

# Infant and Child Feeding Practices and Dental Caries in 6 to 36 Months Old Children in Fiji

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**Abstract:** Dental caries is a multifactorial disease. These factors include the presence of cariogenic micro-organisms, fermentable carbohydrates in diet, susceptible tooth and time. Diet appears to strongly affect caries development. The aim of this study was to examine the feeding practices of infants and pre-school children in the Central Division of the Fiji Islands and suggest appropriate preventive dental strategies. A sample of 102 children aged 6-36 months was randomly selected. Information on feeding practices and oral hygiene habits was obtained through a self-administered questionnaire completed by parents from the post-natal clinics. Children were categorized into age groups of 6-12, 13-24 and 25-36 months. Most of the children (55.5%) were bottle fed in the 6-12 months age group and 44.5% were breast-fed. However percentage of children being breast-fed decreased markedly increased with age. Most of them were breast-fed at some stage. The children who were bottle-fed increased in the 13-24 months age group but decreased in 25-36 months group. Snacks were given between meals for most of the children. Sugar was used as the common sweetener among bottle-fed children. Parents are definitely in need of appropriate advice on feeding and oral hygiene practices. An oral health education programme needs to be mounted at post-natal clinics. (PHD, 2003; 10 (1), Pages 12-16)

## Introduction

With dramatic improvements in the oral health of children in many developed countries <sup>1,2</sup>, the option of and the need for targeted prevention of dental caries has become apparent. In developing societies like those in the Pacific region where sugar consumption is high and where there are no well-organized preventive programs, caries prevalence is already high <sup>2,3</sup> or is increasing.<sup>4</sup> Individuals who are at increased risk of developing dental caries need to be identified and this will contribute to the development of appropriate preventive strategies.

Dental caries is a multi-factorial disease.<sup>5</sup> Factors such as the presence of cariogenic micro-organisms (streptococcus mutans), fermentable carbohydrates, susceptible tooth and time are implicated. It is the fermentation of sucrose and other non-milk extrinsic sugars by plaque bacteria to lactic and other acids, which causes caries. Primary teeth are important to children for their physical and mental health. Tooth decay and early loss of primary teeth may lead to inability in chewing food properly and malnutrition. Premature loss of primary teeth may delay eruption, or shifting of permanent teeth, causing crowding of permanent teeth. One thing health professionals should note is the importance of a child's oral health in their growth and development. <sup>6,7</sup>

In recent reviews dental caries has been characterized as an infectious bacterial disease, which can do severe damage to a child's primary dentition <sup>8</sup>. Diet appears to strongly affect caries development. <sup>9,10</sup> Provision of sugar containing drinks in a feeding-bottle or comforter is clearly associated with dental caries in infants.<sup>11</sup> Consumption of such sugary drinks just before the infant goes to sleep is likely to be most damaging as during sleep the flow of the protective saliva is reduced.<sup>12</sup>

In Fiji, dental services are free to children below fifteen years of age. School dental programmes, which started in Fiji since the early 1950's is the only on-going program rendering dental care for primary schools. For many

reasons, coverage of dental programs in antenatal clinics, kindergartens and post-natal clinics varies throughout the districts in Fiji. A study <sup>13</sup> conducted by dental students from Fiji School of Medicine in 1999 among preschool children aged 3-5yrs showed that the prevalence of dental caries among this group was 71% while only 29% of children were classified as caries free. Of the 71% of children classified with dental caries, 28% were classified into the group with nursing caries. The aim of this study was to relate the feeding practices of preschool children in Fiji and the impact on early childhood caries.

## Methods

Approval for the study was obtained from the Divisional Medical Officer Central/Eastern. The study was conducted at the post-natal clinics in Navua, Nausori and Suva in Fiji. A sample of 102 preschool children aged 6-36 months was randomly selected from those children present at the clinic days of examination.

