

Original Research

Association between healthy eating index, body mass index and early childhood caries in school children

Vidyut Prince¹, Purvi Fulmali², Vivek Singhai³, Anmol Bagaria⁴, Yesh Sharma⁵, Vibhor Azad⁶

¹Assistant professor, MGM medical college and LSK hospital, Kishanganj, Bihar, India;

²Department of Research, Junior Research Fellow, Sumandeep Vidyapeeth, Vadodara, Gujarat, India;

³Private Practitioner, Bhopal, Madhya Pradesh, India;

⁴Private practitioner, Mumbai, Maharashtra, India;

⁵Department of Conservative Dentistry & Dentistry, Maharaja Ganga Singh Dental College Sriganganagar, Rajasthan; India;

⁶Awadh Dental College Jamshedpur, Jharkhand, India

ABSTRACT:

Background: Dental caries affects almost all age groups, but the presence of caries in young children is an important concern than that of elderly people. The present study was conducted to assess association between healthy eating index, body mass index and early childhood caries in school children. **Materials & Methods:** The present study was conducted on 230 school children of 5-7 years of both genders. Caries were recorded based on the WHO criteria (1997); decayed, missing, and filled teeth (dmft) scores were used to calculate caries experience. Healthy Eating Index (HEI) was recorded. Body mass index was assessed as BMI = Weight in kg/ Height in m. **Results:** 5 years had 85 children, 6 years had 80 and 7 years had 65 children. The difference was significant ($P < 0.05$). The mean dmft score of obese was 10.3, overweight was 10.5, normal had 7.9 and underweight had 4.3. The difference was significant ($P < 0.05$). The mean HEI of severe ECC children was 48.8 and in simple ECC was 53.0. The difference was significant ($P < 0.05$). **Conclusion:** Authors found positive correlation between BMI scores and ECC. There was higher rate of dental caries in overweight children. Diet was considered risk factor for dental caries and obesity.

Key words: Caries, healthy eating index, overweight.

Received: 26 October, 2019

Revised: 21 November, 2019

Accepted: 23 November, 2019

Corresponding Author: Dr. Vivek Singhai, Private Practitioner, Bhopal, Madhya Pradesh, India

This article may be cited as: Prince V, Fulmali P, Singhai V, Bagaria A, Sharma Y, Azad V. Association between healthy eating index, body mass index and early childhood caries in school children. J Adv Med Dent Scie Res 2020;8(1): 86-89.

INTRODUCTION

Early childhood caries (ECC), which results from a chronic imbalance between multiple risk factors and protective factors, remains a public health problem in many communities.¹ The development of new carious lesions in both primary and permanent dentitions, increased treatment costs, delayed physical growth and development, loss of school days, increased numbers of days with restricted activity and a diminished ability to learn are consequences of ECC.² The negative impact of severe forms of ECC on the quality of life of young children and their families has

been documented in the literature and can require dental rehabilitation under general anesthesia.³

Dental caries affects almost all age groups, but the presence of caries in young children is an important concern than that of elderly people. Early childhood caries can rapidly destroy the primary dentition of toddlers and small children affecting their general health, growth patterns, and quality of life, and if left untreated can lead to pain, acute infection, and premature loss of deciduous teeth, malocclusion, nutritional insufficiencies, and speech problems.⁴

Diet plays an important role in the causation of caries. The Healthy Eating Index (HEI) is one index of overall diet quality based on the food pyramid where 24 h dietary recall is used, and it is comprised 10 component scores, each ranging from 0 (poor) to 10 (good). Nutrition is one of the basic requirements of any living organism to grow and sustain life.⁵ The present study was conducted to assess association between healthy eating index, body mass index and early childhood caries in school children.

MATERIALS & METHODS

The present study was conducted in the department of Pedodontics. It comprised of 230 school children of 5-7 years of both genders. Parents were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

General data such as name, age, gender etc. was recorded. A thorough oral examination was done in all children. Caries were recorded based on the WHO criteria (1997); decayed, missing, and filled teeth (dmft) scores were used to calculate caries experience. Healthy Eating Index (HEI) was recorded. The HEI is composed of ten components, each representing different aspects of a healthful diet. The HEI is a sum of the components with a possible score of 0–100. Each of the ten dietary components has a scoring range of 0–10. An HEI score over eighty implies a “good” diet, an HEI score between 51 and 80 implies a diet that “needs improvement,” and an HEI score <51 implies a “poor” diet.

Body mass index was assessed as BMI = Weight in kg/ Height in m.² Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant (P< 0.05).

