

# Effectiveness of an Oral Hygiene Program for Brazilian Orphans

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The aim of this study was to examine the effectiveness of a preventive oral hygiene program in a group of 7-11-year-old children living in an orphanage in Brazil. The program was based on professional tooth cleaning, as well as dental health information and oral hygiene instruction during a 6-month period. A total of 80 children were examined and 42 who had all first molars erupted were selected for the study. Clinical measurements were recorded at baseline and after 3 and 6 months. Assessment of the efficacy of the program was based on plaque and gingivitis. At the final examination, the mean percentage of surfaces without visible plaque was 36.2% in the experimental group and 15.1% in the control group. These values were also reflected in improved gingival health. The test group showed bleeding upon probing from less than 20% of their interproximal areas, compared to 50% in the control group ( $p < 0.01$ ). The results of this study indicate improved oral health through the implementation of preventive programs among children who have never been exposed to preventive dental treatment and who are living under adverse social conditions.

Key Words: schoolchildren, gingivitis, dental health education, oral hygiene program.

## INTRODUCTION

Dental research has greatly increased the understanding of the etiology, prevention and treatment of dental disease. It has been shown that dental plaque is the predominant cause of gingivitis in man (1). The introduction of preventive dental care, including plaque removal, has been shown to decrease the level of gingivitis (2,3). Tooth brushing is still the most important factor in oral hygiene and maintaining the gingiva healthy (4). Dental flossing has been shown to have a better plaque-removing effect than the use of toothpicks on the interproximal surfaces in adolescents (5).

Behavior and attitudes of children are formed and developed from social, cultural, economic and ethnic factors throughout their lives. This process is also influenced by their knowledge of health and prevention of disease, including oral diseases (6). The

absence of family support might also influence oral health behavior.

Thus, the purpose of the present study was to examine the effectiveness of a preventive program in a group of children, with health hazards, poverty and lack of education.

## MATERIALS AND METHODS

### *Subjects*

The target population was children living in a Santo Antonio orphanage in the city of Niteroi, located 14 km from the city of Rio de Janeiro, Brazil. Facilities in the orphanage were suitable with respect to supervision and examination of the participants during the study. The children had never been taught the importance of preventive measures and had not participated

in any other preventive program. The nuns taking care of the children were aware of their dental treatment needs but were not cognizant of preventive measures. All children were females from 7 to 11 years of age. Forty-two children with all first molars erupted were selected from 80. They were stratified by age and divided into two groups, 14 children serving as a control, and 28 as an experimental group. Five children, 2 from the control group and 3 from the experimental group, moved from the orphanage and did not participate throughout the entire study. The clinical measurements were recorded at baseline and at 3 and 6 months. Each child in the experimental group received oral hygiene instructions and prophylaxis once every 3rd week during a 6-month period. Oral prophylaxis was performed by means of a rotating rubber cup and abrasive paste. The clinical measurements were taken 3 weeks after oral prophylaxis. All children received toothbrushes and dental floss at the beginning of the study. The nuns were instructed to request the children to clean their teeth every day after dinner.

Table 1. Questionnaire used in personal interview with participants.

- 1) What does dental plaque cause?
- 2) Is sugar bad for your teeth?
- 3) How can you control dental plaque?
- 4) Is oral hygiene important?
- 5) Do you brush your teeth daily?
- 6) Do you use dental floss daily?
- 7) How many times a day do you eat sugar?

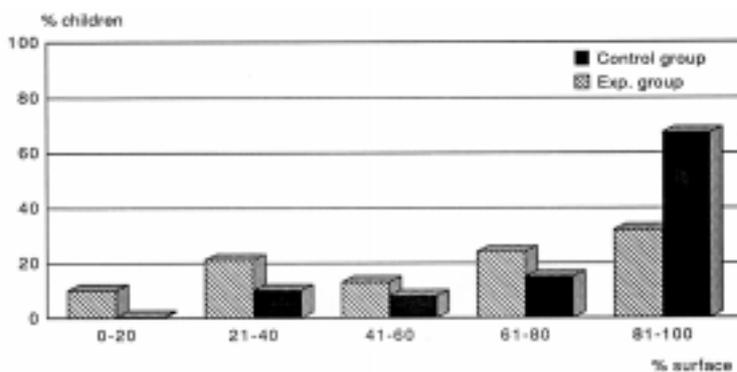


Figure 1. Percentages of tooth surfaces with plaque at final examination. N = 25 in experimental group; N = 12 in control group.

