Original Article

Sweetness Preferences and Caries detection in Schoolchildren of Hamedan/Iran

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Abstract:

Objective: Despite the strong relationship between sugars, mutans *streptococci* levels and caries, relatively, little research has been carried out on one of the factors that may influence sugar intake; namely sweet preference. The objective of the present study was to explore the association between sweet preference and the levels of dental caries in 6-12 year-old schoolchildren in Hamedan.

Materials and Methods: Samples of both sexes (n=362) were randomly selected. Children's preference for sugar was measured using a modified version of the Sweet Preference Iventory, which assessed their preference for 5 different concentration of freshly prepared sucrose/tea solution: 0.075M, 0.15M, 0.3M, 0.6M, and 0.9M. Five thermos flasks were filled with the five different concentrations of tea and color-coded. The children were asked to taste, one after another and select the most palatable solution. Then, caries experience was assessed according to WHO guidelines. Socio-demographic information was collected based on a simple questionnaire.

Results: Three hundreds and twenty of the children completed all aspects of the research. 64 of them were permanent teeth caries free and 51 were milky teeth caries free. Mean DMFT was 0.61 (SD=1.14) and dmft 3.9 (SD=3.12). The majority of the children (41.4%) preferred the two highest concentrations (0.6, 0.9) and 15% of them preferred the highest sweetness level (0.9M).The moderately sweet solution (0.3M), was selected by 30.9% and only 12.4% and 15.3% preferred the less sweet solutions respectively (0.075M, 0.15M).

Conclusion: There was no statistical relationship between sweet preference and dental caries.

Key Words: Sweetening Agents; Dental Caries; Students

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INTRODUCTION

Consumption of sweetened food is influenced by a variety of biological, sociological, and environmental factors [1]. The main reason for high levels of caries in industrialized countries and the increased levels in non-industrialized countries is believed to be the consumption of non-milk extrinsic sugars (sucrose) [1-6]. Studies have shown that a change from the use of locally produced to manufactured food, particularly those with high sugar content, has been accompanied by an increase in dental caries [7]. The preference for sweet tastes can be detected in the newly born and appears to be common in all neonates [8]. Desor et al [9] found that babies given sugars early in life, tended to like products with higher sugar levels when they were toddlers.

The objective of the present study was to explore the association between sweet preference and the levels of dental caries in 6-12 year-old school children in the city of Hamedan.

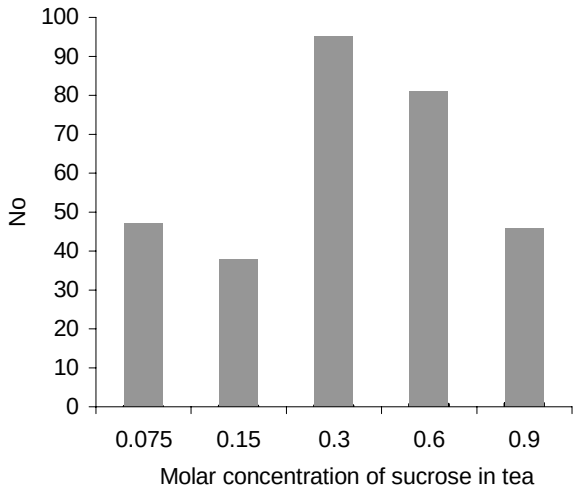

Fig 1. Comparison between perceived sweetness and actual Molar concentration of sucrose in tea.

MATERIALS AND METHODS

The target population for this cross-sectional survey was 362 (6-12 year-old) school children of both sexes randomly selected from six primary schools in Hamedan. The sampling frame comprised all schools in Hamedan, six out of the primary Schools. The samples were invited through letters (questionnaire) also explaining the aim of the study, socio-demographic information (child age and gender, educational level of parents), oral health behaviors and habits such as feeding practices (breast or bottle feeding and tooth brushing habits at home).

Children's preference for sugar was measured using a modified version of the sweet preference inventory [10], which assessed their preference for five different concentrations of freshly prepared sucrose/tea solution: 0.075M, 0.15M, 0.3M, 0.6M, and 0.9M.

Three methodological modifications concerning the sweet preference test were undertaken according to previous studies. First, the adoption of a sucrose/tea solution instead of a sucrose/distilled water solution as the latter was largely rejected (not accepted) by the children. Second, as none of the children liked tea without sugar, the 0.0M solution was excluded; and third, because in the study done by Maciel et al [11] the majority of the children preferred the 0.6M solution, a higher concentration was included in our study (0.9M).

