

Oral Health Promotion in a Low-Income Population

Promoção de Saúde Bucal em uma População de Baixa Renda

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Received: 27/08/18

Approved: 03/01/19

Abstract

Although in recent years there has been reduction in prevalence of tooth decay, it has also been observed the phenomenon of polarization of the disease, with a small portion of the population focusing most of the disease. The caries control is efficient if the main factors involved in its etiology can be controlled. Diet and hygiene are considered the main factors for the disease, but the socio-economic factor is also important, being the difference in polarization of the disease. This study was carried out in a small town where not all people have access to fluoridated water. In this study guidelines were carried out on oral hygiene and diet of the population from 6 to 9 years of age met in the program for the eradication of child labor (PETI) were introduced to reduce the number of cariogenic microorganisms and thus reduce the incidence of caries in this population. The diet modification was difficult due to the economic situation of such children. The results were verified by the pattern of incidence of caries through clinical examination, by evaluating the menu offered to children and by counting of microorganisms. A significant reduction of cariogenic microorganisms was observed at the beginning of the work, but this reduction is not maintained when the visits became more spaced. To promote and maintain oral health, punctual actions are of little value. It is important that periodic reinforcement of the guidelines for the results become perennials.

Keywords: Healthy Diet. Dental Caries. Oral Hygiene.

Resumo

Embora nos últimos anos tenha ocorrido redução na prevalência da cárie dentária, tem-se observado o fenômeno da polarização da doença, com uma pequena parcela da população concentrando a maior parte da doença. O controle da cárie é eficiente se os principais fatores envolvidos em sua etiologia puderem ser controlados. A dieta e a higiene são consideradas os principais fatores para a instalação da doença, porém o fator socioeconômico também é importante, sendo o diferencial na polarização da doença. Este estudo foi realizado em uma pequena cidade em que nem todas as pessoas têm acesso à água fluoretada. Neste estudo foram realizadas orientações sobre a higiene bucal e a dieta para a população de 6 a 9 anos de idade atendida no Programa de Erradicação do Trabalho Infantil (PETI) com o objetivo de reduzir o número de microrganismos cariogênicos e, assim, diminuir a incidência de cárie nesta população. O fator socioeconômico foi um dificultador para a modificação da dieta destas crianças. Para tentar solucionar este problema, foi sugerida a criação de hortas comunitárias. Os resultados foram verificados através do padrão de incidência de cárie através de exame clínico, pela avaliação do cardápio oferecido às crianças e pela contagem dos microrganismos. Foi obtida uma redução significativa dos microrganismos cariogênicos no início do trabalho, porém esta redução não se manteve quando as visitas se tornaram mais espaçadas. Para promover e manter saúde bucal, ações pontuais são de pouca valia. É importante o reforço periódico das orientações para que os resultados se tornem perenes.

Palavras-chave: Dieta Saudável. Cárie Dentária. Higiene Bucal.

1 Introduction

Caries is an infectious and multifactorial disease. For its prevention one should try to encompass the largest possible number of factors involved, being the main ones the oral hygiene, feeding and the control of the main cariogenic microorganisms^{1,2}.

Although we have observed a decline in the prevalence of dental caries, some people still have many lesions of the disease. Low-income populations are particularly susceptible to this disease, and one must intervene in their risk factors to decrease its prevalence. The World Health Organization (WHO) recommends that common risk factors for certain diseases be identified and controlled, aiming at the overall

health of the individual - the caries and obesity, two serious public health problems, have the diet as a common factor. However, a healthy diet is not accessible to all segments of the population³. Thus, this project aimed to improve the standard of diet of children who attend the Child Labor Eradication Program (PETI) of the city of Sarandi-PR, through the creation of community vegetable gardens, as well as education regarding oral hygiene.

The Ministry of Labor created PETI as a way of removing children and adolescents younger than 16 years from the child work. Children are placed in a school second shift and their families receive an allowance from the government. Only adolescents from 14 years can work, but only on condition

of apprentices. The program, in addition to ensuring direct transfer of income to families, offers the inclusion of children and young people in guidance and counselling services. The school attendance is also required.