### Oral hygiene instruction and prophylaxis program

The children in the experimental group were taught the etiology and prevention of gingivitis on models, as well as in their mouths. Illustrative posters were used to supplement instruction in oral hygiene. Disclosing solution (0.5% fuchsin water solution) was used to assess the relationship between visual feedback and oral hygiene behavior. The participants were instructed to brush their teeth according to the method described by Bass (7). Interproximal cleaning was demonstrated with dental floss. Finally, the ability to clean the teeth was evaluated clinically in each child. Each child received 20 minutes of individual instructions. At the follow-up examinations, each child received customized instructions based on their current oral hygiene status.

### Clinical recording

The plaque index (PI) was recorded on 4 surfaces of each tooth as visible or not visible after use of a disclosing solution, and gingival health was assessed according to the gingival index (GI) described by Löe (8) with the following parameters: GI 0 = no gingival inflammation; GI 1 = mild inflammation without bleeding; GI 2 = moderate inflammation with bleeding, redness, edema and ulceration; GI 3 = severe inflammation with spontaneous hemorrhage, redness, edema and ulceration. In addition to the GI, the percentage of interproximal bleeding upon probing was calculated.

### Personal interview

All participants were interviewed by a trained dentist (L.B.F.-F.) at the end of study. Three questions were about behavior concerning dental health, and 4 questions were about knowledge of oral health (Table 1).

### Data analysis

The significance of differences between means in different sub-groups was tested with ANOVA. Chi-square test was applied for assessing the significance of differences in the distribution of numbers of individuals. The null-hypothesis was rejected at  $P < 0.05$ .

## RESULTS

Both groups had poor oral hygiene at the baseline examination. The mean percentage of surfaces without visible plaque was  $2.3 \pm 8.0$  in the experimental group (N=25) and  $10.8 \pm 13.5$  in the control group (N=12) at baseline. This difference was statistically significant ( $P < 0.05$ ). The effect of the preventive program was obvious in the experimental group (experimental:  $36.2 \pm 28.5$ ; control:  $15.1 \pm 20.3$ ), even if the level was still unsatisfactory. The mean percentage of debrided surfaces had increased to about 35% ( $p < 0.01$ ). The level of oral hygiene in the two groups at the final examination is illustrated in Figure 1. Sixty-seven percent of the children in the control group had more than 80% of their tooth surfaces covered by plaque, compared to 32% in the experimental group ( $p < 0.05$ ).

Every fifth examined site was diagnosed as GI 2 or GI 3, at the baseline examination in the experimental, as well as in the control group. The number of affected sites, i.e., with GI scores of 2 or 3, decreased significantly in the experimental group at final examination (Figure 2). GI 3 was rarely found, one child in each group. The continuous increase of the percentage of healthy gingival sites in the experimental group was statistically significant ( $P < 0.01$ ).

The percentage of papillae with bleeding upon probing at baseline was  $28.1 \pm 22.9$  for the experimental group (N=25) and  $29.9 \pm 26.8$  for the control group

(N=12). At final examination, the values were  $10.0 \pm 7.7$  for the experimental group and  $24.4 \pm 22.4$  for the control group. The reduction in the experimental group and the difference between the two groups at final examination were statistically significant ( $p < 0.01$ ).

Questions about oral health and about the etiology of oral diseases were answered correctly by 11 children in the experimental group, compared to 2 in the control group. All but 4 children (2 in each group) knew that they had to avoid sugar to maintain good oral health; only 4 in the experimental and 5 in the control group claimed that they ate sugar every day. Both groups were aware of the importance of plaque control and were familiar with oral hygiene methods. This fact however, was not reflected in their answers about their tooth cleaning habits. Only four in each group stated that they brushed their teeth every day, but 11 in the experimental group and 5 in the control group used floss daily.

## DISCUSSION

Previous studies have shown that preventive tooth debriding methods, resulting in successful plaque control, decrease the incidence of gingivitis in schoolchildren (9,10). It is commonly accepted that plaque removal can be achieved through either professionally administered prophylaxis or active debridement, using oral hygiene activities on the part of the child. Both of these methods were implemented in this study. Increased gingival health in the experimental group, however, is very likely to be due to frequently performed prophylaxis (professional tooth cleaning). This may be an argument in favor of frequent professional tooth cleaning and oral hygiene instruction, since the sites with gingivitis decreased at the end of the study. In the experimental group, a 50% reduction in the number of sites with bleeding papillae was observed, while in the control group no significant change occurred after 6 months of examination.

