Dental health education programme for 6-year-olds: a cluster randomised controlled trial

**Abstract**

**Aim** Oral health is a reflection of general health and significantly influences the quality of life. Dental caries is one of the most common chronic diseases of childhood which may adversely affect physical, mental and social growth of children. Oral hygiene methods can effectively prevent oral and dental diseases, and oral hygiene education plays an important role in this regard. The aim of the present study was then to assess the effect of oral hygiene education on the oral and dental health of 6-year-olds.

**Materials and methods** A hundred and sixty 6-year-old children from 4 pre-school centers were divided into two groups, case and control, in this cluster randomised controlled trial. The children in the case group received oral and dental education in one session. The parents of the case group were also instructed in one session. The children and parents of the control group did not receive any instructions. Plaque index (PI): Turesky-Gilmore-Glickman; gingival index (GI): Loe & Silness; at a) baseline, b) 1.5 and c) 6 months after the first examination. Data were analysed by repeated measure ANOVA.

**Results** PI: A significant difference was found between the baseline examination and the first follow-up (p<0.001), and between the baseline examination and the second follow-up (p<0.001). GI: Although values in the case group were lower, no statistically significant difference was found between the two groups and within each group (p>0.05). Regarding the number of brushing times, a statistically significant difference was found between the first and the second follow-ups of the study groups (p>0.05). The brushing type and the application of other hygienic measures did not show any difference (p>0.05).

**Conclusion** Within the limitations of the present study, it may be concluded that oral hygiene instruction to 6-year-old children and their parents improves their dental health.

**Keywords** Child; Dental care; Dental health education; Dental plaque index; Oral health; Oral hygiene; Oral hygiene indices; Periodontal index.

**Introduction**

Oral health is a reflection of general health. It was reported in the 2000 National Oral Health Conference (USA) that “you cannot be healthy unless you have good oral health”. Moreover, oral health can significantly influence the quality of life [Blumenshine et al., 2008; Pongpichit et al., 2008; Valencia-Rojas et al., 2008; Barbosa and Gavião, 2008; Knevel et al., 2008]. Asthma, diabetes and obesity are among the most common chronic diseases of childhood. However dental caries, as the most common chronic disease of childhood, involves children five to eight times more than asthma. According to the “NHANES” report of 1999-2000, 41% of 2-11 year-old children have dental caries in their deciduous dentition and 42% of 6-19 year-olds show dental caries in their permanent dentition [Blumenshine et al., 2008]. In 2002, the WHO reported that 60% to 90% of school children show dental caries [Kasila et al., 2006; Barbosa and Gavião, 2008].

Gingival disease is also one of the most important oral health issues that affect the quality of life of children. It has been reported that more than one fifth of children have inflamed bleeding gums and about half of them have problems in cleaning their teeth [Barbosa and Gavião, 2008]. In a 2008 study, only 4% of the children did not show signs of gingivitis and only 3% of them had caries-free permanent first molars [Knevel et al., 2008]. Since dental caries and gingival diseases are mostly induced by dental plaque, the prevention of plaque accumulation especially before the eruption of the permanent dentition seems necessary [Forrest, 1989].

Untreated dental caries in children will result in the impairment of dental structures and even tooth loss and adversely affect their general health [Valencia-Rojas et al., 2008]. It may consequently result in compromised systemic health, severe pain, and malnutrition [Valencia-Rojas et al., 2008] and impair their physiological, social and mental development [Blumenshine et al., 2008].

A study in the USA [Blumenshine et al. 2008] showed that a considerable proportion of education time is annually lost due to dental problems and dental visits. Decreased school time will have a negative effect on quality of life of the children [Pongpichit et al., 2008]. It has been estimated that over 51 million hours of education is annually lost due to oral and dental deseases [Blumenshine et al., 2008].

