NUTRITIONAL STATUS AND CARIES EXPERIENCE AMONG 12 TO 15 YEARS OLD SCHOOL GOING CHILDREN OF LUCKNOW

Ridhi Narang[1], Sabyasachi Saha[2], G.V. Jagannath[3], Sahana S.[3], Minti Kumari[4], Shafaat Mohd.[4]*

1. Dr. Post Graduate, Department of Public Health Dentistry, Sardar Patel Postgraduate Institute of Dental and Medical Sciences, Lucknow, India.
2. Dr. M.D.S., Prof. & Head, Department of Public Health Dentistry, Sardar Patel Postgraduate Institute of Dental and Medical Sciences, Lucknow, India.
3. Dr. M.D.S., Reader, Department of Public Health Dentistry, Sardar Patel Postgraduate Institute of Dental and Medical Sciences, Lucknow, India.
4. Dr. M.D.S., Senior Lecturer, Department of Public Health Dentistry, Sardar Patel Postgraduate Institute of Dental and Medical Sciences, Lucknow, India.

Abstract

The aim of the present study was to assess the nutritional status and caries experience among 12-15 year old school going children of Lucknow, India.

The study comprised of 600 children attending public schools in Lucknow, India. Basic socio-demographic and oral hygiene practices information was obtained using pre-designed structured interview. Nutritional status was assessed using the BMI index. Dental caries experience was recorded using DMFT index. SPSS version 12 was used for statistical analysis. Association between BMI and DMFT was obtained using Pearson's coefficient test.

The mean BMI of males, females and total was 16.08±1.99, 17.34±2.10 and 16.64±2.13 respectively. Mean DMFT of total subjects, males and females were 0.79±1.16, 0.88±1.32 and 0.69±0.92 respectively.

The study reveals the poor nutritional and health status of school children under study, identifying this group for targeted services aimed at improvement of their health and nutritional status.

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Introduction

The WHO has declared that every human being has the right to access adequate, sufficient and healthy nutrition. However, social inequalities, changes in life style, the process of industrialization & other factors have had a negative influence on the spread of this fundamental right[1].

Today the world faces two kinds of malnutrition, one associated with hunger or nutritional deficiency and the other with dietary excess. Urbanization and economic development has resulted in rapid changes in diet and lifestyles[2]. The World Bank estimates that India is ranked 2nd in the world of the number of children suffering from malnutrition, after Bangladesh (in 1998), where 47% of the children exhibit a degree of malnutrition. The prevalence of underweight children in India is among the highest in the world, and is nearly double that of Sub-Saharan Africa with dire consequences for mobility, mortality, productivity and economic growth. Simultaneously, there are a small, but increasing percentage of overweight children who are at a greater risk for non-communicable diseases such as diabetes and cardio-vascular heart disease later in life[3].

With regard to dental caries global weighted mean DMFT value for 12 year old age group was 1.61 in 2004. In India, data from the National Oral Health Survey (2002-2003) states

Corresponding author:
Dr. SABYASACHI SAHA
Department of Public Health Dentistry
Sardar Patel Postgraduate Institute of Dental and Medical Sciences, Rai-Bareilly Road, Lucknow, India. Pin- 226025.
Mobile No. 09451248210

E-mail: dr_sabyasachi@yahoo.com

that in children aged 12 years, the caries prevalence was 53.8% and the mean DMFT was 1.8[4].

According to the available literature, nutritional deficiencies may impair not only the tooth structure but also the development of salivary glands. During the formation of teeth the physical and chemical properties of enamel could be altered in the direction of increased dental caries susceptibility. There may be a greater prevalence of dental caries because the excessive consumption of sugary foods[1].

Studies are sparse in this region of the country on nutritional status and prevalence of dental caries. Hence the present study was undertaken to assess the nutritional status and prevalence of dental caries among 12-15 year old children of public schools of Lucknow, India.

Materials and methods

The present cross- sectional study was carried out to assess the nutritional status and caries experience among 12-15 years old school going children of Lucknow, India. Data collection was carried out in the month of August and September 2010.

A pilot study was conducted using the proforma on 30 school going children to assess the operational feasibility of the study. Needful changes in the proforma were made from time to time.

Sample size was calculated using the standard formula seeking results at 95% Confidence Interval for which the value of z=1.96, the allowable error (e) taken as 0.05. Thus using the above mentioned formula, pilot study conducted and the prevalence of the disease, sample of 600 school going children was obtained. Multistage cluster random sampling was done. In the first stage, Lucknow city of India was divided geographically into 5 areas *i.e.* East, West, North, South and Central. In the second stage, 1 ward was randomly selected from each geographic area. In the third stage 120 individuals, aged 12 to 15 years were examined from each 5 ward.