Previous studies have shown that the frequency of gingivitis in 10-12-year-old children improved from 77% to 63% with monthly prophylaxis during a period of 1 year (11). Another attempt at prevention of gingivitis in 103 schoolchildren (7-11-years-old) was per-

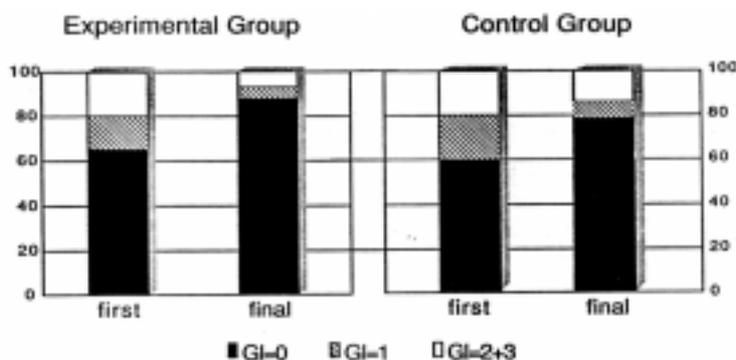


Figure 2. Distribution of gingival index (GI) scores at baseline, second and final examination. GI 0 = no gingival inflammation; GI 1 = mild inflammation without bleeding; GI 2 = moderate inflammation with bleeding, redness, edema and ulceration; GI 3 = severe inflammation with spontaneous hemorrhage, redness, edema and ulceration. N = 25 in experimental group; N = 12 in control group.

formed in Brazil (12). This longitudinal study evaluated the efficacy of professional tooth cleaning and topical fluoride application monthly, without oral hygiene instruction. In this study, the test group also failed to control plaque between the period of professional tooth cleaning and the clinical measurements. Thirty-two percent of the children in the experimental group had more than 80% of their tooth surfaces covered by visible plaque at the final examination. This study cannot determine the relative effect of professional removal of plaque as part of a comprehensive program.

Both the motivation of the individual and his/her manual dexterity in the use of oral hygiene tools influence the success of at-home plaque removal (13). Whether or not patients accept health recommendations seems to be influenced by a number of background factors such as attitudes and beliefs about health, disease and prevention (14). The significance of these factors concerning oral health behavior has been supported by findings in several studies (15). The use of toothbrushes as part of oral health behavior may also be influenced by social and other environmental factors (16).

Rayant and Sheiham (17), however, failed to find any relationship between favorable beliefs about prevention and the status of oral cleanliness. The failure to introduce effective oral hygiene habits among the children in this study confirms these findings. Although the children were informed of the importance of oral hygiene, they did not clean their teeth daily.

The reason why the level of knowledge was the same in the two groups may be that the nuns were influenced by and interested in the program, and thus also shared their own knowledge with the children in the control group. This may also be one of the explanations for the somewhat improved hygiene and gingival conditions in the control group at the end of the study.

To be effective in improving gingival health among schoolchildren, it is necessary to do long-term field trials with repeated efforts and measures (18). The design of this type of intervention must be adjusted to the oral disease level in the target population and to the relative efficacy of different preventive programs (19).

Due to economic and practical limitations, this study did not involve the target population at large, nor represent a relevant sample. Understanding the cultural and socioeconomic backgrounds and environmental conditions present in the target population will increase cost-benefit predictions and will also qualify the ran-

domization method to be used.

This study shows that there is a great need for preventive measures among children living under special circumstances. Even if the results are fairly modest, they indicate the possibilities of coping with dental health problems by implementing preventive programs among orphan children with social problems. It is obvious, however, that information about dental health and dental health behavior must be repeated and practiced over a longer period of time than has been done in this study.

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## RESUMO

Freitas-Fernandes LB, Novaes Jr. AB, Feitosa ACR, Novaes AB. Programa de higiene oral em crianças órfãs no Brasil. *Braz Dent J* 2002;13(1):44-48.