Since dental caries is still very common, further attempts at improving oral health seem necessary. Personal oral hygiene measures are the main part of the oral disease prevention. Dental professionals should instruct patient, especially those at higher risks due to high plaque index (PI) and high gingival index (GI), to maintain proper oral hygiene [Lee et al., 2008]. In addition to healthy nutritional habits, to preserve proper oral hygiene and prevent caries and periodontal diseases the use fluoride tooth paste [Knevel et al., 2008], and regular tooth brushing (twice a day) are required [Kasila et al., 2006]. On the other hand, the importance of oral hygiene education on oral health cannot be overlooked. It has been shown that brushing habits developed during childhood and adolescence will last for the rest of life of the subject. The aim of
Educational and oral hygiene programmes is then to correct these habits and to maintain them ever after [Kasila et al., 2006]. Also studies have shown that education by experts will help children modify their oral hygiene habits and maintain good oral health [Pine et al., 2000].

According to the literature, the effect of oral and dental hygiene education, education time, repeated education, and the age of the children is not yet clear enough. For instance, some authors [Vanobbergen et al., 2004] have suggested long-term educations and some other [Biesbrock et al., 2004] have suggested short-term education to be successful. Also some authors [Worthington et al., 2001; Vanobbergen et al., 2004] believe there is no significant relationship between oral hygiene education and oral health, while others [Worthington et al., 2001; Biesbrock et al., 2004] claim the opposite.

The present study then aimed to assess the effect of an oral hygiene education programme for 6-year-old children and their parents on the PI and GI of the children.

Material and methods

Study population

In this cluster randomised controlled trial, four preschool centers were randomly selected. One class of each center was randomly considered as the case group and another class was randomly selected as the control group.

The study protocol was approved by Ethics Committee of the Azad University of Tehran.

Baseline examinations

After obtaining informed consents from the parents, the demographic data, baseline PI (PI0), baseline GI (GI0) and oral hygiene habits were recorded. All examinations were carried out in the medical room of each center by one examiner using disposable mirror, disclosing solution and Williams probe under dental chair light. Plaque was recorded based on the Turesky-Gilmore-Glickman modification of the Quigley-Hein PI [Silness and Loe, 1964; Tureskey et al., 1970] gingival health was recorded based on Loe-Silness index [Silness and Loe, 1964; Tureskey et al., 1970].

Education

The parents of the case group were then invited to receive oral and dental hygiene education from a dental student. They were asked to properly cooperate during the course of the study and help their children with their new oral hygiene routines. The importance of healthy teeth in aesthetics and for the preservation of jaw bone, nutrition and its effect on dental caries, the time and site of eruption of the first permanent teeth, the importance of the first molar, dental plaque as the etiologic factor for caries, the process of plaque accumulation, correct brushing methods, brushing time and frequency, and the application of dental floss were explained to the parents.

The children of the case group were instructed for 30 minutes using brochures, catalogues, poems, stories, models, etc. on the correct brushing method, brushing frequency and appropriate characteristics of a toothbrush were taught to the children. All the children of the present study were given similar toothbrushes (soft junior) and toothpastes (Pooneh) and were asked to use only the brushes and the toothpastes they were given during the study.

Follow-ups

PI (PI1 & PI2) and GI (GI1 & GI2) were recorded again after 1.5 (first follow-up) and 6 (second follow-up) months.

Statistics

Data were classified and statistically analysed using the SPSS v11.5 (SPSS Co., Chicago, Ill). To compare the baseline values and the first and the second follow-ups, repeated measure ANOVA was used. PI0 and GI0 were the covariates and PI1, PI2, GI1 and GI2 were the dependant variables. The test between subjects was done to compare the groups. The p-value was set at 0.05.

Results

The present study included 160 6-year-old children divided into two groups of case and control; 87.5% of the children of the first group and 85.25% of the latter completed the study. The demographic data of children including gender, age, number of siblings, father's occupation and education of parents were not significantly different between the case and the control groups (p>0.05) (Table 1).

The mean PI0 in the case group was 3 ± 0.63, which reached 2.6 ± 0.66 (PI1) at 1.5-month follow-up and 2.8 ± 0.58 (PI2) at 6-month follow-up.

In the control group, the mean PI0 was 3.07 ± 0.67, which reached 2.97 ± 0.58 (PI1) at 1.5-month follow-up and 2.99 ± 0.7 at 6-month follow-up.

Statistical analysis showed the following.