The implementation of community vegetable gardens has as objective the cultivation of different foods, enabling the food access and control of their users, once such nutrients and medicinal plants are not always accessible to low-income populations, in this case, the children participating in the project. In addition, as secondary objectives for its implementation, the vegetable garden allows, indirectly, social inclusion, occupational therapy and the improvement of the quality of life of all those involved in the process, from producers to consumers. It is also emphasized the educational and environmental result, product of the community garden, which encourages the practice neglected in current habits⁴.

Therefore, the humanitarian aspects of this work were in line with the objectives of PETI, which seeks to eliminate child labor in partnership with the various sectors of state and municipal governments and civil society. The goal of the program is to keep children and adolescents in the institution, by means of the complementation of family income. In addition, there is a standardized supply which is drawn up by a nutritionist in the municipality. The work developed in PETI added to the benefits of the project in general ensured the synergy of efforts in favor of low-income students attended⁵.

Families with per *capita* income of up to half a minimum salary are characterized as low-income⁶, this criterion used for sorting and accession of students in the program. Thus, recognizing the government the financial need of families that against the law oblige their children and adolescents (age 16 years) to work, in order to assist the family income. PETI contributes with complementary grant (Bolsa Cidadão) [Citizen Grant] - and to some extent substitutions - the value of R\$ 25.00 (twenty-five reais) per child, when residing in cities with fewer than 250,000 inhabitants; and R\$ 40.00 (forty reais) per child, when residing in cities larger than 250,000 inhabitants⁵.

The city of Sarandi presents no fluoride present in water in enough doses to exert therapeutic effects, making the oral health of the residents of this municipality impaired, because it does not have the correct completion of fluorine in the oral cavity. Among the measures for the caries control is the use of fluorides. In Brazil the fluoridated water was regulated in 1975⁷, but still this is not reality in all Brazilian municipalities. There is a recommendation by the Ministry of Health that are offered two complementary forms of use of fluoride to the population. Preferably, these two forms would be the fluoridation of the public water supply and the fluoride toothpaste⁸.

When there is the use of fluoride toothpaste for a population with access to fluoridated water, there is a marked reduction in the prevalence and severity of caries. On the other hand, when people do not have access to fluoridated water or preventive programs on oral health, they have an increased risk for the development of caries disease⁹.

The presentation of a true picture of the city that hosted the project activities, with a population of approximately 85,000 (eighty-five thousand) inhabitants (sensu performed in 2010), Sarandi is part of the Metropolitan Region of Maringá city, merging, including, with the Maringá city territory. However, Maringá presents a high HDI, while sarandi suffers with the precariousness in various sectors of public responsibility (Education, Health, Safety). This precariousness of actions in public services has been proven by the facts and difficulties found for completion of this project¹⁰.

The objective of this work was the improvement in oral health in this population, through the application of theoretical knowledge in practice by encouraging the participation of students in activities of social nature.

2 Material and Methods

The research was approved by the Research Ethics Committee of Centro Universitário de Maringá - UniCesumar (CAAE 16141413.2.0000.5539). All procedures were explained to the legal guardians of the participants, who then signed an Informed Consent Form.

The relationship between quality of life and oral health has been the focus of attention of professionals of Dentistry, mainly by the relevance of oral health problems and physical and psychosocial impacts it brings in the people's lives. The oral health problems can cause pain, discomfort, limitations and other conditions arising out of aesthetic factors that affect social life, the power, the exercise of daily activities and the well-being of individuals². The economic factor is also of great importance for the development of caries disease¹¹. For this reason, it was chosen the PETI population.

For a favorable dental development, it is necessary that the individual make a balanced diet, encouraging healthy eating habits, for prevention of diseases¹². Having established that the diet of children of PETI - Sarandi was inadequate because of problems of access caused by lack of financial resources, assessment was performed of the possibility of planting of vegetables and fruits by an agronomist and students in the space available in PETI-Sarandi (Figure 1). As well as analysis of the menu offered by the institution and teachings about the importance of healthy eating for the general and oral health by the Dentistry students.

Figure 1 - Location available for the vegetable garden planting, PETI, Sarandi-PR



Source: The authors.

