Effectiveness of a motivation method on the oral hygiene of children

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ABSTRACT. Aim The aim of this study was to determine the influence of an oral hygiene motivation model on removing dental plaque in 57 subjects with an age range from 4 to 16 years, divided into three age categories on the basis of dentition phases, and to analyse the differences in behaviour between the three age groups and between sexes. Materials and methods Patients were instructed on how to carry out effective oral hygiene and were examined using the O’Leary plaque index at baseline (t0), 1 week, 1 month and 3 months later. At t0, examiners promised a present to the children if after 1 month they had better level of oral hygiene. After 1 month, the trainers gave a present to the children that had better level of oral hygiene. No gift was promised for the next visit at 3 months for evaluating if brushing teeth regularly had become an habit. Statistical analysis of the results was performed using ANOVA. Results At t0, the mean O’Leary plaque index was very high; after 1 week, this value had already decreased; after 1 month it slightly decreased; after 3 months, the mean O’Leary plaque index was still low. Discussion Children cleaned correctly their teeth both when examiners promised them a present, and when no gift was promised. Nevertheless, the mean value of the lower index of plaque was recorded after the first month, showing the children’s susceptibility to the prizes. Females had better oral hygiene than males. Conclusions This oral health motivation method was effective in establishing good oral health habits among children.

KEYWORDS: Children; Motivation; Oral hygiene; Plaque index; Primary prevention.

Introduction

Dental caries is the major oral health problem in developing countries, affecting 60-90% of the school children and the vast majority of adults [Petersen et al., 2005]. This disease may affect the child’s ability to eat, sleep, and in some cases even to sleep and learn [Slayton, 2005]. Therefore, primary prevention against tooth decay should be based on preventing the onset of the disease and aim to maintain the oral health for the whole life or, at least, for a long time. Essentially, it is focused on patient’s information, education and motivation. Primary preventive systems include fluoride prophylaxis, fluoride toothpastes, control of oral hygiene and limited consumption of fermentable carbohydrates [Jacobsen and Young, 2003; Simonsen, 2002; Burt et al., 2006; Cameron et al., 2006; Smyth and Caamaño, 2005; Tinanoff et al., 2002].

Daily tooth brushing associated with fluoride toothpaste is the most important oral hygiene habit, because dental plaque can be removed or at least decreased by the simple systematic use of toothbrushes and dental floss [Pine et al., 2000; Jackson et al., 2005; Levine et al., 2007]. For this reason, tooth brushing, when done correctly and in conjunction with fluoride toothpaste, reduces the incidence of dental caries [Addy and Adriaens, 1998].

In fact, Wendt et al. observed that if the habit of daily tooth brushing is adopted at as early as one year old, it is more likely that children will be caries free by the age of three [Wendt et al., 1994]. In addition, a health education study on adolescents demonstrated reductions of plaque levels over twelve months after lessons in toothbrushing with a fluoridated paste [Redmond et al., 1999]. Consequently, for an optimal primary prevention children should be instructed on how to remove dental plaque. Moreover, to assess the learning process in performing tooth brushing, it is necessary not only to establish a dental health education programme, but also to use a motivational reinforcement. The dentist should, then, explain the
oral health problems, describe the anatomy and the function of the mouth, illustrate the preventive dental practices and utilise a motivation method to promote child’s compliance.

Motivation is defined as readiness to act, or the driving force behind our actions. The most enduring motivating factor is greater responsibility. An efficient motivation, targeting the personal needs of the patient, may improve the quality of plaque control. This may be accomplished by the active involvement of the patient in the programme, through self-diagnosis of dental needs and conditions, and by the dentist encouraging the patient to make his or her own suggestions about cleaning priorities [Axelsson et al., 1994]. Therefore, for successful establishment of needs-related tooth-cleaning habits, the patient must be well motivated, informed, and instructed [Smiech-Slomkowska and Jablonska-Zrobek, 2007; Ashkenazi et al., 2007; Rodrigues et al., 2003; Worthington et al., 2001].

The aim of this study was:
1) to determine the influence of an oral hygiene motivation model on removing dental plaque in 57 subjects (29 males and 28 females) with an age range from 4 to 16 year, divided into three age groups on the basis of dentition phases (permanent, mixed and primary dentition);
2) to analyse the differences in behaviour between the three age groups and between sexes.

Materials and methods

The sample of this study consisted of 57 selected healthy patients (29 males and 28 females) with an age range from 4 to 16 year and outpatients of the Department of Paediatric Dentistry of the University of Naples “Federico II”, Italy. Participation in the study was voluntary.

The ethical principles expressed in the World Medical Association Declaration of Helsinki were followed in this study and all parents of the children, after they had been given verbal and written explanations of the experimental protocol and the study aims, gave written informed consent.