Five thermos flasks were filled with the five different concentrations of tea and color-coded. In addition, five cups, number coded on the bottom, were put on the table in an order unknown to the children. Preprepared uniform instructions according to their age were given to each child, asking them to taste liquid in the cups, one after another, and point to the most palatable one. Interstimulus mineral water rinses were given to the children during the process. If the child were in doubt, the test was to be repeated. Afterwards, all the children were examined at the school in daylight by a single examiner. Caries experience was measured by the DMFT/dmft index, following WHO approved instructions using plane mouth mirrors and no dental probes [12].

The reliability of the methodology was assessed by repeating the data collection procedure on a 10 percent subgroup of the samples.

The data were analyzed using SPSS software by Pearson chi-square test [13].

RESULTS

A total of 320 children out of 363 completed all aspects of the research, a response rate of 86.6%. In addition, 70% of mothers and 30% fathers were respondent. The majority of the fathers (52.4%) and the mothers (49.1%) had high levels of education. In relation to feeding habits and oral hygiene practice, as reported by their parents, 83% of the children had been breast-fed. Parents also reported that only 11% of the children brushed their teeth three times a day and only 15.3% of them were using dental floss.

High levels of sweet preference were identified. Approximately half of the children (41.4%) preferred the two highest concentrations (0.6M, 0.9M), while, 15% of them preferred the sweetest one (0.9M). The moder-

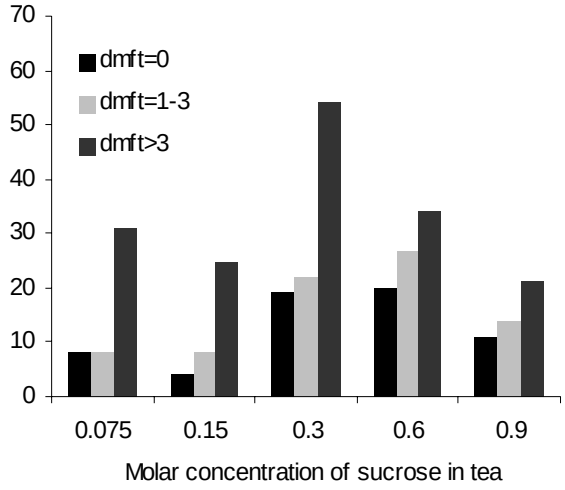

Fig 2. The association between dmft and Molar concentraion of sucrose in tea.

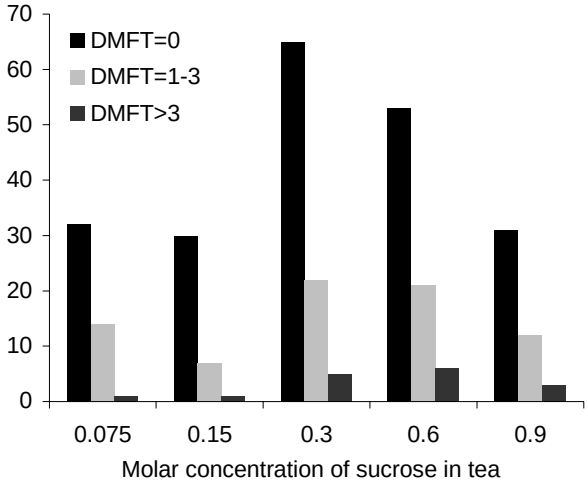

Fig 3. The association between DMFT and Molar concentration of sucrose in tea.

ately sweet solution (0.3M) was selected by 30.9% and only 12.4% and 15.3% of the samples preferred the less sweet solutions, 0.075M and 0.15M, respectively (Fig 1).

Two hundred and twenty-three children were caries-free and 65 of them were milky teeth caries free. The mean DMFT was 0.6 (SD=1.08) and the dmft 3.88 (SD=3.12).

Socio-demographic characteristics were not statistically associated with the children's preferences for sweetness. There were no relationships between sweet preference and dmft/DMFT (Fig 2, 3).

