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Prevalence of Early Childhood Caries and its Association with Body Mass Index in children of Rathinamangalam Village

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I. Introduction:

"Oral Health is a mirror of general Health". Any factors affecting the general health also affect the oral health and vice-versa. (1).Proper diet and nutritional status are pre-requisite not onlyfor maintenance of health but also for the proper growth of the child. Though caries is a multi-factorial disease,the role played by Diet in the causation of caries has been well documented (2,3).In some advanced countries, frequent eating of food and high consumption of carbohydrates were reported to be the reason of increasing obesity and dental caries [1,4, 5]. Conversely, in some developing countries dental caries resulted in malnutrition and inability of consuming food[1, 6-8].Severe Early Childhood Caries is one of the conditions in children which generally presents with pain and affects the nutritional status of the child which may also adversely affect the growth of the child. (1, 9) So this study was conceived to know whether children with Severe Early Childhood Caries have a lower Body Mass Index as compared to children without Early Childhood Caries.

II. Aims And Objectives:

The aim of this study was to determine the association of Severe Early Childhood Caries and Body Mass Index for preschool children aged 2.5 - 6 yrs and whether the Body Mass Index of children with Severe Early Childhood Caries is similar or different as compared to children without Early Childhood Caries.

III. Materials And Methods:

This cross sectional study was conducted by the Department of Pedodontics and Preventive Dentistry, Tagore Dental College and Hospital. The Inclusion criteria wereChildren aged 2.5 yrs– 6 yrs, Children with Severe Early Childhood Caries, Children who are Caries free, Children without any positive Medical History or Hospitalization for past 6 months

A total of 2516 patients attending the schools in the vicinity were selected.Dental caries was diagnosed according to WHO criteria using def index. All selected children were clinically examined for dental caries. The examination was carried out using a dental explorer, a mouth mirror. Teeth were considered as decayed when the teeth show clinical signs of caries.Based on dental caries, the subjects were divided into two groups. The caries free group, whose def score was zero; and the Severe Early Childhood Caries group which defines any sign of smooth surface caries in children younger than three years, def score greater than four at age three years, def score greater than five at age four years, or greater than six at age five years.

Anthropometric measurements were recorded by one investigator. Weightassessment was done using a single calibrated scale. Height was measured using a stadiometer by having the subject standing straight without shoes. Body Mass Index (BMI) was calculated using the standard formula – Mass (Kg)/height(m^2). BMI percentile was calculated by using Centre for Disease Control (CDC) Body Mass Index age growth charts which are age and gender specific.

IV. Results:

Total of 2516 students were examined, of which 1379 were males and 1137 were females. 435(17%) patients had severe Early Childhood Caries, of which 230 were males and 205 were females and 2081 patients were free of caries.The difference in the occurrence of SECC between the genders was not statistically significant which is depicted in Table1 and Table 2.

Among the 230 male patients affected by SECC, 149 patients were underweight, 59 were normal weight and 25 were overweight Of the 205 female patients with SECC, 137 were underweight, 50 were normal weight and 18 patients were overweight. Calculating the percentage revealed that 9.8% of patients with Severe Early Childhood Caries were overweight, 25% of children with Severe Early Childhood Caries were within the normal weight range and 65.7% of children with Severe Early Childhood Caries were underweight.Statistical Analysis (Chi-Square Test) has revealed that the proportion of patients with Severe Early Childhood Caries who were underweight was statistically significant ($p< 0.005$) as compared to patients without Severe Early Childhood Caries as depicted in Table 3 and Table4.

TABLE 1 – Chi Square Test for gender comparison

			caries		
			present	absent	Total
group	males	Count	230	1149	1379
		Expected Count	238.4	1140.6	1379.0
		% within group	16.7%	83.3%	100.0%
		% within caries	52.9%	55.2%	54.8%
		% of Total	9.1%	45.7%	54.8%
	females	Count	205	932	1137
		Expected Count	196.6	940.4	1137.0
		% within group	18.0%	82.0%	100.0%
		% within caries	47.1%	44.8%	45.2%
		% of Total	8.1%	37.0%	45.2%
Total		Count	435	2081	2516
		Expected Count	435.0	2081.0	2516.0
		% within group	17.3%	82.7%	100.0%
		% within caries	100.0%	100.0%	100.0%
		% of Total	17.3%	82.7%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.796[a]	1	.372		
Continuity Correction[b]	.704	1	.401		
Likelihood Ratio	.794	1	.373		
Fisher's Exact Test				.397	.201
Linear-by-Linear Association	.795	1	.373		
N of Valid Cases	2516				

TABLE 2 P > 0.005 – Statistically insignificant between gender (Male and Female)