A written consent was obtained from the school authorities before the commencement of this study. Approval to carry out the study was obtained from the Ethical Committee of the Institution. To assess the intraexaminer agreement, the examiner investigated 10% of the sample on the second occasion. The kappa statistical test evidenced a near- perfect agreement between the measurements (0.94). Two interns from the department were taken as recording assistants who were also trained.

The proforma had two parts: the first part was a structured interview with 15 questions. Demographic data was collected. The socioeconomic status was elicited through father's and mother's education, their occupation, family income and number of siblings. Personal information regarding oral hygiene practices was collected. Frequency of snacking and their attitude towards dental visit was also elicited.

Second part of the proforma consisted of clinical assessment through anthropometric measurement for recording nutritional status using BMI index (for Asians) and Dental caries experience using DMFT index (Henry T. Klein, Carrole E. Palmer and Knutson J.W. in 1938). Type III examination was done. The instruments used for dental caries recording included plane mouth mirror and sickle cell explorer and cold sterilization procedure was followed.

The statistical analyses were performed using the Statistical Package for the Social Sciences, version 12 for Windows. Chi square test was used to find association between dental caries and Nutritional status .Pearson's correlation coefficient was used to find any possible relationship between BMI and DMFT. $P < 0.05$ was considered to be statistically significant.

Results

Out of the 600 children examined 333(55.5%) were males and 267 (45.5%) were females. Majority (33.67%) of the children had their father's education uptil primary school, followed by high school (28.5%). Majority of the mothers of school children examined were illiterate (57.33%).

The use of fluoridated tooth paste is significantly more in males than females ($p<0.001$). There is no significant difference in snacking frequency among males and females ($p=0.69$). Frequency of brushing once is more in females and brushing twice being more in males but the difference is statistically non significant ($p=0.10$). Majority of the subjects both male (97.9%) and females (99.25%) never visited a dentist.

Table 1 shows that a large proportion of male subjects (99.10%) were underweight compared to female who presented 74.53% as underweight. Normal weight females were significantly higher compared to males (p<0.001).

Also the BMI of females is significantly higher than males (p<0.001).

The mean BMI of males, females and total was 16.08±1.99, 17.34±2.10 and 16.64±2.13 respectively.

Gender	Under weight		Normal weight		Over weight		Obese class I		Obese class II	
	n	%	n	%	n	%	N	%	n	%
Males	300	90.10%	31	9.3%	-	-	2	0.60%	-	-
Females	199	74.53%	63	23.60%	5	1.87	-	-	-	-
X^2 =31.46 , p<0.001*										

Table 1. Gender wise distribution of school children and BMI. (*Statistically significant).

Table 2 shows higher proportion of males (184) and females (141) examined had DMFT score 0 i.e. they are caries free.

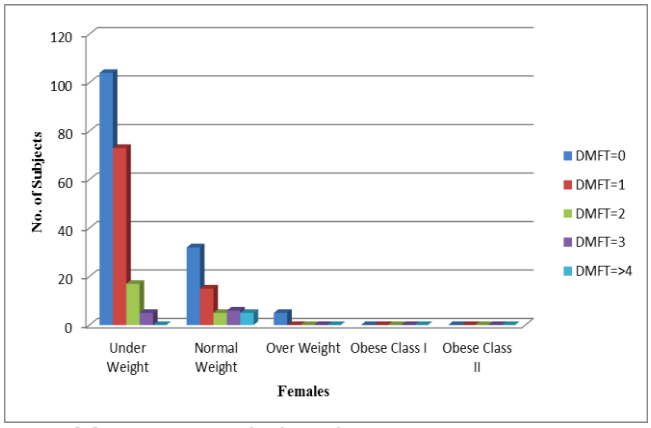
Comparing the scores of DMFT among males and females more number of females had a score of 1, whereas score 2, 3 and ≥ 4 were more in males and this difference is statistically significant (p<0.001).

Mean DMFT of total subjects, males and females were 0.79±1.16, 0.88±1.32 and 0.69±0.92 respectively.

Thus the mean DMFT among male subjects is significantly higher than in female subjects (p<0.005).

Gender	DMFT 0		1		2		3		≥4	
	n	%	n	%	n	%	n	%	n	%
Male (n=333)	184	55.26 %	75	22.52 %	39	11.71 %	16	4.80 %	19	5.71 %
Female (n=267)	141	52.81 %	88	32.46 %	22	8.24 %	11	4.12 %	5	1.87 %
X^2 =13.46 , p<0.001*										

Table 2. Gender wide distribution of school children and DMFT scores.

