Association of Malnutrition and Socioeconomic Status in Dental Caries – A Cross Sectional Study

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ABSTRACT

The objective: of this study was to assess the association of nutritional status and socio economic status in dental caries among rural children.

Methods: Children of age 6 – 10 yrs (n = 120) from government schools in two villages of Kanchipuram district were the study subjects. The children's nutritional status was assessed by means of anthropometric measurements. Body Mass Index using weight and height of children was evaluated using the reference standard of the WHO 2007. The socioeconomic status was assessed based on education, occupation and material possession. The children's oral cavity was screened for decayed and filled teeth (dft index)

Results: Nutritional assessment showed that 66.7% were malnourished. Female children (71.7%) were more malnourished than males (62.2%) with no significant difference between them. Children belonging to the low income group were more malnourished (74.7%) than children of middle income group (53.3%) (p = 0.01). The prevalence of caries in this population was 60% with mean dft index score of 1.7. Caries occurrence was more in the low income group (61.3%) than middle income group (57.8%) with no significant difference between the two groups (p = 0.70). Comparing the caries occurrence between the malnourished children and the normal weight children it was seen that the caries occurrence was less in the malnourished children (p = 0.23)

Conclusion: This cross sectional study concludes that malnutrition is not associated with dental caries and socioeconomic status influences nutritional status of a child in this rural population.

Keywords: Nutritional status, Socio economic status, Dental caries

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INTRODUCTION

Nutrition is an essential and important component in human growth, development and in maintaining healthy life. Until the turn of the century the science of nutrition had a limited range (1). But now with UNICEF stating that one in every three malnourished children live in India(2), issues regarding nutrition should gain a lot of importance and should be put in the forefront.

Malnutrition is known to produce high morbidity and mortality, and considering its effect on the oral cavity, malnutrition is shown to have pre eruptive and post eruptive effects. Nutrition exerts systemic effect upon the dentition via the pulpal blood supply and the saliva (3). Poor bone calcification, retarded centers of ossification, small teeth, delayed tooth eruption, retarded jaw growth, and crowded dentition have been related to protein deficiency during the critical growth period(4), A single, prolonged, mild to moderate malnutrition episode in the first year of life may result in higher primary dentition caries rates, an increase in permanent dentition caries and that the caries risk may be mediated by means other than enamel hypoplasia(5,6).However, in develop-

ping countries, in the absence of dietary sugars, undernutrition is not associated with dental caries.

Undernutrition cou¬pled with daily increased amount and/ or frequency of sugars results in levels of caries greater than expected for the level of sugars intake(7).

In a developing country like India with different social and cultural factors, and eating habits and with not enough literature on this association on Indian population, this study was taken up on rural children of Kanchipuram district in the state of Tamil Nadu to assess the association of nutritional status and socio economic status on dental caries.

METHODOLOGY

A cross sectional survey was carried out on children aged 6-10 years of both sexes. Two government schools located in two different villages, and blocks but from the same district were sam¬pled into the study. Informed consent was got from the Head of the schools to carry out the study. All children who attended the school on the day of screening were included in the study. As the children come to these schools from the nearby villages, the sample collection was fairly representative of the population. A total of 120 children were included in the study(n = 120), from both the schools.

Assessment of Socio Economic Status

An interview schedule was adminis-tered to the children to assess the socio economic status of the child. The socio economic status (SES) of the child was assessed based on three variables-education, occupation of the head of the family and material possession like Television, refrigerator, mobile phone, bicycle, two wheeler, and pres-ence of a toilet at home. A weightage was assigned for each variable. The total of the three weightages will give the SES score which was graded to indicate the three classes, namely low

income, mid¬dle income and high income groups. The scoring was done as follows:

- **Education:** Illetrate-0, Primary Education-1, Middle and Highe Secondary- 2, Senior Secondary and above- 3
- **Occupation:** Unemployed-0, Unskilled worker-1, Semiskilled worker-2, Skilled worker-3
- **Material possession:** Possession of 1 or 2 - 1, Possession of 3 or 4 - 2, Possession of 5 or 6 - 3
- **Socio Economic Status Score Card:** Total score:1-18
  1-6 = Low Income, 7-12 = Middle Income, 13-18 = High Income

ASSESSMENT OF NUTRITION-AL STATUS

Anthropometric measurements such as height and weight for each child was recorded having the subjects stand upright without shoes. The WHO In¬ternational growth chart(8) was used to evaluate the nutritional status. Z scores for boys and girls aged 5-19 years is generated in the WHO growth chart. A cut off of ±2 SD was used to identify children at significant risk for either in¬adequate growth or excessive growth. So a child who's BMI was-2 SD was considered malnourished and children below -3 SD were considered severely malnourished. Similarly children between +1 to +2 SD were considered as overweight and above 2 SD as obese.

ASSESSMENT OF DENTAL CARIES

Dental caries was the outcome meas-urement which was measured by decayed, and filled teeth(df Ind1.5ex).

Table 1: Demographic variables of the study population

1	Number of study subjects	n=120
2	Gender	
	Males	67(55.8%)
	Females	53(44.2%)
3	Mean Age of children	8.5 years
4	Socio Economic Status	
	Low Income	75(62.5%)
	Middle Income	45(37.5%)
	High Income	none
5.	Nutritional status	
	Malnourished	80(66.7%)
	Normal	40(33.3%)
	Over weight/Obese	none

Ra¬diographs were not taken. The WHO (1997) dental caries diagnostic criteria was used for caries diagnosis(9). A sin¬gle examiner did the oral exami-nation and recorded the dft index to avoid inter examiner variability.

