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ORIGINAL ARTICLE

Impact of Three Different Education Methods on Oral Hygiene and Theoretical Knowledge of Schoolchildren

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Abstract

Objective: To evaluate the impact of three different education methods on the oral hygiene levels of school children using clinical and theoretical findings. **Material and Methods:** 144 children (72 males and 72 females), whose ages ranged between 8-13, were divided into 12 equal experimental groups according to their ages and gender. They were all considered to have poor hygiene. Only one out of the three different education methods (brochure, model or video) was applied to each group. The percentage change in PI, GI, BOP and theoretical test points from the baseline to the 6th months were evaluated. The data was statistically analysed by using Kolmogorov-Smirnov and One-way ANOVA tests. **Results:** Reduction in PI, GI and BOP scores was significantly greater ($p<0.05$) in the video applied groups compared to the brochure groups in the age of 8-10 groups for both genders and in 11-13-year-old males. In 11-13-year-old females, all methods showed similar results ($p>0.05$). There was no significant difference in test points in 8-10 and 11-13-year-old female groups ($p>0.05$), whereas a significant increase in test points was observed in the video and model applied groups compared to the brochure groups in 8-10 and 11-13-year-old male groups ($p<0.05$). **Conclusion:** It may be more helpful and effective for children to get the oral hygiene education using the visual methods, especially for those under the age of ten.

Keywords: Dental Plaque Index; Education; Oral Hygiene.

Introduction

Dental caries and periodontal diseases are the main causes for deterioration of oral hygiene and these factors are important problems, which affect the health of the common population [1-3]. There are many factors that negatively affect the oral hygiene levels of an individual, and the microbial dental plaque is the most accepted factor among them [4,5]. The bacterial activity of the dental plaque causes the decrease the oral hygiene level with bacterial toxins, if the dental plaque is not removed from the oral cavity by tooth brushing and flossing. Additionally, periodontal diseases like gingivitis are the other results of the poor oral hygiene. Gingival inflammation occurs frequently in children and the prevalence of periodontal disease for the schoolchildren under 14 years for age is 51.54% [4-6].

Tooth brushing and flossing are the main processes which prevent the accumulation of dental plaque on the tooth surface [3,7]. The effectiveness of tooth brushing increases from childhood to adolescence, and children gradually take the responsibility of their oral hygiene after the age of approximately 6 years. In that period, proper brushing method has an important role for an influential dental plaque removal [5], and the Modified Bass technique is one of the methods, which is commonly recommended for the patients who have periodontal disease [8,9]. The principles of this technique are removing the supragingival plaque with using controlled movement to avoid trauma and moving the toothbrush around all the surfaces of the teeth. In this technique, the head of the toothbrush is placed parallel with the occlusal plane. The bristles are placed at the gingival margin pointing at a 45° angle to the long axis of the teeth and the brushing process is started at the most distal tooth in the arch. Rotational short vibrations are exerted on the supragingival area, and the last motion is the directing the bristles of the toothbrush to the occlusal surfaces of the teeth [9].

The other factor to remove bacterial dental plague and increase the oral hygiene level is the motivation of the individual about the importance of having a good oral hygiene [3]. Additionally, the tooth brushing and flossing educations, which are given by oral health professionals, play a crucial role to change the self-developed and inadequate cleaning techniques of the individual. To provide the acquisition of proper oral hygiene habits in individuals, different education methods such as giving a brochure [10] or showing a video [11] can be used. However, the preference of the optimal education technique varies according to clinicians, and having effective educational results is complicated in child population, especially if they are at a young age [3,12]. So, these techniques' practical and theoretical benefit for children is an issue necessary to be considered. Moreover, the loyalty of the children to these educational programs is another discussion topic.

The aim of the present study was to evaluate the impact of three different education methods (giving a brochure, expression with a model, or showing a video) on the oral hygiene levels of children who were in school age. In addition, comparison of the comprehension capacity of children in different ages and evaluation of the effectiveness of these education techniques on that ability were the other aims.

Material and Methods

Study Design

This cross-sectional study was performed in Bulent Ecevit University, Faculty of Dentistry, Department of Pedodontics in the year of 2014. The sample was made up of patients between 8 and 13 years old who applied to our clinic for periodontal complaints as gingival bleeding during the process of tooth brushing.

