

Evaluation of mothers' dental caries and attitudes and their impact on infants' oral health

Avaliação dos índice de cárie das mães e suas atitudes e o seu impacto na saúde bucal dos seus filhos

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ABSTRACT

Objective: The early childhood is an important period since during this stage there is establishment of the diet and hygienic habits that will influence the oral health condition of the individual. The aim of this study was to evaluate the attitude of mothers regarding diet and oral hygiene provided to their sons and the impact of these attitudes on their prevalence of caries. In addition the influence of mother's prevalence of caries in the dmfs-index of their children was studied.

Methods: A sample of 132 babies was selected; dental plaque status (index of Quigley/Hein) and the dmfs-index were evaluated. Mother's DMFS-index was evaluated and a questionnaire was applied. Data were analyzed by descriptive statistics, chi-square test and bivariate statistical analysis ($p < 0.05$). **Results:** Descriptive statistical analysis revealed that oral hygiene of infants was performed by mothers in 97% of cases and the mean plaque index of infants was 2.4. With regard to diet, 59% had a cariogenic diet. Dental caries was not found in 58% of infants, yet their mean dmfs-index was 2.3, and the mean DMFS-index of mothers was 41.3. The bivariate statistical analysis showed no significantly association of the caries index between mothers and babies ($p < 0.05$). It was also observed no correlation between diet/hygienic habits and babies' dmfs. **Conclusion:** None of mothers' attitudes regarding diet and oral hygiene or their caries prevalence had an impact on infants' oral health; these data reinforce the multifactor and complex etiology of the disease and the need of multiples preventive measures.

Key words: Dental Caries; Child; Parents; Preventive Dentistry

RESUMO

Objetivo: A primeira infância é um importante momento, pois nela são estabelecidos hábitos de dieta/higiene que influenciarão toda a condição de saúde bucal do indivíduo. Este estudo avaliou a atitude das mães com relação à dieta e higiene oral realizada em seus filhos e o impacto destas atitudes na sua prevalência de cárie.

Métodos: Verificou-se também, a influência da prevalência de cárie nas mães no índice-ceos das crianças. Uma amostra de 132 bebês foi selecionada e o índice de placa (índice de Quigley/Hein), além do índice-ceos foram mensurados. O índice-CPOD das mães foi avaliado e um questionário foi aplicado. Os dados foram analisados por estatística descritiva, teste qui-quadrado e análise estatística bivariada ($p < 0.05$). **Resultados:** A análise estatística descritiva revelou que a higiene oral nos bebês era realizada pelas mães em 97% dos casos e o seu índice médio de placa foi 2,4. Quanto à dieta, 59% das crianças possuíam dieta cariogênica. Não foram encontradas lesões cáries em 58% dos bebês, apesar do índice-ceos médio da amostra ser 2,3 e o índice-CPOS das mães ser 41,3. A análise estatística bivariada mostrou não haver associação significativa entre o índice de cárie das mães e dos bebês ($p < 0.05$). Foi também observada nenhuma correlação entre os hábitos de dieta/higiene e o índice-ceos dos bebês. **Conclusões:** Nenhuma das atitudes das mães quanto à dieta e higiene, ou seu índice de cárie teve impacto na saúde bucal dos filhos e estes dados reforçam a complexidade da etiologia cárie e a necessidade de medidas preventivas múltiplas.

Palavras-chave: Cárie Dentária; Criança; Mães; Odontologia Preventiva

INTRODUCTION

Favorable conditions for each etiologic factor of dental caries, such as susceptible host, cariogenic oral microbiota and carbohydrate based substrate, must be present for its occurrence.¹⁻⁴ The

susceptibility of infants to this disease is closely related with the educational level of the mother as to her knowledge on transmissibility⁵ and dietary and hygiene habits that should be adopted for infants,³ since they are unable to take care of their own oral health.^{6,7}

Transmissibility is well established, since the mother is the main source of pathogenic bacteria to infants, and the salivary levels of microorganisms of mothers are correlated with those of infants.^{8,9} Thus, the mother does not transmit the disease but the bacteria that cause it, increasing the infant susceptibility to caries. Thus, if caretakers of young children do not have a good oral health status and do not avoid contamination of the infant with saliva through kisses on the mouth, blowing on foods offered to the infant, or shared utilization of tableware, plastic glasses and utensils, colonization of infants' mouth may be anticipated, thereby increasing the risk of caries.¹

However, transmissibility should not be considered only as acquisition of bacteria from the mother by the infant, but also as the transmission of habits related to oral health.^{1,3,6,7} The maternal figure and behavior is a reference to be followed by infants in different situations, acting as an example that will guide the infants' habits.^{6,7} This also applies to the dietary and hygiene habits of mothers, that will be transmitted to the infants and may directly influence their predisposition to dental caries. Therefore, the present study evaluated the attitude of mothers regarding diet and oral hygiene provided to their sons and the impact of these attitudes on their prevalence of caries. In addition the influence of mother's prevalence of caries in the dmfs-index of their children was studied.

