ORIGINAL ARTICLE

Dental Caries, Body Mass Index, and Socioeconomic Status among Preschoolers in Private Preschools and Anganwadi Centers in Bengaluru City: A Comparative Study

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Abstract

Aim: Preschool is the time when deleterious oral habits, caries pattern, and risk factor are established and is the time to intervene and establish healthy trends which can have a lifelong influence. Individuals living in various socioeconomic conditions have an assortment of hazard factors that impact oral well-being. This work was conducted to study the prevalence of dental caries, body mass index (BMI), and socioeconomic status (SES) among preschoolers in private preschools and Anganwadi centers within Bengaluru.

Materials and methods: This cross-sectional study was conducted in Anganwadis and preschools in Bengaluru city. About 800 students were selected by stratified cluster sampling technique. Written informed consent was obtained before the start of the study. Study proforma was used for the recording of sociodemographic details, anthropometric measurements, decayed, missing and filled teeth (dmft), and decayed, missing and filled surfaces (dmfs) index scoring. Statistical analysis was done using SPSS version 22.0.

Results: The mean dmf (t) score in Anganwadi children was 1.60, whereas in private preschool children mean dmf (t) was 1.16. The mean dmf (s) score in Anganwadi children was 3.05, whereas in private preschool children mean dmf (s) was 1.76. There was a statistically significant difference between the two groups with respect to dmf (s) score ($p = 0.01$).

Conclusion: It was found that there is an association between dental caries, BMI, and SES among Anganwadi children when a linear correlation was done.

Clinical significance: Dental caries can cause serious physical and mental problems in children which affects their quality of life. These problems have their root cause from childhood and are related to their BMI and SES. This can be prevented by giving proper health education and dietary advice to parents.

Keywords: Anganwadi, Body mass index, Comparative study, Dental caries, Preschool, Socioeconomic status.

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Introduction

The field of dentistry has seen major advancements in the early detection and management of risk factors associated with dental diseases, especially in early childhood. Despite the advances in the field of medical science, dental caries keeps on being a significant public health issue in developing countries on account of the absence of education, awareness, and poor financial status.[1]

Preschool is the time when deleterious oral habits, caries pattern, and risk factor are established and is the time to intervene and establish healthy trends which can have a lifelong influence.[2] Several studies have claimed that all children are not at equal risk of developing dental caries.[3] Financial status impacts the sustenance and access to medical care. In developing countries, children experience the ill effects of a double danger of ailing health, with obesity in those living in metropolitan regions and undernourishment in kids from provincial and ghetto regions.[1]

Underweight children would have acute or chronic nutritional stress because of poor financial status and the absence of information about general and oral well-being.[4] Overweight and obese children are at expanded risk for developing psychosocial and medical issues when contrasted with others of typical weight.[5]

Scientists have discovered that individuals living in risky financial conditions are more ideal to be presented to hazard factors that impact oral health issue that is straightforwardly identified with the quality of life.[6] The climate where kids live and grow up has likewise been accounted for as impacting their well-being practices and view of oral health.[7] Subsequently, a cross-sectional study was directed to evaluate the prevalence of dental caries and its association with body mass index (BMI) and socioeconomic status (SES) among preschoolers in private preschools and Anganwadi centers in Bengaluru city.

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Materials and Methods

A cross-sectional study was directed to quantify the prevalence and seriousness of dental caries in 3–5-year-old kids and to contemplate if there is any association between BMI and SES. A list

of Anganwadis was obtained from the department of women and child development and preschools were obtained from Deputy Director of Public Instructions (DDPI), out of that 800 students were selected by stratified cluster sampling technique. The study was carried out from August 2016 to April 2017. Ethical clearance was obtained from the institutional review board before the start of the study.

Children of age range from 3 to 5 years, systemically well and no account of the consumption of medications in the last 3 months were selected for the study. Children with mental disability/retardation, recent hospitalization/serious illness, long-term medication, and children of those parents who do not consent were excluded from the study. Required permissions were taken from Anganwadi centers and preschools and the purpose of the study was explained. Sociodemographic details were recorded using a structured proforma. Documented informed consent was sought from guardians before the beginning of the assessment. Anthropometric estimations were taken preceding dental assessment by the examiner. Dental examination was carried out using mouth mirror and explorer. Body mass index (BMI; weight / height in kg/m^2) was determined in percentiles according to the WHO growth standard for children.[8] Dental caries prevalence was assessed using the dmft and dmfs index by Gruebbel.[9] Socioeconomic status was assessed using Kuppuswamy's scale for the year 2016.[10]

Comparison of family income and SES and BMI status was done using a Chi-square test. The association among dental caries, BMI, and SES among Anganwadi and private preschool children was done using Pearson correlation. Student's *t*-test and Mann–Whitney *U* test and Chi-square test are the other tests used in the study. A *p* value is set at $p < 0.05$. Statistical Package for Social Sciences (SPSS) for Windows, Version 22.0. Released in 2013. Armonk, NY, USA: IBM Corp. was utilized to perform statistical analyzes.