In the years 2011 and 2012 PETI was a space for the students' practice in the first year of Dentistry of UniCesumar. These applied the acquired knowledge about the importance of hand hygiene, oral hygiene and microbiological examinations of cariogenic bacteria. Students instructed the children assisted by the program on how to perform hand hygiene and its frequency and performed the collection of predisposing bacteria of caries disease (*Lactobacillus* sp. and streptococci of the group *mutans* (EGM).

In addition, a student of the course of gastronomy made requests for the institution to give guidance to the cooks about care with hygiene during food preparation, storage and correct way to prepare them.

Clinical examination of children was also conducted by the Dentistry students using WHO criteria for comparative purposes. Therefore, it was possible to obtain the children's DMFT and dmft.

Guidance was also given on oral hygiene for children periodically. For the children's evaluation of oral hygiene, the Simplified Oral Hygiene Index of Green & Vermilion was used.

Regarding the clinical examinations, these were performed only in children whose parents consented to the verification of the prevalence of dental caries in this population and bacterial count, performed in comparison to the later one. In addition, exchanges of information were conducted with children and parents about oral health promotion (encompassing information about diet and hygiene, mainly).

The preparation of the media *mitis salivarius* agar and Rogosa for seeding of cariogenic bacteria streptococci of the group *Mutans* (EGM) and *Lactobacillus* sp. was performed in the laboratory of microbiology of UniCesumar:

For the collection of lactobacilli, the collection of saliva was stimulated. Children chew paraffin, for a minute, this first saliva was discarded, and the child still chewed paraffin for one more minute. With a disposable syringe and labeled with the child's name was made to the sample collection of saliva, a quantity of approximately 3 ml, and this was placed in *ependorf* tubes for carrying out analyzes (Figures 2 and 3). The samples were stored in styrofoam boxes and were transported to the Laboratory of Microbiology and

Immunology of UniCesumar.

Figure 2 - Saliva Collection



Source: The authors.

Figure 3 - Transfer of saliva to eppendorf



Source: The authors.

In the laboratory of UniCesumar, the dilution of saliva was performed (Figure 4) of each participant in the project to avoid

the excessive growth of bacterial colonies, which could make it impossible its counting¹³ Dilution is carried out in brain heart infusion (BHI) using the agitator of tubes, to acquire the concentrations of 10^{-1} , 10^{-2} , 10^{-3} , 10^{-4} , being the sowing performed with concentrations of 10^{-3} and 10^{-4} . With the culture media sown, was carried out microaerophilic storage, using anaerobic jars, which were placed in a greenhouse for 48 hours.

Figure 4 - Saliva dilution and seeding



Source: The authors.

After 48 hours, the count of bacteria was performed with electronic counter, to perform the classification of patients as high or low risk for dental caries (considering only the microbiological criterion).

The criterion of classification in accordance with the count of lactobacilli complies with Table 1

Table 1 - Risk classification related to the count of *Lactobacillus* sp.

Risk	Count (CFU)
High	over 100,000
Low	below 1,000

Source: Rogosa¹³

For the EGM collection, a wooden sterile spatula was used, and saliva was collected from the lingual surface (Figure 5). Thus, the spatula was rubbed five times on each side in the language being requested for the child to occlude the lips to remove the excess of saliva to the final. The two sides of the spatula were pressed on a plate of Petri dishes containing agar *mitis salivarius*, added with bacitracin and potassium tellurite (Figure 6). The plates were transported to the Laboratory of Microbiology and Immunology of UniCesumar and incubated for 48 hours at 37 °C in an oven.

Figure 5 - Collection of *Streptococcus mutans* with the method proposed by Köhler and Bratthall (1979)



Source: The authors.

Figure 6 - Sowing of *S. mutans* in *mitis salivarius* agar medium added with bacitracin and potassium tellurite



Source: The authors.

The counting of colonies of EGM is performed, in accordance with the criteria¹⁴ exposed in Table 2.

Table 2 - Criteria for establishment of risk for dental caries based on the count of EGM

Risk	Criteria
Low	0-20 CFU: equivalent to $0-10^4$ CFU of EGM per milliliter of saliva
Medium	21--100 CFU: equivalent to $10^5- 10^6$ of EGM per millimeter of saliva
High	100 CFU: equivalent to a $> 10^6$ CFU of EGM per milliliter of saliva

Source: Data from the survey.