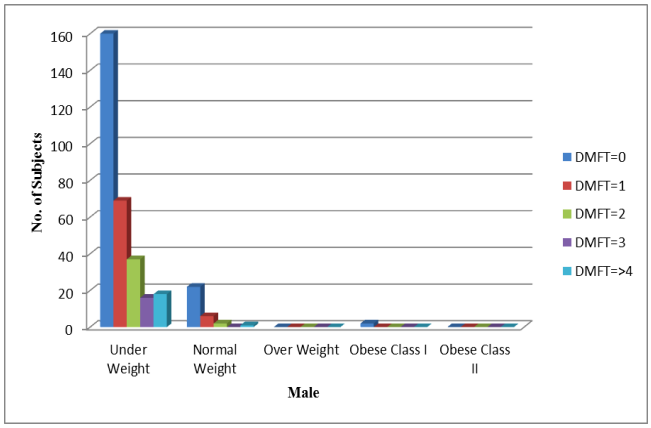


Graphic 1. Correlation between DMFT scores and BMI values in females.

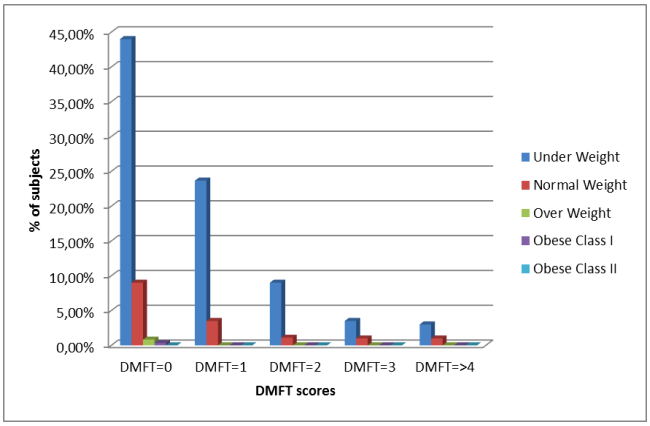
Graph I shows a positive correlation between DMFT and BMI among girls(r=+0.09).

Graph II shows a negative correlation(r=-0.11) between DMFT and BMI among boys.

Graph III shows that majority of subjects who were underweight were caries free (44.0%), followed by 23.67% having DMFT score 1,9% having DMFT score 2 ,3.5% having DMFT score 3 and 3% having a DMFT score of ≥4.Subjects having normal weight with a DMFT score of 0 were 9%,followed by score 1 in 3.50%,score 2 in 1.17% and score 3 and ≥ 4 in 1% each. Only 0.83% of subjects who were overweight had a DMFT score of 0.Similarly only 2% (0.33%) subjects who fall under the category of obese class I had a DMFT score of 0.No significant association was found between DMFT and BMI (p=0.56) rather a negative correlation existed between DMFT and BMI(r=-0.033) and was not statistically significant (p=0.42).



Graphic 2. Correlation between DMFT scores and BMI values among males.



Graphic 3. Correlation between DMFT scores and BMI values among overall 600 school going children.

Discussion

Malnutrition is widely recognized as a major public health problem in developing countries. Growing children in particular are most vulnerable to its consequences[5]. It is estimated that 80% of the total child population of India have high level of dental disease.

Tooth decay is the most prevalent chronic childhood disease affecting 50% of the first graders resulting in almost 52 million missed school hours[6]. Oral health problems not only affects oral health but also has a psychological and emotional impact on the children as they interfere with learning and thus child is not grown upto the full potential.

A cross sectional study was designed to assess the nutritional status and dental caries experience among 12 to 15 year old school going children of Lucknow and to investigate any possible association between the two variables. A total of 600 children attending public schools were examined (333 males and 267 females). Public schools were chosen for the study in order to maintain the homogeneity as these may share similar characteristics probably because overall the sample presented a low socioeconomic level.

The data was collected using a proforma which had 2 parts: the first part is the personal information which facilitates collection of subject's identification, demographic variables, oral hygiene practices, dietary habits and attitude towards dental health. Second part of the proforma consisted of clinical assessment through anthropometric measurement like recording of height and weight for assessing nutritional status using BMI index (for Asians) and dental caries experience using DMFT index

The result of the study revealed that a large proportion of the school children (83.1%) examined were underweight which was not in accordance with Gangadharan et al[7] who reported 34.20% children as underweight. The discrepancy observed was possible due to social class difference between the types of schools studied (public and private schools).High percentage of underweight children is probably because of poor dietary habits and living standards. It was also found that underweight category was more in males compared to females. This result is similar to a study by Kaushik Bose[8] in which the prevalence of underweight was higher in boys (41.8%) as compared to girls (25.2%).