Simultaneously, parents were asked to complete a self-administered questionnaire. Assistance was provided in completion of the questionnaire if requested by parents. Dietary information collected through the self-administered questionnaire covered the following areas:

- Breast feeding
- Use of infant formula or cows milk
- Consumption of snacks
- Socio-economic status of parent
- Dental visits
- Addition of sweeteners in milk
- Frequency of tooth brushing

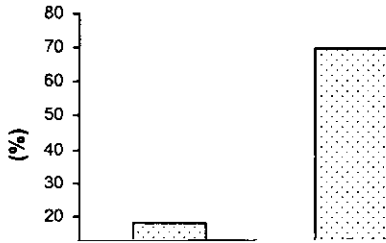
Participants were later categorized into age groups of 6-12, 13-24 and 25-36 months respectively. Dental examinations were performed under natural light and only dental mirrors were used. Caries was recorded as being present if one or more teeth were carious. No radiographs were taken nor explorers used. The data was analyzed using EPI-6 Info program for descriptive statistics.

**Results**

It was reported that 79% of the children had fathers who were employed, 15% who were self-employed and 8% unemployed. About 11% of the children have less than 3 family members, 62% have 3-5 family members and 27% had more than 5 family members.

Education level of the mother was also taken into consideration. Of the total number of children, 18% had mothers who had attended primary school, 70% secondary school and 12% tertiary level (Figure 1)

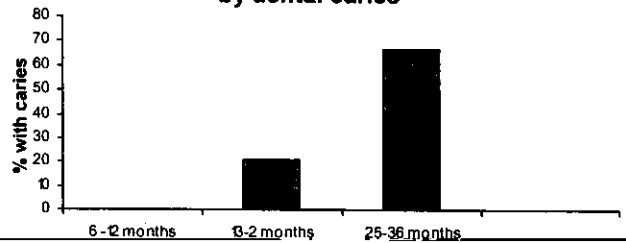
**Figure 1 - Education level of the mother**



**Diet and dental caries**

About 89% of mothers admitted giving snacks to their children. The popular snacks given were bingos and cream biscuits (64%) while 25% of the children ate or were given fruits as snacks. There were no caries detected in 6-12 month group. Caries was reported as early as 16 months of age. In 13-24 month group 21% had dental caries while 79% were caries free. In 25-36 month group 67% had dental caries. This showed that dental caries had increased approximately three times with age (Figure 4).

**Figure 4 - Percentage of children affected by dental caries**



eruption in preschool children in Arizona, USA, and by 34-36 months of age 25% of this population had caries.

Maxillary anterior caries developed as early as 10-12 months of age. Fissure caries of the molars, either by itself or with maxillary anterior caries, was seen as early as 13-15 months of age. Posterior proximal caries was seen as early as 19-21 months, and was only present in conjunction with the other patterns. Dental caries was a significant health issue for these children under 3 years of age, and factors other than bottle-feeding may play an important role in its etiology.<sup>16</sup> This study demonstrated the absence of caries in the 16 months from birth. It may mean that the pre-cavitated caries process started before this period followed by actual visualization of the clinical stages of caries at 16 months for the 21% of the sample group. Various factors, some of which were not investigated in this study could contribute to the three times increase of dental caries in the next age category (25-36 months). This study found most children have an average of 3-5 family members (62%), fathers who were employed (79%) and mothers had attained a secondary level of education (70%). Even though many children in this study were fed homemade food, the giving of snack food like bingos and sweet biscuits was very common.

These factors contribute to the prevalence of ECC amongst the sample group. For many years Fiji had embarked on breast-feeding programs. It is surprising to learn that despite initiatives like this only 45% of the study group breast-fed children from 6-12 months of age. Benefits of breast-feeding to the general health of children have been documented. Even though there are protective effects of IgG in early childhood caries, other factors also are involved in the equation for ECC. This was shown in this study where caries continued to increase affecting 67% of the sample group aged 25-36 months. Bottle-feeding started for 55% of the 6-12 month children and increased to 67% for 13-24 month age group, while the use of cups were common for 49% of the older children. There is a need to educate mothers on the importance of breast-feeding and to continue breast-feeding for a healthy child. Prolonged bottle-feeding has similar cariogenic effects as to prolonged breast-feeding.<sup>17,18,19,20</sup> Sugar was mostly added to milk. Addition of sugar or sugar containing flavoring render infant formula cariogenic.<sup>20,21</sup> The recommended age for discontinuation of bottle-feeding is twelve months.<sup>18</sup>