In addition to the verification of the count of cariogenic microorganisms, a questionnaire was carried out for PETI's students for obtaining data on the daily feeding and checking the risk to caries (Figure 7).

Figure 7 - Completion of the questionnaire with children

Source: The authors.

According to the local reality, a preventive education program was set, in which individualized and collective guidances were carried out (Figure 8).

Figure 8 - Exchange of knowledge between researchers and those responsible for the children

Source: The authors.

3 Results and Discussion

The questionnaire initially carried out with the children participating in the project had as its aim the diet survey usually consumed by them. This questionnaire demonstrated the inadequacy of the ancillary food components to oral health, such as vegetables and legumes, able not only to provide the individual with better oral health conditions as well as contribute vitally for the physical development of the child.

In this sense, analysis of food influences within the dental scope, a balanced diet can provide a healthy nutritional status, as well as contribute to the oral health of the individual. Thus, both the lack of healthy foods, and the ingestion of specific food, influence many processes in the oral cavity, such as the development of caries. The host feeding is classified as a primary factor in the determination of the susceptibility of

children facing the caries disease¹².

The exaggerated consumption of sucrose can also lead to the decline of the oral health. Excessive intake of sucrose was confirmed through the questionnaire performed (high consumption of sweets, stuffed biscuits, sweets, chewing gum, lollipops and other industrialized products of the kind). Feeding endowed of sugars has potential of cariogenic development, once monosaccharides, disaccharides and polyssaccharides fermented by the plaque bacteria, produce acids and influence cariogenicity of biofilm on the teeth. In addition, refined sucrose contributes to the colonization of the oral microorganisms, given the increase in the plate viscosity. Thus, the excessive consumption of certain foods can be harmful¹⁵.

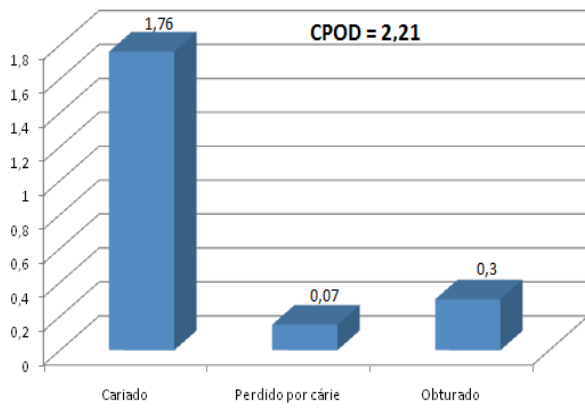
Thus, the scenario formed by the absence of auxiliary foods to oral health and the high intake of sucrose, favor, as observed, together with other factors, the presence of caries lesions in the teeth of the studied children. And this became the main reason for the project, as when it comes to needy children, some of them only had their meals at PETI, hence the importance of the institution to provide a balanced and healthy feeding and thus the provision of community vegetable garden.

In addition to the questionnaires presented, the evaluation of oral hygiene of children was carried out based on the index of Green & Vermillion, having the averagen been equal to 2.18.

The high index reached demonstrates that the children's oral hygiene was not satisfactory. This product is a direct consequence of the lack of education about the right forms of oral hygiene. This ignorance applies even to the simpler measures and usual care, such as brushing and use of dental floss. It is also emphasized that the lack of instruction mentioned above is inherent in the poorer social classes, whose only source of information and instruction comes from insufficient public instruments to success, cognitive characteristic of high social classes that have special instruments of instruction.

The DMFT and dmft indexes were performed in 27 children (Figures 9 and 10), obtained, respectively, results of 2.21 (considered low according to WHO criteria) and 5.32 (considered high), demonstrating that the deciduous teeth were extensively affected by caries. The relative normality found in relation to the permanent teeth is explained by the age range of the children participating in the project (06 to 09 years), where more deciduous teeth and few and recent permanent teeth prevail.