At the beginning of the study, individuals underwent a full mouth periodontal examination including bleeding on probing (BOP) [13], plaque (PI) [14] and gingival index (GI) [15] which are used for the determination of the oral hygiene and periodontal disease levels of the individuals. The oral hygiene situations were detected by the Simplified Oral Hygiene Index (OHI-S) [16]. According to the OHI-S, a 0-1 score was accepted as good oral hygiene, and a 2-3 score was accepted as poor oral hygiene. The patients whose OHI-S scores were under 2 were not included in the study. Additionally, patients who had a periodontal treatment in the last six months, a systemic disease or an abnormal cognitive and motor development, were excluded from the study. PI, GI, and BOP scores were recorded using a Williams periodontal probe (Hu-Friedy Mfg. Co., Chicago, IL, USA). All clinical examinations (at six different sites around each tooth: mesiobuccal, distobuccal, midbuccal, mesiolingual, distolingual, and midlingual) and group allocations were performed by the same investigator (F.O.D.), who was blinded with respect to the study design.

Based on the inclusion and exclusion criteria, 144 children (72 males and 72 females) were accepted according to the basis of voluntariness. During the determination of the oral hygiene and periodontal disease levels, all index scores were recorded for each individual who was included in the study, and these individuals were divided into 12 groups as shown in Figure 1.

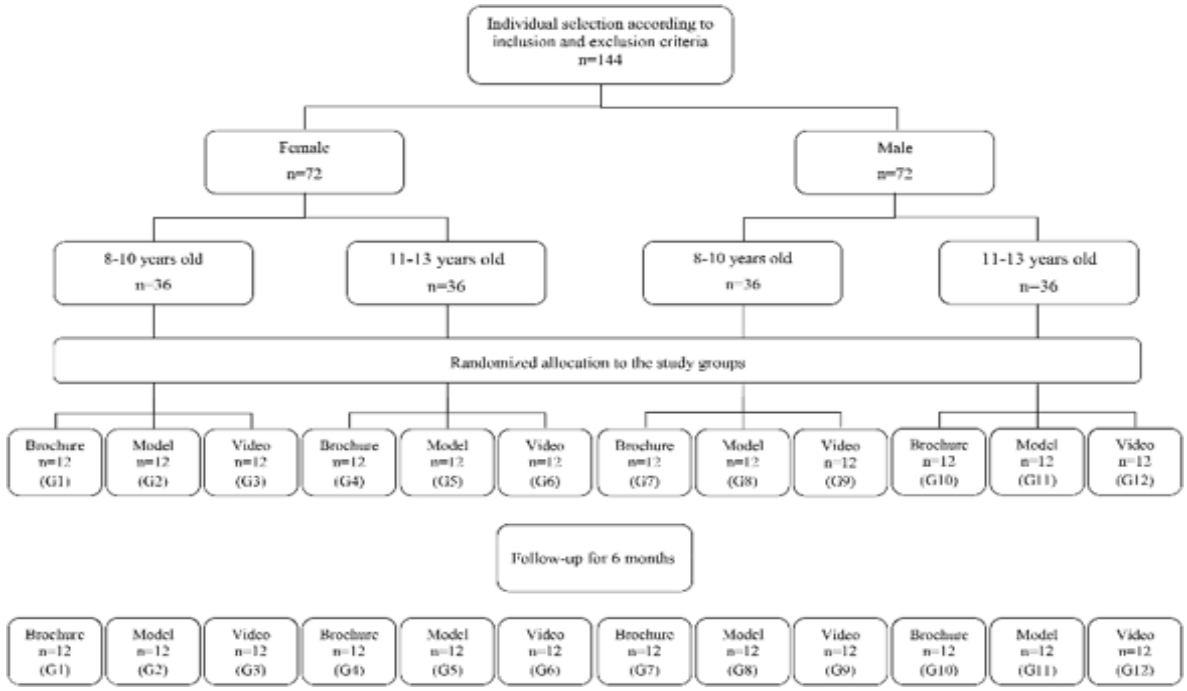

Figure 1. The flow chart of the study method.

Theoretical Test Application

The second step was the application of a theoretical test to all individuals. Ten questions were asked to learn the knowledge level of each individual about Modified Bass technique, flossing and oral hygiene recommendations before the beginning of the study. In that test, each question was given a worth of 10 points, and the knowledge level of each sample was evaluated out of 100 points. During the test, a toothbrush was given to each child to help them on giving an answer for the question 2, 3, 5, 6 and 7. After the test application, all test scores were recorded, and then periodontal treatments were performed by the same specialist.

The Oral Hygiene Education

The third step was the oral hygiene education that was performed in three different methods: giving a brochure, explanation with a model, and showing a video. In the educational step, the right answers to the questions asked in the theoretical test were given.

Giving a brochure: a brochure, consisting of two different sides was given to the individual. The brochure included writings and colour figures about Modified Bass technique for tooth brushing, flossing and some additional recommendations. Each individual was given the same brochure.