Inclusion criteria are: good general health (ASA I-II) and agreement to comply with study visits and procedures. Exclusion criteria are: conditions requiring antibiotic pre-medication prior to dental examination, active treatment for cancer, and conditions that interfered with the examination procedure. Inclusion and exclusion criteria were assessed on the basis of an exhaustive report of the health status of the children.

Subjects were divided into three age groups on the basis of dentition phases.
- Group 1: 32 patients with permanent dentition (age range from 12 to 16 year).
- Group 2: 18 patients with mixed dentition (age range from 6 to 11 year).
- Group 3: 7 patients with primary dentition (age range from 4 to 5 year).

At the initiation session (t0) each child received a dental kit containing a toothbrush, toothpaste, and disclosing tablets. In each group oral hygiene level was assessed using the O’Leary plaque index that evaluated the presence of bacterial plaque on the four dental surfaces: mesial, buccal, distal and lingual. Plaque disclosing tablets were used. Once the dental plaque was coloured, the mouth was examined, recording the coloured surfaces (surfaces with plaque). The final result was obtained by adding the total surfaces with plaque and dividing this by the total number of dental surfaces examined, multiplying it by one hundred [O’Leary et al., 1972].

The patients were, then, instructed on how to carry out effective oral hygiene. Tooth brushing was split into 16 steps involving the actual manipulation of the brush in the mouth. The 16 steps included the outside/inside surfaces of the upper/lower teeth (left, front, and right) and the biting surfaces of the upper/lower teeth (left and right). Participants were advised to clean their teeth three times a day (at 8.00 a.m., 2.00 p.m., 9.00 p.m., that is immediately after breakfast, lunch and dinner, respectively) for four minutes without parental assistance. Subjects in this study were examined by two expert examiners using the O’Leary plaque index at baseline (t0), 1 week, 1 month and 3 months later.

No prizes were offered to the children at baseline, but examiners promised them a present if after 1 month they had better level of oral hygiene measured by the O’Leary plaque index.

The prize consisted of a doll (Barbie, Mattel, Inc., El Segundo, CA, USA) for the girls of groups 2 and 3 and a make-up set (Make-Up Book Ballet, Pupa, MICYS Company SpA, Casatenovo, Lecco, Italy) for the girls belonging to group 1.

Boys’ prizes consisted of a toy-car (Hot Wheels, Mattel, Inc, El Segundo, CA, USA) for groups 2 and 3 and a game for the PlayStation2 (Buzz! Junior: RoboJam, PlayStation Network Europe Ltd, London, UK) for group 1.

After 1 week the children were examined clinically and scored for plaque (O’Leary plaque index), the participants’ difficulties in achieving effective plaque control were checked, information and procedures were repeated. Therefore, examiners reminded them
the promise of the present if they had good oral hygiene at the next visit (1 month after the start of the study).

After 1 month, the patients were examined clinically and scored for plaque (O’Leary plaque index) again and at the end of the session, children were rewarded for their improved levels of oral hygiene measures. No gift was promised for the next visit (3 months after the start of the study) for evaluating if brushing teeth regularly had become a habit.

Three months later, the patients were examined clinically and scored for plaque (O’Leary plaque index) again. The data were processed by means of the SPSS software 10.0 for Windows (SPSS Inc., Chicago, IL, USA) using the one-way analysis of variance (ANOVA).

**Results**

A total of 57 patients, aged from 4 to 16 years (29 m; 28 f), were examined in the present study. All subjects completed the study.

At baseline, the mean O’Leary plaque index was very high (28.47 ±12.53), with a maximum and minimum value of 63.09 and 5.00, respectively (Fig. 1). After 1 week, this value already decreased (21.45 ±10.92), with a maximum of 66.6 and a minimum of 5.00 (Fig. 1). The differences in the mean O’Leary plaque index at baseline and after 1 week were statistically significant (F= 10.157; p <0.01).

After 1 month, the mean O’Leary plaque index slightly decreased (19.14 ± 9.91) with a maximum value of 50.00 and a minimum value of 2.50 (Fig. 1). The differences in the mean O’Leary plaque index after 1 week and after 1 month were not statistically significant.

After 3 months, although no prize has been promised to the patients, the mean O’Leary plaque index was still low (21.42 ± 9.96) with a maximum value of 48.00 and a minimum value of 5.00 (Fig. 1). The differences in the mean O’Leary plaque index after 1 month and after 3 months were not statistically significant.

The difference in performing tooth brushing between males and females was analysed (Fig. 2).

At baseline males and females had a comparable mean O’Leary plaque index (30.99 ± 12.20 and 25.86 ± 12.53, respectively) which was not statistically significant.