Boiled water and diluted fruit juices are appropriate fluids to be fed in addition to milk.<sup>20,21,22</sup> Cordials, pure fruit juices and soft drinks are not desirable because their high sugar content and low pH.<sup>22,23,24</sup> Both of these factors rendered these fluids cariogenic and can lead to extensive caries development.<sup>22</sup> Water and diluted fruit juices can provide the required body fluids, hence there is no need to add

sugar or sugar containing flavorings.<sup>25,26</sup> A major risk factor for nursing caries is putting the child to bed with a bottle containing cariogenic fluids.<sup>17, 20,25,27</sup> Feeding patterns are of prime importance in the etiology of dental caries especially nursing caries in preschool children.<sup>25,28</sup> The manifestation of dental caries at 6 years of age seemed to be associated with a higher daily sucrose intake that had started already at 3 years of age. Moreover, a combination of sweet intake more than once a week and visible plaque The experiments of Weiss and Bibby<sup>30</sup> found that if the enamel is treated with milk and then washed; the solubility of enamel was reduced by 20%. at 3 years of age may be predictive of dental health of a child three years later.<sup>29</sup>

**Pregnant women are advised to avoid the intake of sugar from the fourth month of pregnancy on, due to the fact that the baby's taste sensory organs start developing. If the mother consumes too much sugar at this stage, her child will certainly have greater preference for sweetened foods.<sup>32</sup>**

It was reported that 11% of mothers cleaned the child's teeth after feeding, 44% in the morning only, 15% three times a day and 30% of mothers did not clean the child's teeth. The experiments of Weiss and Bibby<sup>30</sup> found that if the enamel is treated with milk and then washed; the solubility of enamel was reduced by more than 20 per cent. Studies have shown that children who had an adult participating in tooth brushing were more likely to be caries free than children who brushed their own teeth.<sup>16</sup> Children cannot clean their own mouth efficiently; the neural patterns and the muscular coordination that they need for maintaining good hygiene do not develop until they are 8 or 9 years old. Skills to manipulate the toothbrush and dental floss are developing and caregivers as such are responsible. Meanwhile dental behavior is established between the child and the caregiver during this process of assisted brushing.<sup>31</sup> Teeth are susceptible to the detrimental effects of plaque accumulation from the moment they erupt. Therefore it is generally agreed that tooth cleaning should begin immediately after the first deciduous teeth appear. It is not necessary to use a toothbrush at this stage but a moistened gauze, napkin, face cloth or clean handkerchief can be used. It is not essential to use toothpaste initially; for its foaming nature maybe objectionable to the infants and concerns have been raised about the excessive ingestion of fluoride at this age. In order to brush effectively it is necessary for parent to control the infants movement while cleaning.<sup>12</sup> The World Health Organisation guidelines for the reduction of sugar intake during pregnancy is one of the fundamental aspects for the prevention of caries disease. Pregnant women are advised to avoid the intake of sugar from the fourth month of pregnancy on, due to the fact that the baby's taste sensory organs start developing. If the mother consumes too much sugar at this stage, her child will certainly have greater preference for sweetened foods.<sup>32</sup>

It is also beneficial to involve the parents in oral health promotion programmes for children. If appropriate measures are applied early enough it may be possible to totally prevent oral disease. It is recommended that an

infant be examined soon after the eruption of the first primary tooth.<sup>33</sup> This examination should include the soft tissues of oral cavity and the teeth to defects in enamel or early carious lesions. At this time the dentist can teach the parents proper maintenance of oral and dental health. Success had been reported in educating parents for preventative dental treatment for children younger than four years of age.<sup>34</sup> A protocol for preventative procedures beginning early in infancy should include the use of fluoride and instruction in proper home dental care.<sup>35,36</sup>

**Conclusion**

From this study it is concluded that parents are in need of advice on appropriate feeding practices and oral hygiene habits of infants and young children. The caries pattern in this study shows that as the child grows older and feeding

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**Reference**

1. Marthaler TM, O'Mullane D, Vbric V. The prevalence of dental caries in Europe, 1990-95. *Caries Res* 1996 30: 237-255.
2. Burt BA. Trends in caries prevalence in Northern American children. *Int Dent J.* 1994 44: 403-413.