Expression with a model: a model, consisting of a toothbrush and floss, was used for the explanation of the Modified Bass technique and tooth flossing. During the demonstration, the same additional recommendations as in brochure were given. Each explanation was completed in two minutes without any repetition.

Showing a video: a video, consisting of two different parts, was shown using a mobile device (iPad 2, Apple Inc., USA). The first part was explaining the Modified Bass technique whereas the second part was explaining tooth flossing. These two parts included the same additional recommends as in the brochure and the model techniques. The length of the video was two minutes and it was shown only once without any repetition.

All individuals were re-evaluated at the 6th month again, and the last PI, GI and BOP index scores were recorded. Additionally, the same theoretical test, which was applied at the beginning, was repeated to learn the alterations on knowledge levels.

Statistical Analysis

The percentage change in PI, GI, BOP and test points from the baseline to the 6th months were analysed for the evaluation of the effectiveness of education methods on oral hygiene. The Kolmogorov-Smirnov test was used to determine whether the data was normally distributed. Comparisons between the test points and the clinical parameters were analysed using the one-way analysis of variance (One-way ANOVA) with post-hoc Bonferroni tests after the normality of data had been verified. All tests were performed using statistical software (SPSS Inc., version 19.0, Chicago, IL, USA) and $p<0.05$ was considered to be statistically significant.

Ethical Aspects

Ethical approval was accepted by the ethics committee of the Ankara University, Faculty of Dentistry (Protocol No. 36290600/93).

Results

There were no significant differences in PI, GI, BOP and test points at baseline among all groups. Decreased PI, GI and BOP scores and increased test scores were observed in 6th months scores compared to baseline across all groups ($p<0.05$). There were no statistically significant differences between female and male groups in terms of changes in all parameters; when age and method variables are controlled for ($p>0.05$).

Clinical findings (PI, GI and BOP) are summarized in Figures 2, 3, and 4, respectively. Reduction in PI, GI and BOP was greater in the video applied group 3 compared to the brochure and model applied groups 1 and 2 ($p<0.05$). There were no statistically significant differences in the change of all clinical parameters among groups 4-6 ($p>0.05$). With respect to the mean change of PI, GI and BOP, there was a greater decrease in model and video applied groups 8 and 9 compared to brochure applied group 7, and in model and video applied groups 11 and 12 compared to brochure applied group 10 ($p<0.05$).

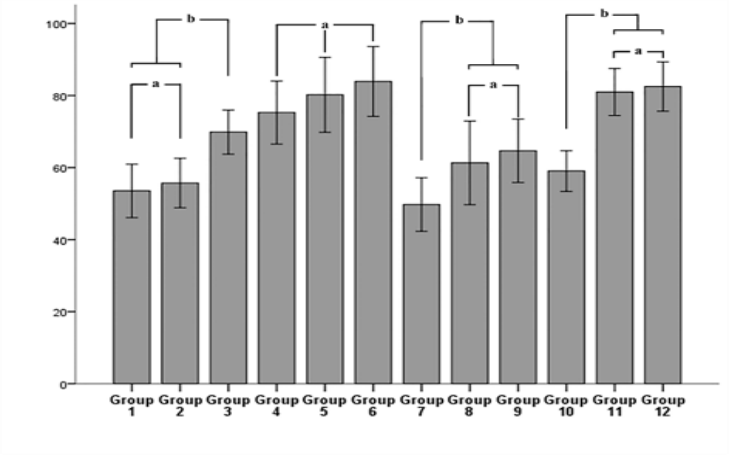

Figure 2. Reduction as percentage of PI scores in all groups (the character "a" shows the insignificant, and the character "b" shows the significant relationship between the groups).

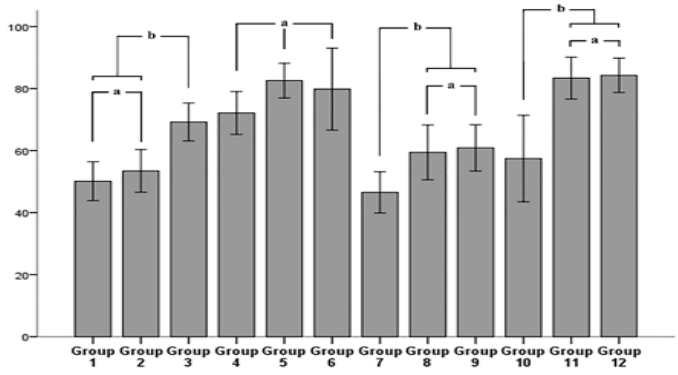

Figure 3. Reduction as percentage of GI scores in all groups (the character "a" shows the insignificant, and the character "b" shows the significant relationship between the groups).