TABLE 3 Chi Square Test Analysis between different categories – underweight, normal weight, overweight

			caries		
			present	absent	Total
group	underweight	Count	283	152	435
		% within group	65.1%	34.9%	100.0%
		% within caries	65.1%	17.5%	33.3%
		% of Total	21.7%	11.6%	33.3%
	normal	Count	109	326	435
		% within group	25.1%	74.9%	100.0%
		% within caries	25.1%	37.5%	33.3%
		% of Total	8.4%	25.0%	33.3%
	overweight	Count	43	392	435
		% within group	9.9%	90.1%	100.0%
		% within caries	9.9%	45.1%	33.3%
		% of Total	3.3%	30.0%	33.3%
Total		Count	435	870	1305
		% within group	33.3%	66.7%	100.0%
		% within caries	100.0%	100.0%	100.0%
		% of Total	33.3%	66.7%	100.0%

TABLE 4 Showing the statistical significance with the number of children with severe early Childhood Caries being underweight as compared to children without Early Childhood Caries

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	318.041[a]	2	.000
Likelihood Ratio	327.935	2	.000
Linear-by-Linear Association	297.703	1	.000
N of Valid Cases	1305		

V. Discussion:

Dental Caries is described as the most common condition whose effects last the life – time of the individual as a restored tooth is never equivalent to the normal and unaffected tooth. Even though the etiology of dental caries can be described by Keyes's triad, there are many other factors which also play an important role in the progress and outcome of the carious process. Severe Early childhood Caries is a pathology which leads to widespread destruction of primary teeth with pulpal involvement resulting in discomfort and pain which can often be the presenting chief complaint of the patient. the involvement of dental and periodontal tissues can have a negative effect on a child's chewing abilities and psychophysical wellness, thus determining a change in what and how he/she eats, and in sleeping habits as well, with substantial negative consequences onweight and height [10,11 12,13,14]

Studies have also reported that children with severe Early Childhood Caries also were underweight and had low BMI. (1,9, 11, 12). Literature has also reported that these patients had weight gain and improved quality of life after receiving the pertinent treatment [1,12,14-15] - The destruction of dental hard tissues and the pain elicited by contact with food and destruction of the dental tissues per se may affect the masticatory abilities of the patient resulting in improper chewing of food. This improper chewing of food in turn impairs the absorption of micronutrients, which play an important role in the growth and development of the child. These chewing troubles lead to a change in the children's diet, (11, 16)And these children tend to prefer liquid, semiliquid, or semi-solid refined foods which are easier to chew and ingest than the solid ones, and give a good, although transient, satiety feeling. This might, in turn, be responsible for a reduced, yet undemonstrated intake of food [11, 16]. Another effect of the new eating habit is that the diet becomes richer in carbohydrates and lipids, but poor in proteins, especially in high-value ones. These types of proteins, complete and well balanced in their amino-acidic profile, are fundamental for children's growth, but are contained in foods with a greater consistency thus requiring a greater chewing activity, in order to make a correct digestion possible and the subsequent absorption of the nutritional factors needed for muscular and skeletal growth [11,17]

Children with SECC may also suffer from inadequate calorie intake (18). Martha Clarke (18) also reported that .children's dietary intake of protein and energy intake may be lower than acceptable and such children could have had low serum albumin values due to the presence of long-term, chronic dental infections.Also reduced levels of Ferritin, Hemoglobin predispose these patients to Iron Deficiency Anaemia, indicating that severe Early Childhood Caries may serve as a risk marker for development of Iron Deficiency Anaemia. [18,19]

It is a well proven fact that optimal levels of growth hormone are needed for proper growth of the child and any alterations in the levels of this hormone can adversely affect the growth of the patient. The levels of circulating growth hormone depend upon the sleeping patterns which get affected in patients with severe Early Childhood Caries.[20.21.22], This may contribute to the growth impairment.

Due to the cross-sectional study design, definitive information about causeand-effect relationships cannot be determined. The sample represented in this study contained the three categories of the BMI in children namely, the underweight category, children within the normal weight range and children in the overweight category, with the results indicating an inverse relationship between Severe Early Childhood Caries and Body Mass Index which was statistically significant indicating that Severe Early Childhood Caries can adversely affect the Body Mass Index . The significance of these results compels the health professionals to educate the public and to conduct motivation programs and aggressively plan preventive and counselling strategies to promote both the oral health and general health of children.

VI. Conclusion:

Rather than a single factor, complex interplay of many factors including dietary behaviour and genetic aspects play an important role in determining the carious state and height and weight of the individual. Further studies may be needed to determine the relationship between Severe Early Childhood Caries, nutritional status which can bring about any alterations in the Body Mass index

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