005; Arora et al., 2011; Gussy et al., 2006]. The oral health status of children in a developing country such as Turkey was evaluated by two national surveys in 1998 and 2004 [Gökalp et al., 2010; Saydam et al., 1991]. Caries prevalence in 6-year-olds in 1988 was 84%, and in 5-year-olds in 2004 was 69.8%. The caries prevalence of 12-year-olds was 84% in 1988, and 61% in 2004. The prevalence of caries was high among 5-year-olds in rural areas, while it was similar for 12-year-olds in urban and rural areas [Gökalp et al., 2010]. The results of both nationwide oral health surveys have shown dental caries to be a significant public health problem for children in Turkey.

ECC is an almost preventable condition, whereas prevention depends on how much attention is given to dental home care and the age of the first dental visit. Mika et al. [2010] in their study concluded that there is an urgent need for educating parents and guardians of young children about dental prophylaxis and healthy behaviours. Oral health education programmes for children are usually directed towards preschool and school children and disregard parents/caregivers. Parents/caregivers are important figures for children aged 5 years-old and under, and it is still the parent who primarily provides for the child's needs (daily routine, diet, behaviour, oral care practices) including professional dental care [Miller et al., 2012]. The American Academy of Pediatric Dentistry (AAPD) emphasised that it is essential to provide preventive education and dental care to parents so that the baby can be free from preventable oral diseases [AAPD, 2006-2007(20:10)]. The AAPD supports parents to build up a safe home environment for every child by 12 months of age. The AAPD promotes communication with early interception programmes, early childhood education and child care programmes, addressing members of medical and dental communities and other public and private community offices in order to raise awareness on age-specific oral health problems [AAPD, 2006-2007 (28:18-19)].

Educational programmes have been shown to improve the knowledge and skills about health. Since dental health is directly associated with the general health, oral health should also be part of well-child care throughout infancy and childhood. Also, with educational interventions, negative habits and lijestyles can be eliminated before they are settled [Harrison and Wong, 2003]. Anticipatory guidance, described as a proactive, developmentally-based counseling technique for the needs of a child during a specific period of life, provides the basis for preventive oral health education and dental care, enabling children to be free from preventable oral diseases [AAPD, 2005-2006]. It is valuable to use age-proper anticipatory guidance, in light of particular developmental needs, to parental figures. Studies have proprosed different methods to provide infant oral health information and detailed anticipatory guidance are most efficient when they meet the parent's particular interests [Alsada et al., 2005; Rothe et al., 2010; Plutzer et al., 2008]. Also, researchers assessed the impact of mothers' knowledge on children's oral health in different populations of different countries [Davies et al., 2005; Plutzer et al., 2008; Azevedo et al., 2014; Hoeft et al., 2016; Hallas et al., 2015]. However, there has been no infant oral health education intervention and anticipatory guidance for parents or caregivers in Turkey.

The aims of this study were to determine basic knowledge of parents on infant oral health and to evaluate the efficacy of an infant oral health education programme with targeting of for raising awareness on oral health of infants among primary caregivers attending the paediatric clinic of a Children's Hospital in Turkey.

Materials and methods

Setting and study population:

This study was conducted in compliance with the guidelines of the Declaration of Helsinki and it was approved by the local ethics committee of the Dr. Behçet Uz Children's Hospital (2012/11; B-104-ISM-4-35-65-72). This randomised interventional study was conducted on 150 parents (father or mother) who had a baby aged 0–12 months and visited the well-baby clinic in Dr. Behcet Uz Children's Hospital, Izmir-Turkey between March and July 2012. Dr. Behcet Uz Children's Hospital is a major teaching district hospital where the patients come from different regions of Turkey. The hospital provides health care to children of families from medium to low socio-economic status. In the study, 39 parents had a 0–3-month-old newborn, 45 parents had a 3–6-month-old infant, 36 parents had a 6–9-month-old and 30 parents had a 9–12-month-old baby. Parents were included in the research regardless of age and literacy.

This study was planned as a pre-test, an educational session and a post-test. Once the parents agreed to participate in the study, they were enlisted at the time of visit and scheduled for a one-hour session during lunch time, conducted by the same paediatric dentist in the conference room. The presentations were given once a week to a group of 10 participants in 15 sessions each on a different day. Parents attended only one presentation. The participants first completed a pre-presentation questionnaire, then watched a 30-minute PowerPoint presentation with an interactive explanation and then finally completed an immediate post-presentation questionnaire in the same session. If both parents attended the educational session, only one of them was required to fill the questionnaire. The illiterate parents were assisted by the paediatric dentist or an assistant person. Before enrollment in the study the participants signed an informed consent.

