

LETTER TO THE EDITOR

DENTAL CARIES AND DIETARY HABITS IN SCHOOL GOING CHILDREN

Sir,

(Received on May 31, 2000)

Dental caries (DC) is a local disease, which occurs on hard tissues of teeth leading to its destruction by oral microorganisms. Various environmental factors affect dental caries prevalence, which are – diet, especially sucrose rich; demographic factors such as age and sex and improper brushing habits. Caries is a biosocial disease, as living standards improve the severity of the disease usually increases. In the industrialized countries dental caries is one of the most ubiquitous and expensive diseases. In developing countries where many of the basic needs are not provided for, the problem of dental disease receives low priority.

The factor of diet in relation to caries has been studied most exhaustively like sucrose, cocoa, milk and fibers. Our study hence, includes these criteria for further analysis. Young children and adolescents consume an enormous quantity, of especially the so-called “junk foods”, which are high in sugar and other carbohydrate content (1).

Moreover they also consume a good amount of chocolates, lesser amount of fibers and green vegetables, thus taking cariogenic diet and avoiding cariostatic diets (2).

The cariostatic components of foods are:

- (a) Naturally occurring- Phytate (unrefined flours), cations (unrefined), cocoa butter, and glycirrhizic acid and Plant phytins.
- (b) Artificial- Phosphates, metal ions, and trace elements. These prevent caries by inhibiting demineralization of tooth surface (3).

The importance of sucrose in caries is its role as a substrate in the synthesis of adhesive and storage polysaccharides, the glucans and levans. These polymers account for the “stickiness” required for initiating and maintaining plaque formation on tooth surfaces. *Streptococcus mutans* is most virulent cariogenic organism. (4). The enzymes glucosyl- and fructosyl-transferases have been isolated from *Streptococcus sanguis* and *Streptococcus mutans*. *Streptococcus* is highly specific for sucrose and does not utilize fructose, glucose, maltose or lactose. Bibby (1969) demonstrated that fermentable carbohydrates produced D C only when remained in contact with a tooth surface for a specific time interval, this condition being fulfilled best by “junk foods” (5). A study by Dodds also showed the same thing. (6)

In our cross sectional study we randomly chose 804 school going children from different schools in the age group of 5 to 12 years. The group comprised boys (390) and girls (414). The assessment was done using dietary questionnaire and DMF (decayed, Missing and Filled teeth) criteria. The missing criterion was not considered here because in this age group it is difficult to say that it is due to natural exfoliation or due to caries.

Our study showed that the children who consumed more chocolates than sweets were having a higher prevalence of dental caries. The prevalence of DC in children with a chocolate loving habit was recorded 63% while in children with sweet loving habit, it was found to be 60% in our study. Regarding the vegetarian and non-vegetarian habits, it was noted that non-vegetarians had a lower prevalence of DC as compared to vegetarians with figures going to 65.5% in vegetarians and 59.46% in non-vegetarians ($p = N.S.$).

The most important role for carbohydrates in dental caries is their ability to serve as excellent fermentable energy sources for a variety of oral microbes. It is shown that the "junk foods" like chocolates contain added sugars and not the natural sugars. These added sugars are the main culprit in the causation of DC, while natural sugars are regarded noncariogenic, probably due to a low concentration of sugar. Also natural sugar contains fibers and phenolics, which have an anticariogenic effect.

Although cocoa and milk are considered to have an anticaries effect, yet they produce caries when taken as chocolate, which is due to its high sucrose content (7). The milk

chocolate has low to moderate cariogenic potential in spite of its high sugar content; this may be because of its high fat content. However, this product also contains tannin derivatives from cocoa, which demonstrate cariostatic activity, but remains masked due to high carbohydrate content.

In sweets the high fat content lessens the adherence of sweets to the teeth making the oral clearance time shorter thereby becoming lesser cariogenic. The chocolates are, however, manufactured using skimmed milk powder containing a very little amount of fat. This makes chocolates more sticky than sweets hence the rate of clearance of chocolate is more than that of sweets making chocolates more cariogenic. Thus, it is more important that in which diet combination, the sugar has been consumed - either sweets or chocolates (8, 9). Some wellknown studies like Vipeholm study by Gustaffsson et al studies showed that restricting the sugar intake in diets lessened the occurrence of caries (10). The Turku sugar studies demonstrated that xylitol is noncariogenic. (11).