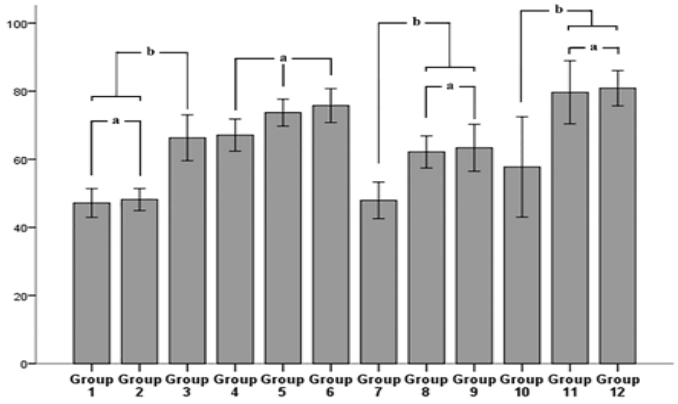

Figure 4. Reduction as percentage of BOP scores in all groups (the character "a" shows the insignificant, and the character "b" shows the significant relationship between the groups).

Changes in test points were shown in Figure 5. There was no significant difference in test points among groups 1-3 and 4-6 ($p>0.05$), whereas a significant increase in test points was observed between groups 8 and 9 compared to group 7, and in groups 11 and 12 compared to group 10 ($p<0.05$). In the first test, the most correct answered question was the first question with a 90,9% ratio, whereas the most wrongly answered were the second and seventh questions with a 98,6% ratio. In the final test, which was applied in the 6th month, the most correct answered questions were the first and eighth question with a 98,6% ratio, whereas the most incorrect answer was the third one with a 52% value.

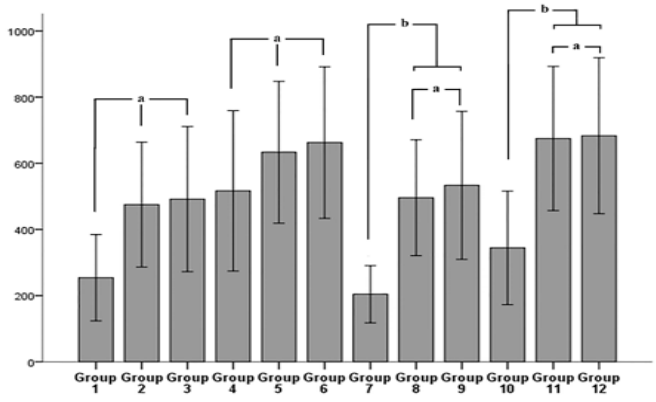

Figure 5. Raising as percentage of Test scores in all groups (the character "a" shows the insignificant, and the character "b" shows the significant relationship between the groups).

Discussion

Although the importance of having a good oral hygiene is well known, it is indicated that most of patients cannot achieve this goal [8]. Additionally, poor oral hygiene may have serious effects on general health, and dentists should draw attention of patients who have a poor oral hygiene about this issue. So, oral hygiene educations play a crucial role when aiming to improve the oral hygiene levels of these patients [17]. To organize these educations during one's childhood is

critical because the skills and behaviors of an individual develop and consolidate in this period, and it is very hard to change the detrimental habits beyond adolescence. Furthermore, in childhood, an individual is receptive to accepting and keeping favorable health behaviors [2,3,18]. Thus, the schoolchildren population whose ages ranged from 8 to 13 were included in the study.

Tooth brushing and flossing play a critical role in an effective dental plaque control, and good oral hygiene depends on the effectiveness of the particular method, which is used for removal of dental plaque [7]. The modified Bass technique is often recommended as being particularly efficient in removing plaque at the gingival margin, and usage of tooth floss once a day is the additional recommendation to removal dental plaque, which accumulates in approximal surfaces of teeth [8,9]. According to these recommendations, in the presented study, a combination of the modified Bass technique plus tooth flossing was chosen for teaching the removal of dental plaque.

With all education methods, scores of PI, GI and BOP significantly decreased in all groups after six months. This result showed that having an education using any method such as brochure, model or video was significantly effective in improving the poor oral hygiene levels of children in clinical condition. Additionally, similar results were also obtained in test scores in each group, and this result showed that the children's knowledge about oral health significantly and considerably increased while the oral hygiene levels were simultaneously improving. So, it is understood that children can be easily motivated through education, although teaching the brushing techniques is a complex and time-consuming procedure [8]. On the other hand, it is commonly believed that tooth brushing is not totally effective among children younger than ten years because of the lack of motivation and poor skill which can be considered as normal at these ages [5]. Contrary to this belief, our study findings showed that younger aged groups showed reduced PI, GI and BOP scores from baseline to 6th months. However, varieties of the education method showed significant differences in the oral hygiene levels of these individuals.

