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Original Research Paper

RELATIONSHIP OF EARLY CHILDHOOD CARIES AND BODY MASS INDEX IN CHILDREN ATTENDING A TERTIARY HEALTH CARE CENTER OF NEPAL

Dental Science

KEYWORDS: Body mass index, Early childhood caries, Nutrition

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ABSTRACT

Introduction: Relationship of early childhood caries (ECC) and nutritional status is controversial. To our knowledge there are no previous studies exploring the relationship between nutritional status and early childhood caries in Nepalese children. Materials and Methods: A cross sectional study was conducted in 208 children of age 3 years to 6 years visiting pediatric dentistry department of Dhulikhel Hospital. Age of each child was recorded along with anthropometric measurements. Oral examination was carried out to record dmft. Results: The mean dmft was 7.03 ± 4.25. Only 2 (1%) children had body mass index (BMI) deficiency. Maximum number of children 172 (82.7%) had normal weight. 26 (12.5%) were overweight and only 8 (3.8%) were obese. There was no statistically significant association of BMI with dmft (p=0.612) or pulp involvement (p=0.540). Conclusion: ECC was not associated with BMI.

INTRODUCTION

Early childhood caries (ECC) is the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger (AAPD, 2014). Children who are suffering from ECC may experience pain, chewing difficulties, speech problems, general health disorders and psychological problems (Mattos-Graner, 1998; Berkowitz, 2003). In fact, chronic dental pain may cause avoidance of foods and lead to malnutrition (Ruhaya H, 2012).

BMI is widely used as a surrogate measure for obesity because it corrects for an individual's height in relation to weight, and is a commonly used indicator of nutritional status. Given that dental caries rates and BMI both measure diet-related health outcomes, an association between the two is not surprising (Hooley M, 2012). Both the caries and nutritional status of children share common risk factors (Sheller B, 2009; Oliveria LB, 2008; Reifsrider E, 2004; Dye BA, 2004). These two common chronic diseases are often influenced by socioeconomic status primarily low income and low parental education levels, overconsumption of carbohydrate rich foods, increased frequency of snaking and health behaviors of children (Davidson K, 2016).

Despite the advances in the field of medical science, dental caries continues to be a major health problem in the developing nations. In the developing nations, children suffer from a dual risk of malnutrition, with obesity in those living in urban areas and under nutrition in children from rural and slum areas (Wang Y, 2002). Studies on nutritional status in relation to dental caries are very limited in Nepal. To our knowledge there is scarcity of literature exploring the relationship between nutritional status and ECC in Nepalese children. So, this study aims at evaluating the relationship of ECC and BMI in children visiting a tertiary health care center of Nepal.

MATERIALS AND METHODS

A cross sectional study was conducted in 208 children of age 3 years to 6 years visiting Pediatric Dentistry department of Dhulikhel Hospital, Kavre, Nepal. Ethical approval for the study was obtained from Institutional Review Committee of Kathmandu University School of Medical Sciences. Only the children with age from 3 to 6 years with no history of any congenital or genetic problems and no any medical history were included. Parental consent was obtained prior to data recording.

Data were collected from January 2016 to July 2016 by a single examiner. General information of each child (name, gender, birthday, day of visit) was recorded using data sheet. The weight and height of each child was also measured according to WHO guidelines (WHO 1995) and the values were recorded and analyzed using the nutritional survey model within WHO's AnthroPlus v1.0.4 software. This software enables the calculation of growth reference data for children by generating z-scores and percentile curves and cut-offs based on the standard deviations (SD) from the median. Children were categorized as severely thin (<–3SD), thin (<–2SD), normal weight (–2SD to +1SD), overweight (>+1SD) or obese (>+2SD) (De Onis M, 2007).

Intraoral examination for each child was done in the dental chair under adequate illumination using mouth mirror and Shepherd's hook explorer (No. 23) to record the child's caries experience as carious, missing or filled primary teeth (dmft) index according to WHO guidelines (WHO,1997). The number of pulpally involved teeth were also recorded based on visual examination along with intraoral periapical radiographs.

All the data was analysed using Statistical Package for Social Sciences (SPSS v 20.0). Descriptive analysis was done to observe the caries experience (dmft), pulp involvement and BMI. According to the z-score obtained children were divided in two categories ≤+1 z-score and >+1 z-score. Caries experience was categorized as dmft<3, dmft≥3 (Edalat A, 2014). Pulp involvement was categorized as pulp involvement absent (0) and pulp involvement present ≥1.