The foods with high fat and protein content are considered to have an anticariogenic effect (12). On the basis of this fact it is presumed that non-vegetarian foods, owing to their high fat and protein content, can be anticariogenic as compare to vegetarian food. Although, green vegetables contain tannins and phytins, which are cariostatic (13) but still these are not effective in small children because most children in this age group do not like to consume green vegetables. Fats may possibly decrease caries activity by altering surface properties of the enamel, by having a direct

toxic effect on oral microbes, through interference with sugar solubilization, or simply by the replacement of dietary carbohydrates. Proteins may function to reduce caries posteruptively direct effect on plaque metabolism, replacement of dietary carbohydrate, or by increasing saliva secretion, which enhances oral cleaning time (14). The adult vegetarian diet, specially the

green vegetables, contain tannins and phytins which are cariostatic but these may not be effective in small children because most children in this age group do not like to consume green vegetables. This might be the explanation, as per our study, that vegetarian children were found to be more prone to DC as compared to children who were mainly on non-vegetarian diets.

RAJ KUMAR YADAV*, SHOBHA DAS AND PAYAL R. KUMAR**

*Departments of Physiology,
Lady Hardinge Medical College,
New Delhi - 110 001

and

**Department of Gastroenterology and HNU*,
All India Institute of Medical Sciences,
New Delhi - 110 029

REFERENCES

1. Hefti, Schmid R. Effects on caries incidence in rats of increasing dietary sucrose levels. *Caries Research* 1979; 13: 298-300.
2. Carlsson T, Egelberg J. Effect of diet on early plaque formation in man. *Odontologisk Revy* 1965; 16: 112-125.
3. Bibby BG. Fruits, vegetables and dental caries. *Clinical Preventive Dentistry* 1983; 5: 3-11.
4. Drucker DB, Verran, J. Comparative effects of the substance - sweeteners- glucose, sorbitol, sucrose, xylitol and trichlorosucrose on lowering of pH by two oral *Streptococcus mutans* strains *in vitro*. *Archives of Oral Biology* 1979; 24: 965-970.
5. Bibby BG, Goldberg HJV, Chen E. Evaluation of caries producing potentialities of various food stuffs. *JADA* 1951; 42: 491-509.
6. Dodds MWJ, Edgar WM. The relationship between plaque pH, plaque acid anion profiles, and oral carbohydrates retention after ingestion of several "reference foods" by human subjects. *Journal of Dental Research* 1988; 67: 861-865.
7. Newbrun E. Sucrose in the dynamics of carious process. *International Dental Journal* 1982; 32: 13-23.
8. Grenby TH. The deposition of dental plaque in young adults on a diet containing chocolate and skim milk powder. *Archives of Oral Biology* 1974; 19: 213-215.
9. Paolino VJ, Kashket S. Inhibition by cocoa extracts of biosynthesis of extra cellular polysaccharides by human oral bacteria. *Archives of Oral Biology* 1985; 30: 359-363.
10. Gustafsson BW et al. The Vipeholm dental caries study. *Acta Odontologica Scandinavica* 1954; 11: 232-364.
11. Scheinin A, Makinen KK. Turku sugar studies I-XXI. *Acta Odontologica Scandinavica* 1975; 33 (supplement 70): 1-349.
12. Lewis Menaker (ed). The biologic basis of dental caries, harper and Row publisher, Hagerstown. 1980, p.352-53.
13. Cole et al. Effect of pyridoxine, phytate and invert sugar on plaque composition and caries activity in the monkey. *Caries Research* 1980; 14: 1-15.
14. Rugg-Gunn AJ. Diet and dental caries. In The prevention of Dental Disease, ed.J.J. Murray 1983; pp. 3-82. Oxford: Oxford University Press.

*Corresponding Author