O objetivo do estudo é examinar a efetividade do programa de prevenção oral em um grupo de crianças de 7-11 anos de idade, morador de um orfanato no Brasil. O programa é baseado no polimento profissional, assim como informação sobre saúde dental e instrução sobre os meios de higiene oral, durante um período de seis meses. Em um total de 80 crianças que foram examinadas, 42 foram selecionadas para o estudo pois tinham todos os primeiros molares erupcionados. As medidas clínicas foram registradas no exame inicial, após três e seis meses. A eficácia do programa foi baseado em placa e gengivite. O exame final e a porcentagem média das superfícies sem placa dental foi 36,2% no grupo experimental e 15,1% no grupo controle. Os valores foram também refletidas em uma melhora nos sítios com saúde gengival. O grupo teste mostrou sangramento, após sondagem, em menos de 20% nas áreas interproximais, comparado ao 50% no grupo controle ( $p < 0,001$ ). O resultado do estudo indicou melhora da saúde oral através da implementação do programa preventivo em crianças que nunca tiveram sido expostas a tratamento de prevenção e que vivem sob condições ambientais adversas.

Unitermos: crianças, gengivite, programa de prevenção, placa bacteriana.

## REFERENCES

1. Løe H, Theilade E, Jensen-Borglum S. Experimental gingivitis in man. *J Periodontol* 1965;36:177-187.
2. Lindhe J, Axelson P, Tollskog G. Effect of proper oral hygiene on

- gingivitis and dental caries in Swedish schoolchildren. *Community Dent Oral Epidemiol* 1975;3:150-155.
3. Hugoson A, Koch G. Development of a preventive dental care programme for children and adolescents in the county of Jonkoping: 1973-1979. *Sed Dent J* 1981;5:159-172.
  4. Barenie JT, Lescke GS, Ripa LW. The effect of tooth brushing frequency on oral hygiene and gingival health in schoolchildren: reassessment after 2½ years. *J Public Health Dent* 1976;36:9-16.
  5. Dini EL, Foschini AL, Brandão IM. Periodontal conditions in a 7-19-year-old student population in Araraquara, São Paulo, Brazil. *Cad Saude Pública* 1997;13:321-324.
  6. Sheiham A. Theories explaining health behavior. In: Gjermo P, ed. *Promotion of selfcare in oral health. A Symposium held in Oslo, Norway, September 10-12, 1986*;105-124.
  7. Bass CC. An effective method of personal oral hygiene. *J Louisiana Med Soc* 1954;106:100-112.
  8. Løe H. The gingival index, the plaque index, and the retention index systems. *J Periodontol* 1967;38(suppl):610-616.
  9. World Health Organisation. *Epidemiology, etiology and prevention of periodontal disease*, Tech Rep Series 621. Geneva: WHO, 1978
  10. Hamp SE, Fornell J, Johansson LA, Karlsson R. Effect of systematic plaque control on caries and gingivitis in schoolchildren after 3 years. *Community Dent Oral Epidemiol* 1978;6:17-23.
  11. Bandersten A, Egelberg J, Koch G. Effect of monthly prophylaxis on caries and gingivitis in schoolchildren. *Community Dent Oral Epidemiology* 1975;3:1-4.
  12. Bellini HT, Campi R, Denardi JL. Four years of monthly professional tooth-cleaning and topical fluoride application in Brazilian school-children. 1. Effect on gingivitis. *J Clin Periodontol* 1981;8:231-238.
  13. Galgut PN, Waite IAM, Todd-Pokraped A, Barnby GJ. The relationship between multidimensional health locus of control and the performance of subjects on a preventive periodontal programme. *J Clin Periodontol* 1987;14:171-175.
  14. Glavind L. The result of periodontal treatment in relationship to various background factors. *J Clin Periodontol* 1986;13:789-794.
  15. Becker MH, Maiman LA. Social behavioral determinants of compliance with health and medical care recommendations. *Medical Care* 1975;13:10-24.
  16. Honkala E, Freeman R. Oral hygiene behavior and periodontal status in European adolescents: an overview. *Community Dent Oral Epidemiol* 1988;16:194-198.
  17. Rayant GA, Sheiham A. An analysis of factors affecting compliance with toothcleaning recommendations. *J Clin Periodontol* 1980;7:289-299.
  18. Dini EL. Changes in periodontal conditions of children and adolescents from Araraquara, Brazil: 1995-1998. *Braz Dent J* 2001;12:51-55.
  19. Freire MC, Sheiham A, Hardy R. Adolescents' sense of coherence, oral health status, and oral health relate behaviours. *Community Dent Oral Epidemiology* 2001;29:204-212.

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