In the present study the mean DMFT for 12-15 year old children was 0.79±1.32.It was seen that mean DMFT scores for boys was higher (0.88±1.32) than for girls (0.69±0.92) and this is similar to the study done by Goel P et al[9] and dissimilar to the study done by Sofi G et al [10].

The value for the DMFT of the entire sample boys and girls are low compared to many population of similar age and sex. Regarding the values observed for the components of the index in the present study.45.83% of the children was represented by decayed and missing component, thereby demonstrating a dire need for dental treatment. Only 1.17% of the children represented the filing component demonstrating the met need of the population. The variance noted between the met and unmet needs of the population may be because of the lack of awareness towards oral hygiene, lack of access to dental care as there are no health services available in the vicinity and also the poor affordability because of lower socioeconomic status.

Regarding the central issue of the study no significant association was found between DMFT and BMI. This is in accordance to Silvia et al[11] and Sudhakar et al[12]. Dissimilar results were obtained in two studies carried out by Peru, Alvarez et al[10,13] who found a statistically significant association between chronic malnutrition and dental caries in children between 8 and 11 years of age. Johansson et al[14] studied Indian children between 8 and 12 years of age and observed the same association in both the primary and permanent dentition.

Results of the present study revealed that predisposition to dental caries were higher among malnourished individuals. The possible explanations in the literature as to why this is so are as follows: defects in the tooth structure may occur during their formation (enamel hypoplasia) and abnormalities may result in salivary flow.

A great variety of systemic and local aetiological factors have been identified as risk factors for hypoplasia and malnutrition is one of the systemic factors[15].

However Rugg-Gunn stressed that a number of studies had correlated malnutrition and low birth weight to enamel hypoplasia in the primary teeth, with one exception[16]. The exception highlighted was the study by Lita al[17], which assessed 1344 Chinese children between 3 and 5 years of age and found through multivariate analysis that premature birth and low birth weight ,but not nutritional status ,were correlated with enamel defects. The explanation for this aspects may be based on the chronology of mineralization of the primary teeth. According to Logan and Kronfeld[18], the beginning of mineralization of the primary teeth occurs while still in the intrauterine period. At birth, the occlusal surface of the molars are already mineralized ,except for the second lower molar, which has a partially mineralized occlusal face and the incisors and canines are at a more advanced phase of calcification. The hypoplastic tooth eventually loses continuity of the enamel surface leaving it rough which is caused by the disintegration of the enamel prisms and the accumulation of debris and microorganisms thus predisposing the tooth to dental caries.

The second factor that could be associated with a higher prevalence of dental caries among malnourished individuals is a reduction in salivary flow as a consequence of abnormalities in the development of salivary glands (Alvarez et al & Johansson et al)[13,14].

However this variable was not taken into consideration in the present study because of the difficulty in standardizing tests of salivary flow.

In this study a negative correlation was found between DMFT and BMI (r=-0.033) which is similar to the finding of a study done by Sudhakar et al[12] in which results showed negatively correlated DMFT and BMI (r=-0.12).

Results of this study also showed a negative correlation between DMFT and BMI for boys (r=-0.11) which is in accordance to the findings by Sudhakar et al[12] which also proved a negative correlation between DMFT and BMI(r= -0.10).

A positive correlation(r=+0.09) between DMFT and BMI existed for girls according to this study which is in contrast with the findings of a study by Sudhakar et al[12] in which a negative correlation (r=-0.14)was observed between DMFT and BMI among girls.

The possible limitation of the present study was a small sample size with a narrow range of age. A larger sample with a wider range of age would have depicted a clear picture of any possible association between DMFT and BMI overall and age wise specifically.

As only public school going children were chosen which represented low socioeconomic status larger population were underweight thus limiting the possibility of analyzing any possible association between DMFT and overweight /Obese.

Conclusions

The study provided evidence that majority of the children under study were malnourished. Hence screening for common health problems and the assessment of nutritional status should be an essential part of school health services.

Early detection and appropriate treatment of malnourished children must be done at the earliest. Children found to have dental caries should be appropriately dealt or referred. School nutritional programmes must be included to improve the health and nutritional status of school children.

Declaration of Interest

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