Results

There were 800 children in the study, 400 from Anganwadi, and 400 from private preschool (Table 1). In the Anganwadi group, the majority belonged to the low-income group, whereas in the private preschool group, the majority belonged to the high-income group. Chi-square test is applied to compare the explanatory variables like family income, SES levels. There is a statistically significant difference in family income between both groups (p value ≤ 0.001) (Table 2). Mann–Whitney *U* test is used to compare the mean dmft/dmfs scores between Anganwadi and private preschool children. Comparison of mean dmfs/dmfs scores shows that except for the m (t), all the other mean scores between Anganwadi and private preschool children are statistically significant (Table 3).

On comparison mean BMI scores between Anganwadi and private preschool children using independent Student's *t*-test, mean BMI score was less in Anganwadi children compared to private school children (Fig. 1). Karl Pearson correlation test is used to appraise the relationship between dmft/dmfs, BMI, and SES scores in Anganwadi and preschool children. Linear correlation is done to estimate the plausible link between BMI, SES, and dmft/dmfs. There is a less negative correlation obtained with dmfs score and BMI among Anganwadi children, i.e., as the BMI increases there is a decrease in dmfs score (Fig. 2).

Discussion

Socioeconomic status is an important factor that determines nutrition and growth in a child. Poor dietary status is usually observed among individuals of poor financial status. A less than stellar eating routine is liable for different infections like dental caries. An investigation led by Mahjabeen et al. uncovers a hearty opposite connection between dental caries and weight among ghetto living children of Dhaka. Poverty-stricken individuals do not notice that much consideration regarding the dental issues of their kids since they discover the dental treatment to be extravagant.[11] In addition, needy individuals are unable to give solid and nutritious food to their kids. Because of their poor financial status and low buying influence, they cannot give their kids proper food plentiful in animal protein, nutrients, and minerals which are needed for their development. The absence of a sound eating routine causes extreme insufficiency of vitamin D which further builds the danger of demineralization and causes dental caries.[12]

The mean dmft and dmfs score was higher among Anganwadi children compared to private preschool children. This is in line with a study conducted by Sakeenabi et al. in which the lower SES group had experienced dental caries incidence compared to children from middle and upper SES.[13] In an investigation led by Peltzer et al., it has been accounted for that caries occurrence and augmentation was related to low financial status, e.g., lower family pay and low degree of guardians' schooling having a more seasoned mother or a more youthful mother, single-parent families, higher birth request, and bigger family size. Furthermore, poor parental oral well-being, mothers' nurturing style, maternal mental trouble, and absence of social capital and social help.[14] A group of elements, e.g., low parental instruction level, ethnicity, restricted admittance to services, and backing are related to low SES had been reported as the reason for higher dmft score in low SES children.[15]

The mean f (t)/f (s) was more in private preschool children, whereas there was no f (t)/f (s) component in Anganwadi children. The barriers to obtaining dental treatment may be due to lack of awareness, lack of access to dental care/inaffordability barrier

Table 1: Distribution of study participants based on their age and sex

		Anganwadi		*Private school*	
Variables	*Categories*	*N*	*(%)*	*N*	*(%)*
Age	3 years	165	41.3	204	51.0
	4 years	158	39.5	144	36.0
	5 years	75	19.25	52	13.0
	Total	400	50.0	400	50.0
Sex	Male	180	45.0	193	48.3
	Female	220	55.0	207	51.7
	Total	800	50.0	800	50.0

Table 2: Comparison of distribution of anganwadi and private school children based on their family income and socioeconomic status