Educational presentation and questionnaire

The interactive educational PowerPoint presentation included information about infant oral health care and prevention. This information was based on anticipatory guidance in accordance with the American Academy of Dentistry. The educational programme was developed by using the AAPD guidelines. Information covered the topics of healthy pregnancy, oral and dental development, teething, healthy nutrition, oral hygiene, fluoride, acquisition of oral bacteria, night feeding and oral habits, ECC causes and sequelae, injury prevention, and the first and regular dental visits. The pre-questionnaire included basic demographic information such as age, mother/father, level of education, family income, and ethnic origin. The questionnaire consisted of 26 questions covering the basic information in the presentation. Twelve of the answers were arranged as multiple choice, while 14 of them were structured as True/False/Don't know for simplicity and consistency and all the questions had a Don't know option. The study design was structured according to the structure and use of similar design in earlier studies [Alsada et al., 2005]. The post-questionnaire included 3 questions to evaluate satisfaction, whether there was a lack of content in the presentation and whether the parents' behaviour in caring their child's teeth at home would change based on the information provided. '

Statistical analyses

Statistical analyses were performed by using the SPSS for Windows program, version 15.0 (SPSS Inc, Chicago, IL). Mean standard deviation or median (minimum-maximum) values were given for continuous variables. Statistical differences of total scores for the questionnaire as a whole were evaluated by comparing correct answers before and after education using the paired t-test. "Don't know" or blank responses were counted as incorrect. Comparison of differences for individual questions on pre- and post-test were determined by Wilcoxon Rank's Test. Demographic, educational and income level information of the participants were expressed as frequency and related percentage. The relationship between the knowledge and confounding factors including educational level, age and demographic values were compared by the correlation analyses. The adjusted risk ratios were calculated at 95% confidence interval of the difference. A 0.05 p-valuewas considered to be statistically significant.

Results

The distribution of 150 parents enrolled in the study according to the gender was as follows: there were 108 (72%) mothers and 42 (28%) fathers with a mean age of 26.8 years (range 18–47 yrs). Most of the parents had primary or secondary level of education with the percentage of 32% and 38%, respectively. The majority of the parents belonged to the low (48%) or medium socio-economical class (50%) with regard to their family income. Demographic features such as age, gender, educational level and family income of the participants are presented in Table 1.

Statistically significant increase was determined in "correct" responses of the questionnaire compared 'before' and 'after' education (p, t(49) =-14.423). The range on the pre-tests was 7–20 of 26 with a mean of 13.7 (SD=2.76), whereas the range on the post-tests was 12–26 of 26 with a mean of 21.2 (SD=3.34). The number of "False" or "I don't know" responses significantly decreased between the pre- and post-tests (p). These two types of responses were evaluated as "incorrect" responses (Table 2).

The level of infant oral health baseline knowledge for pre-test scores was found to be correlated with age, while there was no relationship with the level of education (Spearman's correlation r=0.187; p=0.192; r=0.407; p=0.003). Older parents had higher knowledge.

All parents knew that the main types of food that can cause tooth decay are starchy foods and foods with sugar, on both the pre- and

Parent Characterisric	n (%) or mean±SD; median; range
Age (years)	26.6 ± 5.90; median=27; range=18–47
Parent	
Mother	108 (72%)
Father	42 (28%)
Educational level	
Illiterate	6 (4%)
Primary	48 (32%)
Secondary	57 (38%)
Tertiary	39 (26%)
Family income	
Low	72 (48%)
Medium	75 (50%)
High	3 (2%)

TABLE 1 Demographic features of the study population.

post-tests (100%; p=1). Almost all participants (84% or higher) knew that; the child's teeth should be cleaned at least twice a day, the most important time for this is after last feeding at night; what can be done to provide a safe home environment; bacteria that cause tooth decay are transmitted from mother to child by kissing or sharing feeding utensils. Since these items stayed high at both tests, the differences were not significant (p=0.655; p=0.705; p=0.038) (Table 3).