According to the results, the video applied groups showed significant reduction in PI, GI and BOP scores whereas the brochure applied groups in 8-10 years old females and males at the sixth month did not. In 8-10 years old male groups, the method of using a model showed similar significant advantage against the giving a brochure method. So, the type of educational method used may be a factor in assessing the motivational changes of an individual about having a good oral hygiene, even the ability of manipulation of toothbrush and tooth floss in the oral cavity does not yet completely develop in younger aged children [5]. And in present study, it may be thought that giving a brochure did not provide an increased motivation, perhaps due to the lack of attention or reading even there were many colored figures on the brochures shown for tooth brushing and flossing. Some authors suggested to place more images than writings on brochures and to avoid the use of medical jargon in favor of being more understandable [19]. However, the brochure method did not create the same performance results about improving the motivation as the video or model methods, although those suggestions [19] were fulfilled during the preparation of brochures in the present study.

On the other side, in 11-13 years old female groups, there was no significant differences between the applied methods when the reduction percentages on 6th month PI, GI and BOP scores were evaluated. A previous study compared the efficiency of different oral health instruction methods and they did not find a significant difference between video and personal instruction or self-education manual techniques [11]. However, they evaluated those methods on employees, not on schoolchildren, and important factors such as attention span and brushing skills may not be as effective of a variable for adults as in children. Thus, in the presented study, the method of giving a brochure was not as effective as the other methods in male groups at the same ages. Compatible findings were reported previously, which showed that girls appreciated the leaflets more than the boys [10]. These similar results for male children may be considered that young adolescent female children could focus on the oral hygiene educations in each method, whereas the brochure method could not achieve the same result as the model or video methods on same aged male children, even when the efficiency of the materials such as the brochure or a leaflet were highlighted [2,10].

When the theoretical test results were evaluated, it was well understood that most of the children (90.9%) in all groups clearly knew the right answer of the question asking the minimum necessary number of tooth brushing process per day to have a good oral hygiene. However, initial OHI-S scores of patients showed that most of children commonly know the necessity of brushing teeth at least twice a day but they do not follow this instruction. These findings addressed the general belief that the improved motivation is the necessary and most important factor for maintaining a good oral hygiene [3], even if the individual has no information about self-care oral hygiene behaviors. The other point was that none of these patients totally know the Modified Bass technique for tooth brushing process and every patient was using a method, which was created, by using their self-skills or insufficient knowledge. Additionally, 81.2% of patients knew nothing about tooth floss, and 70.3% of patients, who knew the aim of using tooth floss, admitted that they had never used it. These results addressed that in children, not only is there a lack of motivation but also a lack of knowledge about general oral health behaviors.

Despite the lack of general knowledge about the self-care oral health behaviors, the present study showed that all educational methods significantly improved the knowledge among the children included in the present study. However, in all model and video applied male groups, regardless of the age factor, test points were significantly increased when their results were compared with the results of the brochure applied groups. Remarkably, at the end of six months, 52% of all patients still gave the incorrect answer to the third question which asked the initial location of the bristles of the toothbrush at the beginning, and the most of false answers were obtained in the brochure applied groups (41.3%) whereas the least incorrect answers were given in the video applied groups (25.3%).

This situation can be explained that in order to learn the important details in Modified Bass technique such as the angle of the bristles, the ideal location of the toothbrush or brushing direction, it may take time for younger children because of their limited understanding capacity, which is considered to be normal [5]. However, the same incorrect answers were obtained in 11-13 years old

children. According to these results, it was understood that the education method may also play an important role in learning the details as seen in the video and model methods when their results were compared with the brochure method. In a previous study, the comparison of video and written instructions was evaluated for plaque removal by electric toothbrush, and video instructions created significant advantages for cleaning the areas, which could be showed via detailed visual education, and they suggested to show instructional videos for early period of learning during the education [20].

Conclusion

The results of the present study clearly showed the important role of the educational methods for improving the poor oral hygiene levels of children. Although the significant improvements were obtained by all applied methods, it may be accepted that the video and model methods created more advantageous results than brochures. According to these findings, it may be more helpful and effective for children to be given oral hygiene education with visual methods such as video or model. In younger children, especially under the age of ten, the method of showing a video may be chosen as a more appropriate option than model and brochure because of creating more advantageous results in both genders.

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