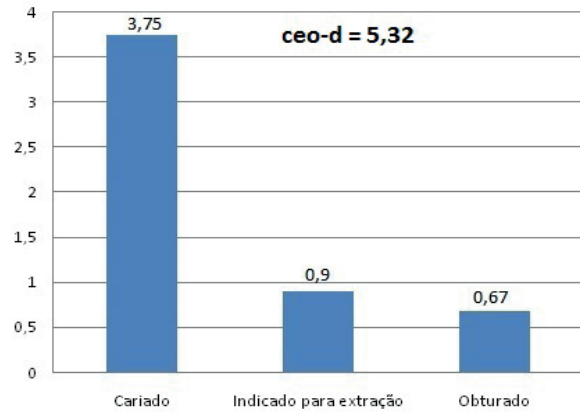
Figure 9 - DMFT index obtained



Source: Data from the survey.

The presence of carious component and the inadequacy of restorations are caused for several reasons, among which the following are highlighted: the low social condition, the financial hyposufficiency, which prevents access to products and materials, as well as professionals capable of providing better oral health conditions of children; the lack of information (or the ability to use the information received -

Figure 10 - dmft index obtained



Source: Data from the survey.

Literacy rate), also associated to low social condition.

Instruction of oral hygiene was then performed (Figures 11A and B) supervised to ensure that the plaque index could be controlled and to motivate the institutionalised people to maintain oral health and prevent the onset of lesions of caries and other diseases related to the lack of care during the sanitization.

Figure 11 - Guidance for oral hygiene, being A performed in group and B individually



A



B

Source: The authors.

In addition to the factors that provide a favorable environment for the development and worsening of the disease caries, referred above, there is also another aggravating factor for the health of these children: the lack of compulsory fluoridation of the public water supply in the city in question (Sarandi, PR), which impairs the refitting of fluorine in the oral cavity, auxiliary element in the process of teeth remineralization. So, it is known that it is unquestionable the influence of fluorine in the caries control, presenting a significant reduction of caries in up to 60% when there is fluoridation in the public water supply. The authors also warn about the effectiveness, practicality, safety and low cost of the measure, making it also accessible to disadvantaged communities¹⁶.

Counting of colonies of bacteria was performed in culture media, proving that all the children participating in the research contained cariogenic microorganisms in large quantities in the oral cavity, and together with the other factors presented, they were classified as high risk to caries.

The project was established to promote improvement in the children's oral condition through the completion of instruction and motivation of oral hygiene, achieving significant results at the time. However, in the course of the subsequent years, only two visits were carried out to the institution and, when the jobs returned, it was observed that the results obtained had receded, proving that, within the dental scope, isolated actions are not capable of reverting consequent of intrinsic factors of the social condition of the subjects of this research.

Furthermore, despite all the work carried out to improve the children's health, the lack of governmental support with t PETI prevented further advancement of the project, given the appalling conditions prevailing at the site, which did not obtain financial support and investment required on the part of the municipality of Sarandi-PR. For this reason, the community vegetable garden was not accomplished until the end of the study, the project already counts with an agronomist committed to research and teaching the children. The positive impact of the changes reflected not only for PETI, but for life and the family of the children who have learned how to maintain a healthy diet and how to make vegetable gardens in their own homes.

4 Conclusion

Given the above, it is concluded that the cariogenic potential on the target audience of the project (for children aged 6 to 9 years) is determined by several variables, among which stand out the diet ingested, fluoridation in the public water supply, and the daily personal hygiene regarding the oral health.

Thus, it is understood that such factors directly reflect the children's oral health. The ingestion of certain foods, such as vegetables and legumes, collaborates with the oral and physical health of the same. On the other hand, the contraindicated diet, such as excessive consumption of sucrose creates an environment conducive to the emergence of caries lesions.

It is also emphasized the direct relevance of fluoridation in the public water supply on the oral health of the population that is offered to them. The presence of fluoride directly influences in the fight against caries, and its insertion into the water is accessible and effective.

Added to the factors involved, personal hygiene is essential. The oral health care must become a priority to patients, so that the advances achieved continue along not only of the project, but their lives.

To improve the health conditions of the population a greater involvement of the public power is required, for which organized actions by civil society achieve success.

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