Relationship of BMI with dmft and pulp involvement were analysed using Fisher's exact test. The level of significance was set at ≤*0.05*.

RESULTS

The study population consisted of 119 (57.2%) boys and 89 (42.8%) girls. The average age of children was 56.6 months. The mean dmft was 7.03 ± 4.25 with a range from zero to twenty. Among 208 children, only 18 (8.7%) were caries free and 190 (91.3%) had caries experience. 32 (15.4%) had dmft<3 whereas 176 (84.6%) had dmft≥3. Pulp

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involvement was found in 151 (72.6%) children.
The average BMI was 15.34 ± 1.61 and only 2 (1%) had BMI deficiency. Maximum number of children 172 (82.7%) had normal weight, 26 (12.5%) were overweight and only 8 (3.8%) were obese

No statistically significant association was found between dmft and BMI z-scores *(p=0.612)* (Table 2). Also, there was no statistically significant association of pulp involvement with BMI z-scores *(p=0.540)* (Table3).

Table 1. Prevalence of ECC and nutritional status of children

ECC prevalence	**Mean**	**(Sd)**
Decayed teeth (dt)	6.57	3.87
Missing teeth (mt)	0.43	1.47
Filled teeth (ft)	0.17	0.75
Overall dmft	7.03	4.25
Pulp involvement	2.09	2.24
Caries experience category	**n**	**%**
Caries free (dmf=0)	18	8.7
dmft<3	32	15.4
dmft≥3	176	84.6
Pulp involvement=0	57	27.4
Pulp involvement>0	151	72.6
Nutritional status	**Mean**	**(sd)**
BMI for age	15.34	1.61
SD	3.19	0.50
BMI for age category:	**n**	**%**
Thin	2	1.0
Normal weight	172	82.7
Overweight	26	12.5
Obese	8	3.8
Total	208	100.0

Table 2. Relationship of BMI with caries experience as assessed by dmft

Caries experience	BAZ groups		Total
	Less than/Equal to +1 z-score	More than +1 z-score	
dmft<3	28	4	32
dmft≥3	145	31	176
Total	173	35	208

p=0.612 Fischer's exact test

Table 3. Relationship of BMI with pulp involvement

Pulp involvement	BAZ groups		Total
	Less than/Equal to +1 z-score	More than +1 z-score	
Pulp involvement=0	46	11	57
Pulp involvement≥1	127	24	151
Total	173	35	208

p=0.540 Fischer's exact test

DISCUSSION

The present study showed a very high percentage (91.3%) of children had ECC with mean dmft 7.03 ± 4.25. Oral health pathfinder survey of Nepal reported approximately 58% of children at age 5-6 years experienced dental caries (Yee R and Mishra P, 2006). The high dmft may be attributed to changing dietary habits of children as frequent intake of snacks, sweet foods and soft drinks. Most of the children that visited the dental hospital required treatment of carious teeth due to which such a large percentage of children were seen as having ECC in this study.

In the present study, maximum number of children 172 (82.7%) had normal weight. There was no significant association of ECC with BMI. This is similar to the other studies conducted globally (Edalat A ,2014; Hong L, 2008; Chen W, 1998; Dye BA, 2004; Macek MD, 2006; Shellar B, 2009; Tripathi S, 2010).

According to the previous literature, the relationship of ECC with BMI is controversial. Some studies reported that ECC was associated with higher BMI (Davidson K, 2016; Bhoomika W, 2013; Reifsrider E, 2004; Bagherian A and Sadhegi M, 2013; Sharma A and Hegde AM, 2009). In contrast to the above, few studies found that children with severe ECC were more likely to be underweight (Gaur S and Nayak R, 2011; Oliveria LB, 2008; Miller J , 1982).

The present study did not show any association of BMI with pulp involvement which was similar to the findings reported by Shellar B (2009). A study with a population of Filipino adolescents showed that PUFA index (pulp involvement, fistula, abscess) was significantly associated with low BMI (Benzian H, 2011).

Limitation of this study is that the convenience sampling was done; therefore sampling bias could have occurred as randomization was not carried out. Since the study was a hospital based, generalizability is low.

CONCLUSION

There was no significant association of ECC with BMI. This study gives a broad overview of the association between ECC and BMI of children and can be used as a reference for planning further studies in a larger population of Nepal.

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