The question answered mostly incorrect on the pre-tests was "Breastfeeding can cause baby tooth decay" (98%). This was the third most improved question on the post-test with 87 correct answers more. The difference for this question between pre- and post-tests was highly significant (p<0.01) (Table 3).

The most improved questions on the post-tests were "Fluoride in drinking water is the main source of fluoride intake during development of teeth"; "When should you start brushing your baby's teeth" and "Fluoride is important for preventing cavities" with correct answers increased to 99, 90 and 90, respectively. Statistically significance was determined separately for these three answers (p<0.01; p<0.01; p<0.01) (Table 3).

The question that received the most incorrect answers on the post-tests was "How long should you brush your child's teeth". This question was replied by 120 people before the education and answered incorrectly by 117 parents after the education. This was found statistically not significant (p=0.22) (Table 3).

Only six questionnaire were completely correct on post-tests (Table 3). There is a correlation between baseline knowledge and knoledge after education among the participants (Pearson's correlation r=0.287; p=0.043). The parents who knew less at baseline still learned less than the parents whose knowledge was better on both tests.

When the effect of the educational presentation was evaluated according to the age and level of education, no correlation was found (Spearman's correlation r=0.149; p=0.301; r=0.062; p=0.667).

Although no questionnaire received all correct responses before education, there were six fully correct after the educational presentation.

All parents that participated in this study found the presentation helpful and satisfactory. However, they all stated to change oral health care for their children.

Discussion

In Turkey the caries experience among children is high [Gökalp et al., 2010; Saydam et al., 1991], but application to paediatric dental clinics is gradually increasing. Caries or other oral diseases can be prevented by giving more attention to oral health. This creates the need for early oral health intervention for caregivers.

Worldwide, there are few infant oral health education programmes, none in Turkey.

Considering the high prevalence of ECC in this country, the issue is educating mothers with little children. Thus, we planned an intervention which was performed as an oral health education session in a small target population that comprised parents who had a child aged between 0–1 year in Turkey.

In this study, a comprehensive practical information appropriate for the developmental stage of children was provided to the parents. All participants completed the whole interactive education programme. This shows that the presentation, duration, use of language, and readability of the questionnaire was favorable for maintaining the audiences' attention.

The results of this study indicated that the success rate in the questionnaire increased from 53% in the pre-test to 82% in the post-test which was significant for the efficacy of an education. This result points in the same direction as the data published by Alsada et al. [2005], Rothe et al. [2010], Plutzer and Spencer [2008], Hoeft et al. [2016], and Hallas et al. [2015] whose studies were carried out in Canada, on multiethnicity of America, Australia, Mexico, and North America respectively.

The parents' age and level of education may be potentially confounding factors that may influence the level of infant oral health knowledge. In the present study, the level of education and age have not been variables affecting degree of learning as mentioned in the study carried out by Rothe et al [2010]. This means that all parents benefited from infant oral health care education. When the baseline knowledge was assessed, the level was higher in older age, with no relationship with the educational status. These results are in line with the data reported by Boggess et al. [2011] and Hoeft et al. [2016], but they are in contrast to several studies claiming that higher education is associated with higher knowledge [Owais et al., 2010; Vann et al., 2010]. On the other hand, we demonstrate in this study that people who knew more before education also knew more after education. This may be perhaps interpreted as the oral educational programmes are more successful for those who are more concerned with oral health.

The aim of all studies performed with infant oral health education programmes is to prevent ECC. A variety of experiments have been

	Pre-test	Post-test	Improvement	
Response	Mean±SD; %.. range	Mean±SD; %.. range	Mean±SD; %.. range	t(49)
Correct	13..7±2..76; 53%; range=7-20	21..2±3..34; 82%; range=12-26	7..5±3..67; 28..85%; -1-15	-14..423**
Incorrect	12..3±2..76; 47%; range=6-19	4..8±3..34; 18%; range=0-14		
Replied "False"	6..4±2..22; 24%; range=3-12	3..44±2..26; 13%; range=0-9	-2..96±3..10; -11-1	6..73*
Replied "I don't know"	5..9±2..97; 23%; range=0-13	1..36±1..71; 5%; range=0-5	-4..54±2..93; -12-3	10..934*

***: p<0.001, *: p<0.01*

TABLE 2 Statistical evaluation of the responses of parents in pre- and post-tests.