• PI1 of the case and the control group showed statistically significant differences. A significant difference was also observed between PI2 of the case and the control groups (p<0.001).

• In both groups, no statistically significant difference was found between PI1 and PI2 (p=0.594).

• In the case group, PI1 and PI2 significantly improved compared to PI0 (p<0.001).

• In the control group, no statistically significant difference was found between PI0, PI1 and PI2 (p=0.005).

In the case group, the mean GI0 was 0.65 ± 0.43, which was 0.58 ± 0.34 at the first and 0.62 ± 0.46 at the second follow-up.

In the control group, GI0 was equal to 0.56 ± 0.49; GI1 was 0.57 ± 0.46 and GI2 was 0.55 ± 0.47.

Statistical analysis showed the following.

• No statistically significant difference was found between the case and the control groups (p=0.391).

• No statistically significant difference was found between GI1 and GI2 (p=0.287).

• GI1 and GI2 were not significantly different to GI0 (p>0.05).

Regarding the number of brushing times, statistically
A significant difference was seen between the first follow-ups of the case and the control groups and between the second follow-ups of the case and the control groups (Table 2). No difference was found between the case and the control groups in terms of brushing technique, flossing, use of mouthwash and other hygienic methods.

Discussion

The findings of the present study showed that the educated group had significantly lower PI at the first and the second follow-ups (p>0.05). Also regarding the frequency of brushing, a significant difference was observed. However, no statistically significant difference was found between the two groups in terms of brushing technique and the application of other hygiene measures (p>0.05).

The findings of the present study are consistent to those of the study of Ekstrand et al. [Ekstrand et al., 2000] in three age groups of 3, 6 and 11 years. They showed that preventive plans (educating children, parents and teachers) are effective and can decrease or eliminate plaque-induced diseases. The age at which the preventive plans start plays an important role in their final success. The authors believed that preventive plans should start at the age of 6 when the first molar has erupted [Ekstrand et al., 2000].

The findings of the present study are also consistent to those of Worthington et al. [2001]. They showed an improved PI following dental hygiene education of 10-year-olds. The authors also showed that knowledge and attitude of the educated children has significantly improved regarding oral health. The authors also reported that the positive effect of the oral hygiene education had lasted for 3 months. In the present study, this time period was 6 months.

Biesbrock et al. [2004] showed that short-term oral hygiene education (1 month) of 6 to 15 year-old children (n=90) is associated with significantly improved PI and GI. Of course, the present study reports a 3% decrease in PI which is yet quite low. Also no statistically significant changes were seen in GI, which may be due to the difference in the study population number and the presence of different age groups in the two studies.

Gingivitis is more prevalent in adolescence (13-17 years), which is thought to be attributed to the increased secretion level of sex hormones and the consequent more prominent response of the gingival tissue to dental plaque. Decreased plaque index, even when small, can then significantly decrease the gingival and bleeding indices [Biesbrock et al., 2004; Carranza and Newman, 2006]. Since the present study included 6-year-olds, the effect of these hormonal factors were absent.

The findings of the present study do not support the report of Vanobbergen et al. [2004] in Finland, which assessed the effect of a 6-year oral hygiene education programme on the oral health conditions of primary school children. They concluded that oral hygiene education does not influence PI and the frequency of brushing. The difference between the present study and the study of Vanobbergen can be attributed to the fact that Vanobbergen et al. conducted a 6-year study with long intervals (one year). Moreover, a 16% and a 24% loss of study population were seen respectively in the control and the case groups, which are relatively high numbers. They also did not educate the parents and/or the teachers along with the children. It may be possible that an effective the education of school children should be supported by the education of their parents.

Although the GI values were lower in the case group compared to the corresponding values of the control group, no statistically significant difference was observed. Since a significant PI decrease was achieved in the present study, one might expect a parallel decrease of plaque induced gingivitis. The present study, however, again shows that GI is not necessarily influenced by PI.

Conclusion

Generally, the oral and dental education of 6-year-old patients (preschool) may have a positive effect on their...
dental hygiene and contribute to the development and maintenance of appropriate oral hygiene habits.

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References


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