A statistically significant difference (F= 9.09; p <0.01) was recognised after one week in the mean O’Leary plaque index in males (25.04 ± 12.79) as compared to females (17.73 ± 7.03).

The differences in the mean O’Leary plaque index between males and females after 1 month were not statistically significant (17.31 ± 9.19 for the females and 20.89 ± 10.41 for the males), while after three months these values returned to be significant (F= 12.30; p <0.01) (17.11 ± 9.01 for the females and 25.56 ± 9.17 for the males).
The difference in performing tooth brushing between the three groups (permanent teeth, mixed teeth, primary teeth) was also analysed (Fig. 3).

At baseline, the mean O’Leary plaque index was the highest in group 2 (mixed teeth) (30.19 ± 13.98), followed by the one recorded in group I (permanent teeth) (28.51 ± 11.56) and the one recorded in group III (primary teeth) (23.85 ± 13.64).

After the first week, improvements were recorded in all the groups with the following values: 21.96 ± 8.99 for group I, 21.71 ± 14.06 for group II and 18.50 ± 11.15 for group III.

After 1 month these values already decreased in all the groups (19.46 ± 9.41 for group I, 19.78 ± 11.01 for group II, 15.98 ± 10.14 for group III).

After 3 months, the mean O’Leary plaque index increased in the first two groups (21.68 ± 9.79 for group I, 23.54 ± 10.89 for group II), while it decreased in the third group (14.72 ± 5.46).

Discussion

Statistical analyses showed a remarkable decrease of the mean O’Leary plaque index between time 0 and 3 months. The high mean value of this index at baseline (t0) (28.47 ± 12.53) was, partly, justified considering that many children had their first-time dental visit at this study.

A week from the beginning of the study, the mean O’Leary plaque index significantly decreased (F= 10.157; p<0.01) thanks to the instructions and the motivation of the oral hygiene (promise of the prize). This effect went on until the observation at 1 month (19, 14 ± 9, 91), when the praiseworthy children got the prize. After 1 month, therefore, 59.65% of the patients improved, 26.32% worsened, while 14.03% were stable.

Between 1 and 3 months, not being further promises of prizes, the results obtained from the children, were, probably, due to the initial education.

The mean O’Leary plaque index after 3 months slightly increased (21.42 ± 9.96) but was lower than the one recorded at baseline (t0) (28.47 ±12.53). Comparing the mean O’Leary plaque index after 3 months with the one after 1 month, 49.12% of the patients improved, 38.59% worsened and only 12.28% remained stable.

Consequently, around 50% of the children were stimulated by the motivational method. Patients therefore cleaned correctly their teeth both when examiners promised them a present (after one month), where the percentage of improvement was 59.6, both when no gift was promised (after three months), where the percentage of improvement was 73.68. Nevertheless, it must be underlined that the mean value of the lower index of plaque was recorded after the first month, showing the children’s susceptibility to the prizes.

The slight increase of the mean O’Leary plaque index after 3 months could be owed to the decrease of the attention of the children after their initial enthusiasm. Interestingly, the differences in the mean O’Leary plaque index between males and females were statistically significant after one week and after three months (with less dental plaque for the females), while differences were not statistically significant at baseline and after one month. Furthermore, males were more motivated by the prize than by the understanding importance of the oral hygiene, while females appeared more mature and their mean O’Leary plaque index remained nearly the same at 1 week, 1 month and 3 months. In fact, while for the girls there was a rapid improvement that remained constant, for the boys there was an improvement between baseline and the first week, then the mean O’Leary plaque index decreased in the first month and increased after three months returning to the same value as the first week.

At the end of the treatment, the statistically meaningful difference between sexes showed that, despite in both groups a decrease in the mean O’Leary plaque index has been recorded, females had better oral hygiene.

The difference in performing tooth brushing between the three groups (permanent teeth, mixed teeth, primary teeth) was also analysed.

Independently from the age, the behaviour was similar; an improvement was recorded in all the three groups after 1 week and 1 month. After 3 months, a slight worsening was noticed in groups 1 and 2, while a slight improvement was recognised in the third group (primary teeth). This finding was consistent with the idea that children belonging to groups 1 and 2 have been influenced more from the promise to receive a prize than from the oral hygiene motivation.

Finally, there wasn’t a control group (that should be no intervention and no prize) because it was assessed that the control was baseline (t0), when the mean O’Leary plaque was recorded for the first time, before giving instruction to the children on how to carry out effective oral hygiene.

Conclusions

This oral health education programme was effective in establishing good oral health habits among children. The results obtained in the present study highlight that, more than the instructions for a suitable hygiene, also
a correct and persuasive motivation method may significantly affect children’s oral health promotion.

References