**Table 2: Suggested guide to Oral Health activity and responsibility**

Activity	Responsibility	National Level	Target Population
Appropriate advice on	Antenatal, postnatal	Action, surveillance	All children

8. Caufield PW, Cutter GR, Dasauaya Ke AP. Initial acquisition of imitans streptocoeci by infants: Evidence for a discrete window of infectivity. *J Dent Res.* 1993 72: 37-45.
9. Rugg-gunn AJ, Edgar WM. Sugar and dental caries: A review of the evidence. *Comm Dent Health* 1984; 1: 85-92.
10. Sheiham A. Sucrose and dental caries. *Nutr Health* 1987; 5(12): 25-9.
11. Winter GB. Problems involved with the use of comforters. *Int Dent J* 1980; 30: 28-32.
12. Hunter L & Hunter B, Oral Health care in pregnancy and Infancy. (1997) Houndmills, Macmillan; p 73.
13. Afolabi C, Maea D, King T; Prevalence of Early Childhood Caries. (2001) BDS research project, Fiji School of Medicine. (unpublished)
14. Ripa Blinkhorn AS, Hastings GB, Leather DS: Attitudes towards dental care among young people in Scotland: Implications for dental health education, *Br Dent J.* (1983) 155 (9): 311 313.
15. Douglas JM, Tinaoff N, Tang JMW, Altman DS. Dental caries pattern and oral health behaviours in Arizona infants and toddlers. *Community Dent Oral Epidemiol* 2001; 29: 14-22.
16. Derksón GD, Ponti P. Nursing bottle syndrome: prevalence and etiology in a non-fluoridated city. *J Can Dent Assoc* 1982; 26: 389-93.
17. Dilley GJ, Dilley DH, Machen JB. Prolonged nursing habits a profile of patients and their families. *J Dent Child* 1980. 47: 102-8.
18. Srkoc O, Bajan M, Stilinivic D. Etiology of nursing caries. *Acts Stomatol Croat* 1989; 23: 159-65
19. Kroll RG, Stone JH. Nocturnal bottle-feeding as a contributory cause of dental caries in the infant and young child. *J Dent Child* 1976; 43:454 -9.
20. Fanning E, Smith B. *Dietary counseling manual dentistry.* Adelaide: The University of Adelaide Foundation, 1985:56-62.
21. Smith AJ, Shaw L. Baby fruit juices and tooth erosion. *Br Dent.* 1987;162: 65-7.
22. Powell D. Milk is related to rampant caries of early primary dentition? *J Calif Dent Assoc.* 1976: 4; 58-63
23. Holloway PJ, Mellanby M, Stewart RJC. Fruit juices and tooth erosion. *Br Dent J.*1958; 104:305-9
24. Johnsen DC. Dental caries pattern in children. *Dent Clin North AM.* 1984; 28:3-20.
25. American Academy of Pediatric Dentistry Oral Health Policies. *Pediatr Dent.* 1994; 16 Special Issue: 26
26. Marino RV, Bronze K, Scholl TO, Anhalt H. Bottle caries characteristics of children at risk. *Clin Pediatr.* 1989; 28:129- 31.
27. Blinkhom AS, Taylor 1, Willcox GF: Report of a dental health education program on Bedfordshire.; *BrDent J.* (1981) 150:319322.
28. Karjalainen S, Soderling E, Sewon L, et al. A prospective study on sucrose consumption, Visible plaque and caries in Children from 3-6 years of age. *Community Dent oral Epidemiol.* 2001; 29: 136- 42 © Munksguard, 2001.
29. Weiss ME, Bibby BG. Effects of milk on enamel solubility. *Arch Oral Bio.* 1996; 11 :49-57
30. Goepferd SJ. Infant oral health: a protocol *J Dent for Children.* (1986), 53(4):261-6.
31. Goepferd SJ. An infant oral health program: the first 18 months. *Pediatric Dentistry.* (1987) 9(1): 8-12.
32. American Academy of Pediatric Dentistry Reference Manual, *Pediatr Dent* 1995-1996. 17.(Special Issue): 2,
33. Schneider HS. Parental education leads to preventative dental TX for patients under the age of four. *J Dent. Children.* 1993.60: 33-37,
34. Goepfred SJ. Infant oral health: A protocol. *J Dent. Child.* 1986 .53: 261-266,
35. Goepfred SJ. Infant and oral health program: the first 18 months. *Pediatr Dent,* 1987. 9: 8-12,
36. Weunstein P, Domoto P, Wohlers K, Koday M. Mexican American parents with children at risk for baby bottle tooth decay: pilot study at a migrant farm workers clinic. *J Dent Child.*

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