RESULTS

Table I Distribution of patients

Age group (Years)	Number	P value
5	85	0.05
6	80	
7	65	

Table I shows that 5 years had 85 children, 6 years had 80 and 7 years had 65 children. The difference was significant (P< 0.05).

Table II Distribution of children based on BMI and dmft index

	Obese (15)	Overweight (85)	Normal (110)	Underweight (20)	P value
Decayed	10.2	9.6	7.5	4.3	0.12
Missing	0.0	0.8	0.3	0.0	0.34
Filled	0.12	0.11	0.14	0.0	0.16
dmft	10.3	10.5	7.9	4.3	0.01

Table II, graph I shows that mean dmft score of obese was 10.3, overweight was 10.5, normal had 7.9 and underweight had 4.3. The difference was significant (P< 0.05).

Graph I Distribution of children based on BMI and dmft index

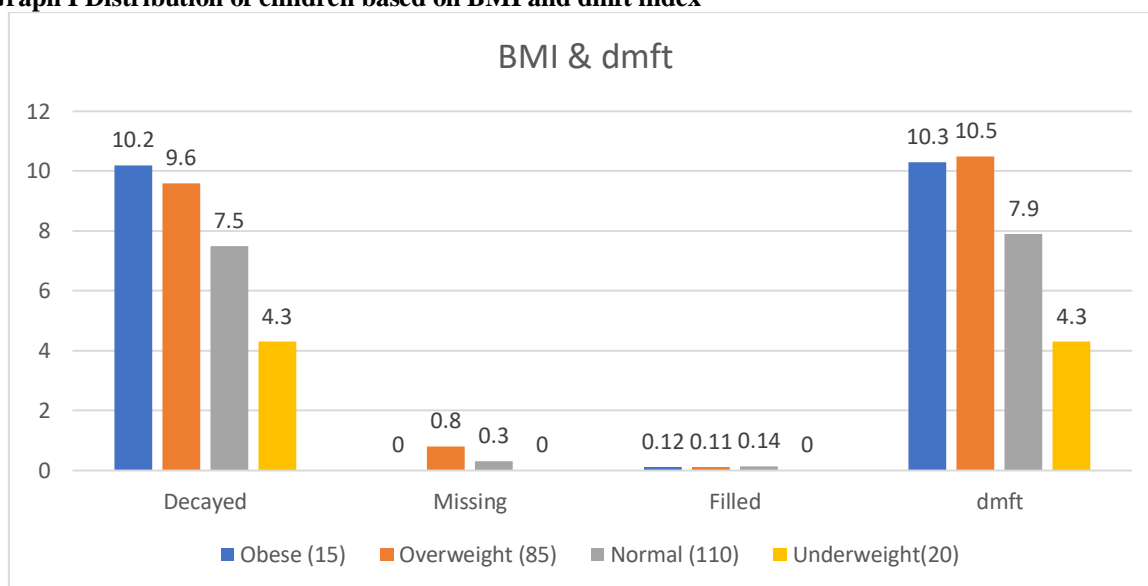


Table III Distribution of children based on HEI and early childhood caries

	Severe ECC	Simple ECC	P value
Grain	1.4	7.2	0.01
Vegetables	0.5	0.6	0.91
Fruit	1.21	0.4	0.05
Milk	1.63	1.7	0.93
Meat/Dal	4.7	3.2	0.08
Total Fat	8.7	9.7	0.12
Saturated Fat	9.12	9.6	0.01
Cholesterol	10.5	10.1	0.91
Sodium	10.3	10.5	0.92
Sugar	0.8	0.0	0.05
HEI score	48.8	53.0	0.04

Table III shows that mean HEI of severe ECC children was 48.8 and in simple ECC was 53.0. The difference was significant ($P < 0.05$).

DISCUSSION

Factors affecting the onset of carious lesions include oral hygiene, diet composition and frequency, socioeconomic status, salivary immunoglobulin, bacterial load, and fluoride intake.⁶ ECC can be a particularly virulent form of caries beginning soon after tooth eruption, developing on smooth surfaces progressing rapidly, and having a lasting detrimental impact on the dentition being detrimental to the general health; however, it significantly influences the quality of life and dietary intake of children, especially when it is associated with pain and discomfort.⁷

In present study 5 years had 85 children, 6 years had 80 and 7 years had 65 children. Vundavalli et al⁸ conducted a study on 350 schoolchildren. Caries experience was recorded using decayed, missing, and filled teeth (dmft) index (WHO criteria 1997); various anthropometric measures such as weight, BMI, and height were recorded as per the standard guidelines. A total of 350 male participants participated in the study, with the age range of 5–6 years and the mean age being 5.4 ± 0.7 . The prevalence of ECC in the study population was 87%. The mean dmft values for each BMI category among the underweight, normal, overweight, and obese children were 4.73, 7.8, 9.4, and 10.8, respectively. The mean intake of grains was 1.9, vegetables 0.61, fruits 1.31; milk 1.78, meat/dal 4.8, total fat 9.9, saturated fat 9.9, cholesterol 10 refined carbohydrates 10, and variety 0.17 in children with severe ECC (S-ECC). Overall mean HEI score was significantly higher in children with S-ECC compared to simple ECC low (43.25 ± 3.44 vs. 57.46 ± 4.12), and HEI and dmft values were negatively correlated.