DISCUSSION

In this century, world sugar production has increased five folds, while in the same period; world population has only doubled [14]. Dental caries has been called a plague of modern civilization and is, without doubt, one of humankind's most common chronic diseases. Evidence showing that the incidence of dental decay is on the rise in many developing countries that previously had very low or low caries prevalence has now been accumulated [3].

Despite the strong relationship between sugars, mutans *streptococci* levels and caries, somewhat little research has been carried out on one of the factors that may influence sugar intake; namely sweet preference. Sugar consumption patterns vary by age, sex, social class, and levels of economic status. A liking for sweetness is a universal human feature and may be related to the fact that no food in nature is both sweet and poisonous. The more exposure there is to sweet products, the greater the preference for sweetness and, consequently, the greater the sugar consumption. A positive significant correlation between sweet preference and dental caries has been demonstrated. There is no doubt that young children tend to like sweet tastes and dislike bitter ones [11].

Several studies have reported that caries free adults detect sweet substances (sucrose and glucose) at lower concentrations than do caries-susceptible adults. The exact mechanisms mediating the relationship between sweet taste thresholds and caries susceptibility are yet unclear [15].

It has been debated weather taste sensitivity is genetically or environmentally determined. Current data do not allow any definitive conclusions to be drawn on the etiology or the direction of the causality for taste sensitivity, dietary habits, and caries experience.

In the present study, a significant negative cor-

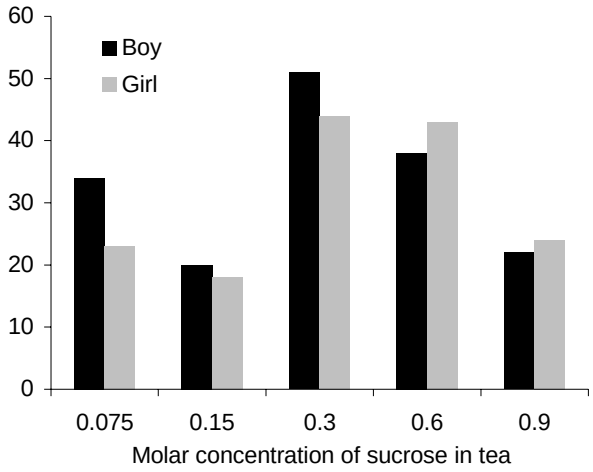

Fig 4. Sweetness preference according to sex.

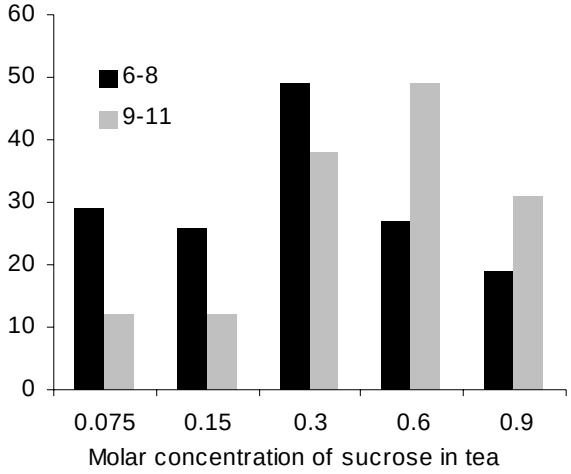

Fig 5. Sweetness preference according to age.

relation between sweet preference and age was detected (Fig 4). Previous studies do approve this finding [16,17]. Also, we found sex not to be effective on the matter (Fig 5).The finding that males have a higher preference for sweetness [9,14,15] also was not supported by Jamel et al [1]. The hypothesis that there would be a direct relationship between sweetness preference and caries experience (DMFT, dmft) among the 6-12 year-old school children in this study was not confirmed (Fig 2,3). Similar findings were also reported by Nilsson et al [18,19], and Maciel et al [11] that did not show a correlation between sweet preference and dental carries. In contrast, Jamel et al [16], Steiner et al [20], and Mickel et al [21] found the correlation to be positive.

Comparisons of our results with other studies because of the different age group are difficult. Other variables for sweet taste preference include gender, race, and gustatory sensitivity [9-22].

CONCLUSION

Sweet preference is not correlated with dental caries. However, other etiological and developmental factors may play a role in these divergent findings.

Further studies on caries-free and caries susceptible individuals are needed, incorporating such variables as maturational level, fluoride and dietary history, bacterial flora (mutans *streptococci*) and salivary composition.

ACKNOWLEDGMENTS

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