		Anganwadi		*Private school*			
Variables	*Categories*	*N*	*%*	*N*	*%*	χ^2 *value*	*p value*
Family income	≤Rs. 2164	0	0.0	0	0.0	785.661	<0.001[a]
	Rs. 2165–6430	186	46.5	0	0.0		
	Rs. 6431–10718	188	47.0	0	0.0		
	Rs. 10719–16077	22	5.5	0	0.0		
	Rs. 16078–21437	2	0.5	8	2.0		
	Rs. 21438–42875	0	0.0	132	33.0		
	≥Rs. 42876	2	0.5	260	65.0		
SES	Lower class	0	0.0	0	0.0	769.525	<0.001[b]
	Upper lower	306	76.5	0	0.0		
	Middle class	92	23.0	6	1.5		
	Upper middle	2	0.5	287	71.8		
	Upper class	0	0.0	107	26.8		

χ^2: Chi-square test
[a,b]*p* value <0.05

Table 3: Comparison of mean dmft/dmfs scores between anganwadi and private preschool children

Variables	*School*	*N*	*Mean*	*SD*	*SEM*	*Mean diff*	*Z*	*p value*
d (t)	Anganwadi	400	1.57	2.66	0.13	0.51	−2.958	0.003[a]
	Private school	400	1.06	2.21	0.11			
m (t)	Anganwadi	400	0.04	0.22	0.01	0.01	−1.806	0.07
	Private school	400	0.03	0.38	0.02			
f (t)	Anganwadi	400	0.00	0.00	0.00	−0.08	−4.165	<0.001[b]
	Private school	400	0.08	0.37	0.02			
dmft	Anganwadi	400	1.60	2.74	0.14	0.44	−2.570	0.01[c]
	Private school	400	1.16	2.34	0.12			
d (s)	Anganwadi	400	2.89	5.22	0.26	1.28	−3.089	0.002[d]
	Private school	400	1.61	3.47	0.17			
m (s)	Anganwadi	400	0.16	1.00	0.05	0.14	−2.523	0.01[e]
	Private school	400	0.02	0.27	0.01			
f (s)	Anganwadi	400	0.00	0.00	0.00	−0.14	−4.165	<0.001[f]
	Private school	400	0.14	0.74	0.04			
dmfs	Anganwadi	400	3.05	5.70	0.29	1.29	−2.832	0.005[g]
	Private school	400	1.76	3.71	0.19			

SD: Standard deviation; *Z*: Mann–Whitney *U* test
[a–g]*p* value <0.05

in obtaining dental treatment, and the probability of being less importance given to dental care. In this study, most of the children in Anganwadi were from the rural and peri-urban areas, so accessibility to dental care also could have been a factor. Low-pay families face a few difficulties getting to and utilizing dental care for their kids, the cost of dental treatments, and guardians' apparent requirement for dental consideration for their kids.[16] The parental perceived need has been discovered to be a critical determinant of care-chasing conduct for kids.[17] One potential clarification is that guardians accept that issues in milk teeth are not significant and that dental care should be looked for just if the youngster has a major issue with outrageous agony.[18]

Obstacles toward attaining and receiving dental care can also due to psychosocial elements. Parental attitude and dental anxiety are the most significant obstructions with regard to dental attendance for younger children. There are many groups of people who are facing access challenges, such as, poor people, poor inner-city residents, and rural area residents. Individuals who live in country territories should make a trip to the closest ward where dental care is accessible.[19]

Among both the groups, obesity and overweight were found to be more among private preschool children, whereas underweight children were found to be more in the Anganwadi group. Children from higher SES families are having easy accessibility to all types of food compared to Anganwadi children. This would have resulted in more obesity and overweight in this group.[20]

The mean height, weight, and BMI were more among private preschool children compared to Anganwadi children. This finding is attributed due to better nutrition and feeding pattern among private preschool children. The proportion of underweight children in Anganwadi was more contrasted with private preschool children. These kids would have intense or constant nutritional strain because

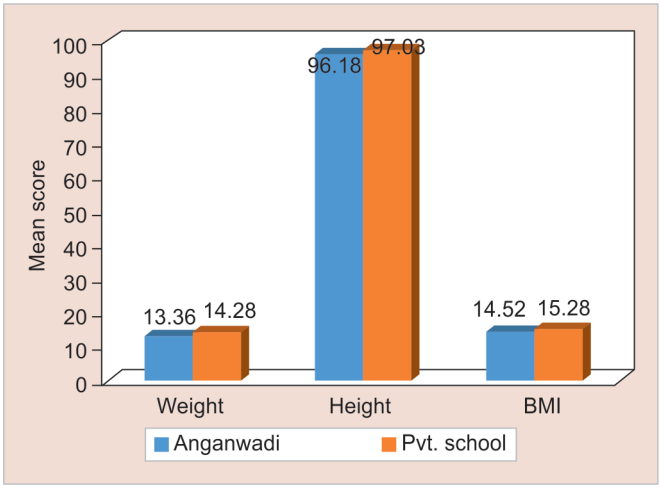

Fig. 1: Comparison of mean BMI scores between Anganwadi and private school children; weight $t = -5.587$; $p \leq 0.001$; height $t = -1.313$; $p = 0.19$; BMI $t = 4.377$; $p \leq 0.001$