We found that mean dmft score of obese was 10.3, overweight was 10.5, normal had 7.9 and underweight had 4.3. The mean HEI of severe ECC children was 48.8 and in simple ECC was 53.0. Ashour et al⁹ study consisted of 269 caregiver-child dyads, 88.5% of whom were included in the Family Health Program. Caregivers were mostly mothers (67.7%), were 35.3 ± 10.0 years old on average and had 9.8 ± 3.1 years of formal education. The mean family income was $2.3 \pm$

1.5 times greater than the Brazilian minimum wage. On average, the children in the current study were 68.7 ± 3.8 months old. Of these, 51.7% were boys, 23.4% were overweight or obese, 45.0% had active ECC, and 17.1% had severe ECC. The average body mass index (BMI) of the children was 15.9 ± 2.2 , and their dmft index was 2.5 ± 3.2 . BMI was not associated with any of the three categories of dental caries ($p > 0.05$). In contrast, higher family incomes were significantly associated with the lack of caries experience in children, but the mother's level of education was not significantly associated with ECC. Alghamdi et al¹⁰ conducted a study among 350 children of both genders. Maximum number of participants (69%) were with normal BMI- for-age followed by underweight, overweight, and obese categories. The mean dmft values for each BMI category among the underweight, normal, overweight, and obese children were 4.9 ± 4.0 , 4.6 ± 3.3 , 2.7 ± 1.9 , and 4.4 ± 3.0 , respectively, which was statistically not significant.

CONCLUSION

Authors found positive correlation between BMI scores and ECC. There was higher rate of dental caries in overweight children. Diet was considered risk factor for dental caries and obesity.

REFERENCES

- Mishra BK, Mishra S. Nutritional anthropometry and preschool child feeding practices in working mothers of central Orissa. *Home Comm Sci* 2007;1:139-44.
- Bansal K, Goyal M, Dhingra R. Association of severe early childhood caries with iron deficiency anemia. *J Indian Soc Pedod Prev Dent* 2016;34:36-42.
- Farooqi FA, Khabeer A, Moheet IA, Khan SQ, Farooq I, ArRejaie AS, et al. Prevalence of dental caries in primary and permanent teeth and its relation with tooth brushing habits among schoolchildren in Eastern Saudi Arabia. *Saudi Med J* 2015;36:737-42.
- Gopal S, Chandrappa V, Kadidal U, Rayala C, Vegesna M. Prevalence and predictors of early childhood caries in 3-to 6-year-old South Indian children – A

- cross-sectional descriptive study. *Oral Health Prev Dent* 2016;14:267-73.
5. Tripathi S, Kiran K, Kamala BK. Relationship between obesity and dental caries in children-A preliminary study. *J Int Oral Health* 2010;2:65-72.
 6. Guenther PM, Kirkpatrick SI, Reedy J, Krebs-Smith SM, Buckman DW, Dodd KW, *et al.* The healthy eating index-2010 is a valid and reliable measure of diet quality according to the 2010 dietary guidelines for Americans. *J Nutr* 2014;144:399-407.
 7. Al-Ansari AA. Prevalence, severity, and secular trends of dental caries among various Saudi populations: A literature review. *Saudi J Med Med Sci* 2014;2:142-50.
 8. Vundavalli S, Nagarajappa AK, Doppalapudi R, Alhabarti AS, Aleiadah AS, Alruwili MN. Association between healthy eating index, body mass index, and early childhood caries in schoolchildren of Sakaka, KSA: A case-control study. *J Indian Assoc Public Health Dent* 2019;17:306-12.
 9. Ashour NA, Ashour AA, Basha S. Association between body mass index and dental caries among special care female children in Makkah City. *Ann Saudi Med* 2018;38:28-35.
 10. Alghamdi AA, Almahdy A. Association between dental caries and body mass index in schoolchildren aged between 14 and 16 years in Riyadh, Saudi Arabia. *J Clin Med Res* 2017;9:981-6