MATERIAL AND METHODS

This study was approved by the Research and Ethics Committee of the Bauru School of Dentistry, University of São Paulo (Proc no. 3032002). A convenience sample of 132 mothers and their sons were selected. The infants aged 10 to 36 months, presented at least four teeth in the oral cavity and were attended at the Baby Clinic of Bauru Dental School – USP for preventive and restorative care. On both types of treatment, there is a threemonthly follow-up, when the parents are informed about adequate diet and hygienic habits and mechanical plaque control is performed by the professional.

The knowledge of mothers on the oral health of infants was evaluated by a questionnaire with questions on diet, hygiene and etiology of dental caries; however, three most relevant questions on

hygiene and diet were selected for the present report, as follows:

Hygiene

- Who performs oral hygiene in the infant?
- How many times a day is oral hygiene performed in the infant?
- Is oral hygiene performed before the infant sleeps?

Diet

- How many times a day the infant is bottle-fed?
- Is the infant bottle-fed at nighttime?
- Which items does the infant ingest frequently: baby bottle with sugar, juice with sugar, tea with sugar, soft drink, chewing candy, lollypop, sandwich cookie, chewing gum, and cake.

Establishment of plaque index

Evaluation of the plaque index of infants was performed by staining with 0.6% malachite green and assessment by the index of Quigley and Hein¹⁰ which ranges from scores 0 to 5 according to the amount of plaque accumulated on each tooth. Sixteen infants could not be examined as to this index.

Establishment of caries index

Dental caries was investigated by the dmfs-index in infants and DMFS-index in mothers. Clinical examination was performed by a single examiner under natural light, with a dental mirror and dental probe if needed (Kappa 0.7).

Statistical analysis

Data were analyzed by descriptive statistics. The Statistic Stats software was used for analysis of association between dietary and hygiene habits and the dmfs-index of infants by the chi-square test ($p < 0.05$). Also, bivariate statistical analysis was employed to evaluate the correlation between dmfs (infants) X DMFS (mothers) and dmfs (infants) X plaque index (infants).

RESULTS

Descriptive statistical analysis revealed that oral hygiene of infants was performed by mothers in 97% of cases; 64% performed it twice a day and 41% performed it before sleeping; however, the mean plaque index of infants¹⁰ was 2.4. With regard to diet, 59% had a cariogenic

diet and 31% were bottle-fed at nighttime. Dental caries was not found in 58% of infants, yet their mean dmfs-index was 2.3, and the mean DMFS-index of mothers was 41.3.

Bivariate statistical analysis demonstrated lack of significant association ($p=0.053$) between the caries indices of mothers and infants. Similarly, there was no correlation of the dmfs-index with plaque index of infants ($p=0.533$), hygiene habits (Tables 1 and 2) and diet (Tables 3, 4 and 5).

Table 1: Correlation of daily frequency of oral hygiene with mean plaque index and mean caries index (dmfs) of infants ($p=0.845$).

Frequency of oral hygiene	Plaque index (N)* ¹	Dmfs-index (N)* ²
1	2,1 (40)	2,4 (40)
2	2,7 (48)	1,4 (56)
3	2,1 (8)	7,0 (12)
4	2,4 (16)	2,8 (20)
5	-	-
6	1,5 (4)	0,0 (0)

*1: $p=0.845$; *2: $p=0.788$

Table 2: Correlation of oral hygiene in the infant before sleeping with mean caries index (dmfs) of infants ($p=0.670$).

Oral hygiene before sleeping	Dmfs-index (mean $\pm$ SD)	Number of infants
Yes	2,0 $\pm$ 4,2	76
No	2,6 $\pm$ 4,7	56

Table 3: Correlation of bottle feeding at nighttime with mean caries index (dmfs) of infants ($p=0.001$).

Bottle feeding at nighttime	dmfs-index (mean $\pm$ SD)	Number of infants
Yes	0,7 $\pm$ 0,8	52
No	3,4 $\pm$ 5,4	80

Table 4: Correlation of cariogenic diet with mean caries index (dmfs) of infants ($p=0,964$)

Cariogenic diet	dmfs-index (mean $\pm$ SD)	Number of infants
Yes	2,4 $\pm$ 4,5	84
No	2,3 $\pm$ 4,4	48

Table 5: Correlation of daily frequency of bottle feeding with mean caries index (dmfs) of infants ($p=0.619$).