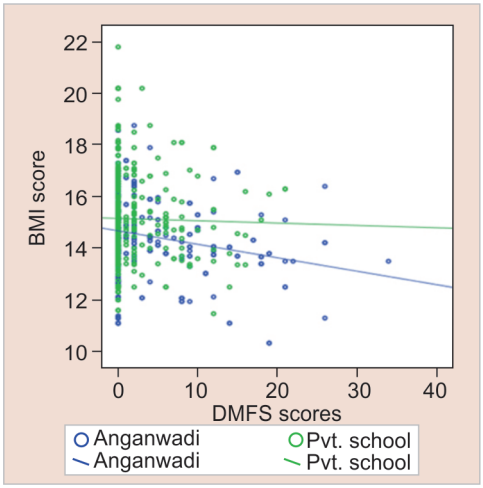

Fig. 2: Scatterplot depicting the relationship between dental decay and BMI scores among Anganwadi and Pvt. school children; BMI: dmfs, $r = -0.21$; $p \leq 0.001$; r = correlation coefficient

of poor financial status and absence of information about general and oral well-being. Consistent training and inspiration of guardians and children can help somewhat to improve their health status.[21]

When linear correlation was applied for dental caries, BMI, and SES among Anganwadi children and private preschool children, a correlation was obtained in the Anganwadi group, but there was no correlation found between dental caries, BMI, and SES among private preschool children. This finding is in line with a study led by Mangukia et al. where the prevalence of dental caries was more in youngsters who were underweight and who had a place with lower financial status.[22] Obesity and dental caries are complex conditions that occur as a result of many contributing elements, such as, biological, hereditary, ecological, and conduct factors. Dietary pattern is also known to influence both obesity and dental caries.[23] Body mass index is broadly utilized as a substitute measure for obesity since it adjusts for a person's height according to weight and is a generally utilized pointer of nutritional status. Given that dental caries and BMI, both estimate diet-related health outcomes with SES as the principal predictor of both an association between them is not surprising.[15] In a study conducted by Prasanth et al., where a greater number of caries was found in private school group people who are from upper socioeconomic status compared to Anganwadi children. It could be because soft drinks and chocolates, which are promptly open, and oftentimes devoured, speak to high sugar source that may add to the potential for dental caries.[4]

The study showed a difference between Anganwadi children and private preschool children in urban and peri-urban areas with respect to SES, dental caries prevalence, nutritional status, oral habits, and treatment-seeking behaviors. This study was conducted in the preschools of urban Bengaluru. It can be extended to rural areas and rural schools to study the sociocultural impact of a rural community on dental caries prevalence. The influence of caregiver/teacher on the oral health behavior of the children was not evaluated as this was beyond the purview of our study. However, this could be explored as a further area of research.

Conclusion

The study was carried out to find the relationship between dental caries, BMI, and SES among Anganwadi children and private preschool children in Bengaluru. It was found that there is a relationship between dental caries, BMI, and SES among Anganwadi children when a linear correlation was done, whereas there was no correlation obtained in private preschool children. The factors BMI and SES have alone or combined effect on dental caries and can influence dmf (t)/dmf (s) score.

Most of the Anganwadi children belonged to lower socioeconomic families and it has an impact on their general health as well as oral health. Poor parental education and lower family income have a barrier toward attaining good oral health. Poor feeding patterns among Anganwadi children also might have resulted in low BMI compared to private preschool children, this could be due to a lack of awareness among parents. Longitudinal studies should be conducted among more children to assess the association between dental caries, BMI, and SES and also other factors that could contribute to dental caries prevalence among Anganwadi children and private preschool children.

Clinical Significance

Malnourishment is a global burden that affects children from both upper and lower classes, but more evident in lower SES children. Obesity and underweight are the two spectrums of malnourishment. Malnourishment during childhood can result in stunted growth. Malnutrition is due to a lack of consuming nutritious food or an inability to consume nutritious food. Inability to consume nutritious food could be due to poor dental health. Poor importance given to primary dentition by parents could be reduced by giving proper education and awareness to the parents.

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