	Pre-Test (n=50) True answer n(%)	Post-test (n=50) True answer n(%)	p
Answered all knowledge questions correctly	0 (0/150)	6 (6/150)	
How to get healthy pregnancy which is important for healthy baby teeth (MC)	63 (42%)	87 (48%)	0,018*
Time of the first baby tooth eruption (MC)	123 (82%)	144 (96%)	0,008*
Age of completion the set of 20 baby teeth (MC)	42 (28%)	123 (82%)	p<0,01*
An unhealthy diet can affect a child's baby and adult teeth (T/F/D)	129 (86%)	150 (100%)	0,014*
The main types of food that can cause tooth decay are: (MC)	150 (100%)	150 (100%)	1
Cleaning baby's mouth after each feeding should begin even before teeth erupt (T/F/D)	108 (72%)	150 (100%)	p<0,01*
Time of starting baby's teeth (MC)	30 (20%)	120 (80%)	p<0,01*
The frequency of brushing baby teeth (MC)	27 (18%)	90 (60%)	p<0,01*
Duration of baby tooth brushing (MC)	30 (20%)	33 (22%)	0,22
Fluoride is important for preventing cavities (T/F/D)	45 (30%)	135 (90%)	p<0,01*
Time to start using fluoride toothpaste (MC)	45 (30%)	90 (60%)	p<0,01*
The amount of toothpaste to be used for brushing a child's teeth (MC)	99 (66%)	150 (100%)	p<0,01*
Swallowing of toothpaste can be harmful to a child's health (T/F/D)	75 (50%)	108 (72%)	0,009*
Fluoride in drinking water is the main source of fluoride intake during development of teeth (T/F/D)	30 (20%)	129 (86%)	p<0,01*
Transmition of bacteria from mother to child by kissing or sharing feding utensils (T/F/D)	126 (84%)	141 (94%)	0,038*
If mother has decayed teeth, it is probably also in the child, as she transfers the germs.(T/F/D)	78 (52%)	135 (90%)	p<0,01*
Main cause of early baby tooth decay is nighttime or bedtime using bottle milk or breast milk (T/F/D)	51 (34%)	126 (84%)	p<0,01*
Time of weaning from a bottle to a sipping cup (T/F/D)	87 (58%)	114 (76%)	0,032*
Breastfeeding can cause baby tooth decay (T/F/D)	3 (2%)	90 (60%)	p<0,01*
child's teeth should be cleaned at least twice a day-the most important time is after last feeding at night (T/F/D)	141 (94%)	144 (96%)	0,655
The necessity of treatment of baby teeh (T/F/D)	30 (20%)	78 (52%)	0,014*
The effect of oral habits and use of a pacifier to the baby's teeth and jaws if continued beyond age 4 (T/F/D)	108 (72%)	138 (92%)	0,002*
what can be done to provide a safe home environment (MC)	141(94%)	138 (92%)	0,705
Prevention of accidents and injuries to the mouth and teeth by proper use of car seats (T/F/D)	117 (78%)	150 (100%)	0,001*
Age of first dental visit (MC)	51 (34%)	117 (78%)	p<0,01*
Prevention of dental problems by regular dental visits (T/F/D)	126 (84%)	150 (100%)	0,005*

*: p<0.05.
MC: Multiple choice, T/F/D: True/Fales/I don't know

TABLE 3 Statistical evaluation of improvement of knowledge within-person change between pre- and post-tests.

carried out with different methods on this topic. Authors presented infant oral health information in printed form [Plutzer and Spencer, 2008; Makvandi et al., 2015] or through a DVD/video [Alsada et al., 2005; Hallas et al., 2015] or in a verbal interactive programme by means of PowerPoint slides [Rothe et al., 2010; Bracho Pacheco et al., 2018], which is similar to our study. Some studies evaluated not only knowledge [Alsada et al., 2005; Rothe et al., 2010], but also the behaviours of the caregivers before and after education [Hoeft et al., 2016; Makvandi et al., 2015; Kanellis et al., 1997; Kowash et al., 2000]. In addition, there are also several reports which include infant oral health examination after providing anticipatory guidance as well as a questionnaire [Plutzer and Spencer, 2008; Hallas et al., 2015]. Regardless of the method, all studies mentioned confirmed that infant oral health education improved the infant oral health knowledge of the caregivers.