Daily frequency of bottle feeding	dmfs-index (mean $\pm$ SD)	Number of infants
1	1,8 $\pm$ 3,2	28
2	0,0 $\pm$ 0,0	4
3	2,6 $\pm$ 5,1	28
4	1,5 $\pm$ 3,5	32
5	3,4 $\pm$ 7,0	20
6	5,5 $\pm$ 6,0	12
7	0,0 $\pm$ 0,0	4
8	1,0 $\pm$ 0,2	4

DISCUSSION

Oral hygiene after meals is necessary to avoid dental caries, since dental plaque in the presence of foods containing carbohydrates will promote demineralization of dental tissues.¹¹ Therefore, this study investigated the correlation between hygiene habits and caries index and dental plaque accumulation. Chesters et al.¹² conducted a study on teenagers and demonstrated a positive correlation between information provided to the patient on the daily frequency of toothbrushing and caries prevalence; however, the present study corroborates the findings of Aimano and Parviainen,¹³ without observation of correlation between the informed frequency of oral hygiene and caries.

Alaluusua and Malmivirta¹⁴ suggest that visible plaque present on the surface of maxillary incisors is the main indicator of caries in infants. Moreover, Holmen et al.⁵ demonstrated, in an *in vivo* study, the importance of removal of dental plaque in the process of prevention and establishment of carious lesions. However, in the present study no correlation was observed between daily frequency of toothbrushing and plaque index, similar results were observed by Eronat and Eden.¹⁵ Not only the frequency of toothbrushing, but also the time when it is performed, has to be considered. The early caries in childhood can be caused by bottle-feeding at nighttime not followed by oral hygiene^{16,17}. In addition, during sleeping there is a reduction on salivary flow rate, which increases the susceptibility of individuals to the disease,^{16,17}. However, on the studied group the correlation between

oral hygiene in the infant before sleeping and the caries index did not reveal statistical significance. On the other hand, the efficacy of toothbrushing may be also important. Assuming that data on the reported number of daily toothbrushing is true, they would not assure total removal of food debris if mothers did not have proper training to perform it. However, there was no correlation between dental caries and the dental plaque indices, which is an indicator of the toothbrushing efficacy.

With regard to diet, the addition of sugar in large scale dramatically increases the caries activity; however, as demonstrated by Sreebny,¹⁸ many conflicting results have been reported in the literature correlating the prevalence of caries and diet analyzed by questionnaire; this study also did not reveal significant correlation between these two variables. These results may be explained by the difficulty to accurately analyze the cariogenicity of diet by application of questionnaires. This impairs the report of the real dietary habits of the infant. Despite of that, Fraiz and Walter¹⁹ found a relationship between high sugar intake and dental caries in infants, in a study conducted by interview with 200 mothers.

The influence of the daily frequency of bottle-feeding on the caries index was also analyzed, since the more daily exposures to food, the larger will be the time period during which the oral pH is below the critical pH, leading to predominance of demineralization over remineralization, thus increasing the individual's susceptibility to occurrence of carious lesions.²⁰ Eronat and Eden¹⁵ observed that a higher frequency of ingestion of foods containing sugar, not necessarily in the baby bottle, was essential for caries activity in infants. However, this study did not find a correlation between the daily frequency of bottle-feeding and the caries index of infants.

The influence of feeding at nighttime and the pattern of dental caries in infants is very important, since mothers often neglect oral hygiene after feeding due to the difficulty to perform it at that time. However, the present study did not observe statistically significant correlation between these two variables, even observing an inverse correlation. Similar results were found by O'Sullivan and Tinanoff,²¹ in which 86% of children with caries in incisors were bottle-fed at nighttime; however, 69% of

caries-free children were also bottle-fed at nighttime. There is a hypothesis for the result observed, the infants tend to abandon the baby bottle with the increase in age, on the other hand, the dmfs-index tends to increase over time. Thus, infants with higher frequency of bottle-feeding because of being younger presented less caries, and children with lower frequency of bottle-feeding due to the increase in age presented higher dmfs index.

It is important to point out that the mothers attitude was evaluated by means of a questionnaire, and the veracity of information provided by mothers on the hygiene and dietary habits is not known. Additionally since the studied group was composed by children attended at the Baby Clinic of Bauru Dental School, many mothers know what is best for the infant's oral health, because they were already informed about adequate diet and hygienic habits, but they do not put this into practice.²²

The last factor indirectly analyzed in this study was the influence of transmissibility of pathogenic microorganisms from mother to infant on the caries index of both.²³ Caufield and Walker⁸ investigated the DNA of cariogenic bacteria present in mothers and infants and demonstrated that the child had the same sample as the mother. Thus, it is clear that the mother is the greatest agent of transmission of pathogenic bacteria to the newborn;⁹ however, it is now known to which extent this fact could influence the pattern of dental caries of both. Similarly to other variables investigated in this study and as in the study of Alaluusua and Malmivirta,¹⁴ the correlation between DMFS of mothers and dmfs of infants was not statistically significant; however, it was nearly significant ($p=0.053$).

CONCLUSION

Based on the results achieved, it was concluded that none mothers' attitudes regarding diet and oral hygiene or their caries prevalence had an impact on infants' oral health. These data reinforce the multifactor and complex etiology of the disease and the need of multiples preventive measures.

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