RESULTS

Data analysis was done using SPSS (version 16). Chi-Square was used to compare outcomes. The results are as follows: A total of 120 children with a mean age of 8.5 years were included in the study. Of these 67 (55.8%) were males and 53(44.2%) were females. As¬sessment of Socio economic status in these children showed that 75(62.5%) were from the low income group and the rest 45(37.5%) from middle income group. There were no children in the high income group. Assessment of children's nutritional status by BMI showed that 80 children (66.7%) were malnourished and 40 children (33.3%) were in the normal weight group. No child was overweight or obese (Table 1).

Out of 67 male children 42(62.6%) were malnourished, and out of 53

Table 2: Occurrence of Malnutrition in relation to Gender and Socio-Economic Status

	Malnutrition		Total	Sig p value (<.05)	Chi square value
	Present	Absent			
Males	42(62.6%)	25(37.3%)	67	0.298	1.081
Females	38(71.7%)	15(28.3%)	53		
Low Income	56(74.7%)	19(25.3%)	75	0.016	5.760
Middle Income	24(53.3%)	21(46.7%)	45		

female children 38(71.1%) were malnourished. There is no statistically significant difference between the males and females although occurrence of malnutrition was more among female children(p0.29). The results showed that out of 75 children in the low income group 56 children(74.7%) were malnourished and the number of malnourished children in the middle income group was 24 out of 45(53.3%). Chi square test showed that there was a significant difference between the low income and middle income groups (p 0.01) (Table 2).

The prevalence of caries in this population was 60% with a mean dft score of 1.7. The results showed that the occurrence of caries was more in children belonging to low income group, 46 children (61.3%) had dental caries in the low income group. 26 (57.8%) children had dental caries in the middle income group. Though caries occurrence was found to be more in the low income group there was no statistically significant difference between the low and middle income group (p = .700). Comparing the caries occurrence between the malnourished children and the normal weight children it was seen that the occurrence of caries was less in the malnourished children when compared to normal weight children. Out of 80 children who were malnourished 45 (56.3%)had caries and out of 40 who were normal weight 27(67.5%) had caries. There was no statistically significant difference between the two groups(p = .236) (Table 3).

DISSCUSSION

This study was conducted on children aged 6-10 years with an objective to find whether an association exists between nutritional status, socio-economic status and dental caries. The results of the study showed that there were no children in the high income group and also none of the children in this study population were found to be overweight or obese. Most people belonging to this area earn their livelihood by doing unskilled jobs and farming and are still in the practice of open defecation. Out of 120 children studied only 18 children had toilets in their household (15%). And children living in such conditions and not being provided with good nutritious food leads to malnourishment that is well evident in this study with 66.7% of the children being malnourished. Reports from NFHS 3(2005-2006)(10) shows that about 41% of India's children below 3 years of age are malnourished and the scenario in Tamil Nadu, a state with an effective Integrated child development services has brought down the prevalence of malnutrition in under 3 years to 26.6%(11). However, sub-clinical malnutrition, incidence of low weight-for-age, anemia, disability and hunger still continue to prevail among children in the lower socio-economic sections of the population(12). As the age group of this study population is 6-10 years this prevalence could not be compared to the actual reported prevalence for want of sufficient information.

The study results show that more female children (71.7%) were malnourished when compared to the male children but there was no statistically significant difference between the two groups. The trend in the Indian society is that usually the female children are under fed due to gender inequalities and it is a well known fact that female infanticide is prevalent in India (13). On an average, girls are better nourished at birth than boys are, especially in the first months of life. However, overtime, nutritional outcomes for both genders decline, declining faster for girls. Indicating potential feeding and care, neglect of girls in infancy and early childhood. By the time girls reach the age of four, they are much more likely to be under nourished than their brothers says the HUNGAMA report (14).

This study also showed that socio economic status plays an important role in the prevalence of malnourishment in this under privileged population. In general, those who are poor are at risk for under-nutrition. More children (74.66%) in the low income group were malnourished and it was found to be statistically significant when compared to the middle income group. When it comes to child malnutrition, children in low-income families are more malnourished than those in high-income families. This phenomenon is most prevalent in the rural areas of India where more malnutrition exists on an absolute level. Whether children are of the appropriate weight and height is highly dependent on the socio-economic status of the population(15).

The prevalence of dental caries in this population was 60% and was found to be more in the low income group though not statistically significant. Socio economic status is a known risk factor for the incidence of dental caries(16) due to various reasons like lack of transport, lack of medical facilities nearby, cost of treatment and lack of knowledge especially among the

Table 3: Occurrence of Dental caries in relation to Nutritional status and socio-economic status

	Dental Caries		Total (<.05)	Sig p value value	Chi square value
	Present	Absent			
Middle Income	24(53.3%)	21(46.7%)	45		
Low Income	46(61.3%)	29(38.7%)	75	.700	0.148
Middle Income	26(57.8%)	19(42.2%)	45		
Malnourished	45(56.3%)	35(43.8%)	80	.236	1.406
Normal weight	27(67.5%)	13(32.5%)	40		

rural population. It was found that dental caries was not associated with nutri¬tional status of the children in this rural population. Rao (1993) in their study on rural, urban and tribal Indian children, found no association between nutritional status and dental-caries(17). On the other hand a study done by Johansson et al (1992) on Indian children found that malnutrition reduced the secretion rate of stimulated saliva and concluded that chronic mal¬nutrition in growing children enhances the cariogenic potential stemming from fermentable carbohydrates(18). Since our study was a cross sectional study done by a convenient sampling method the results have its limitations. More analytical studies are required to prove this association in the Indian population.

CONCLUSION

This cross sectional study concludes that malnutrition is not associated with dental caries and socioeconomic status influences nutritional status of a child in this rural population.

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