In the present study, all parents knew the fact that sugary and starchy foods were the main types of foods which can cause tooth decay. This item was the only one answered correctly by all parents on both the pre- and post-tests, possibly because of being the most basic information. Even so, in such a country with a high prevalence of ECC, regardless of the level of education and the social level, the fact that this information was widespread made us very pleased. Surprisingly, this inconsistency has a parallel in previous reports [Azevedo et al., 2014; Hoeft et al., 2016; Boggess et al., 2011; Cortes et al., 2012; Hoeft et al., 2010; Horton et al., 2008]. Also, in both pre- and post-test aswers of the study, parents showed to be informed regarding the benefit of tooth cleaning at least twice a day, especially after last feeding, and of providing safe home environment also considering possible transmission of bacteria which causes tooth decay from mother to child by kissing or sharing utensils.

The areas of knowledge that were lower at baseline, such as breastfeeding in the development of dental caries, frequency of brushing baby's teeth, time to start brushing baby's teeth, no need to fix cavities in the baby teeth, importance of fluoride for caries prevention and fluoride in drinking water being the main source of fluoride during tooth development – were similar to previous researches of Akpabio et al. [2008], Alsada et al. [2005] and Hoeft et al. [2010, 2016]. However, unlike what we found in our study, Azevedo et al. [2014] stated that 90% of the mothers reported of beginning tooth-brushing during their children's first year. Hallas et al. [2015], and Boggess et al. [2011] reported that mothers knew that fluoride prevents caries (71.6 % and 86.8 %, respectively).

The greatest improvements in knowledge in this study was in learning the importance of fluoride aplication both during tooth development and for decay prevention and the time to start brushing the baby's teeth. While the questions about fluoride were answered as "I don't know", wrong answers were marked to the question about tooth brushing. This indicates that there is a lack of information about fluoride and false beliefs about tooth brushing at baseline. Another noticeable improvement was also revealed regarding the knowledge that breastfeeding can cause tooth decay. This was the most incorrectly answered question by 98% of the respondents on the pre-test, which increased to 60% correct responses on the post-test.

Even though a satisfactory score was achieved for the majority of questions after the education, no progress was made regarding duration of brushing. In general, when looking at the improvement rates at the post-tests, it is obvious that there is less increase in the areas of brushing and treatment of baby teeth, although the presentation covered in detail the consequences of potential dangers on the developing teeth of the permanent dentition, if primary teeth are affected, but not fixed and not brushed regularly. This poor improvement could be the result of a profoundly ingrained belief that since baby teeth are going to be replaced, there should be no compelling reason to fix decayed teeth in the primary dentition. As stated by Rothe et al. [2010], some behaviours like oral hygiene and dietary habits are so ingrained in the daily routine that are really hard to change.

Only six questions were correctly answered by all of the respondents at the post-test in the present study. The authors have indicated that parents do not all seek information on the same topics, and the areas of greatest improvement and attitude change are usually those which already concerned the parents [Nelson et al., 2003]. This emphasises the importance of a more individualized approach to education programmes with specific information for each parent and knowledge level.

In this study, post-tests were filled completely correctly by six mothers, while on the pre-tests no mother was entirely successful. Although, ideally, all questions were required to be answered correctly by all parents on the post-test, the results of the study are considered successful. In general, all parents found the presentation helpful and satisfactory and they declared that they would have a change in their baby's oral health care. The results of this study show that educational presentations can reach a large number of individuals and may provide benefit to people from every level as pointed out in former studies [Dye and Thornton-Evans, 2010].

Except for showing statistically significant results, this study also had a limitation. In the study, only self-reported knowledge was evaluated; but it was not measured how they behaved, in other words parents did not answer questions about their own dental care. Whereas, more interest could be gained by gathering data on their own approach on dental care in general.

Regardless of this limitation, this is possibly the first study in the medical literature evaluating the effectiveness of education on infant oral health care by parents in a Turkish population. This report makes a useful contribution and is an initial attempt at creating educational intervention targeted at raising awareness and comprehension of this social health issue and eventually influencing caregivers' behaviours and dental outcomes.

Conclusion

With respect to the study design and the results obtained, it can be concluded that educational presentations are effective in improving knowledge and raising awareness on infant oral health care of parents and caregivers. Further educational intervention studies including a larger number of parents are needed in order to decrease ECC prevalence in Turkey.

Conflict of interes

The authors have declared no conflict of interests.

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