Original Article

"Is there is any relationship between malocclusion and nutritional pattern of children"

Saeed Hossain Khan[1] , * Md Nazmul Hasan[2], Sakiba Anjum[3], Tanzila Rafique[4]

1. Assistant Professor, Department of Dental Surgery, BIRDEM General Hospital, Shahbag, Dhaka, Bangladesh
2. Senior Lecturer, Department of Orthodontics, School of Dental Sciences, Health Campus, University Sains Malaysia, Malaysia.
3. Scientific Officer, Applied Nutrition Research Section, Institute of Food Science and Technology, Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh.
4. Medical Officer, Department of Orthodontics, Faculty of Dentistry, Bnagabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

ARTICLE INFO

Article history:
Received: 14 March 2014
Accepted: 07 June 2014

Key words:
Malocclusion,
Malnutrition,
Energy Protein Malnutrition (EPM),
Orthodontic.

Abstracts:

Objective: Malnutrition of children results the underdevelopment of skeleton and facial structure, which might causes the malocclusion in developing dentitions. The study was aimed to investigate the relationship between the malocclusion and malnutrition. **Method:** Cross-sectional observational study was done with structured questioner from 627 school children (276 male, 349 female) of 7 to 15years age. Variable were set according to WHO guideline of malocclusion and malnutrition. **Result:** Among the study populations subject with malnutrition, having persistent digit sucking habit of more than 6years of age has been associated with malocclusion (OR = 3.1; 95%CI). **Conclusion:** No association was reported between malnutrition and malocclusion.

Introductions:

Crowded, irregular and protruding teeth, collectively termed as malocclusion, have been a problem since antiquity, and attempts to correct these disorders go back to at least 1000 BC. Developmental anomalies of the dentition are frequently observed among the orthodontic patients. Anomalies in tooth number, shape, and position may lead to the disturbances in maxillary and mandibular arch length and occlusion complicating orthodontic treatment planning[1]. Evidence suggests that energy-protein malnutrition is associated with impaired growth and development of bones. Malnutrition is a multifactorial disease that can have an early onset during intrauterine life or childhood or can occur during an individual's lifetime as a result of poor nutrition and/or repeated episodes of infectious or chronic diseases[2]. The highest rates of energy-protein

Address of Correspondence :
Dr. Md Nazmul Hasan
Senior Lecturer, Department of Orthodontics,
School of Dental Sciences, Health Campus,
University Sains Malaysia,
16150 Kubang Kerian, Kelantan, Malaysia
Phone: +61116874961
Email: mnhasan@usm.my
nazmul2030@gmail.com

malnutrition (EPM) are recorded in developing countries[3] and represent a major nutritional problem, both because of their magnitude and the health disorders they give rise to[2,4] . Evidence suggests that energy-protein malnutrition acts by either exacerbating an existing morbidity or contributing to the emergence of associated comorbidities. In the field of oral health, the association between malnutrition and impaired growth and the development of facial bones has been reported by researcher [5] and has been linked to a reduction in the length of the skull base and jaw height [6]. There have also been reports of variations in maxilla-mandibular width, lower facial height [5] as a result of malnutrition. Malnutrition acts by either exacerbating an existing morbidity or contributing to the emergence of associated comorbidities. In the field of oral health, the association between malnutrition and impaired growth and the development of facial bones has been reported by a number of researchers[5] and has been linked to a reduction in the length of the skull base and jaw height[6]. There have also been reports of variations in maxilla-mandibular width, lower facial height [5] as a result of malnutrition.
Though tooth tissue discrepancy has already been reported by researcher[7] as a possible etiological factor of malocclusion, however, based on above studies [5,6] the role of malnutrition could not be ruled out. Moreover animal studies[8] also suggest that reduction in the size of jaw is with protein and calories malnutrition. Based on above studies there might be a relationship between malnutrition and malocclusion. Therefore the aim of our present study is to evaluate the relationship from the survey done in the different dental camp among school children of Bangladeshi populations (7-15 years).

Materials and Methods:

The study was a cross sectional population based study, conducted among the school children of sirajgong, Bangladesh during January 2012 to June 2012. Each subjects were completed a questionnaire and were invited to participate in a detailed personal interview and clinical examination in an oral health camp arranged by researchers. Student aged 7 to 15years old who are mostly studying at primary and early secondary school in public or private sector, having their first permanent molar teeth and central incisor teeth present in their mouth to establish the malocclusion group. The excluded individuals are those who refused to submit the voluntary informed-consent form, adolescent with any type of physically handicap or history of any type of trauma to head region, and those having reported to have received any type of orthodontic treatment previously. From the student attending the camp those who diagnosed having any short of malocclusion were evaluated the nutritional status form.

The dental examinations were under taken with routine dental examination instrument (dental mirror, periodontal probe) to diagnose the malocclusion. Dental malocclusion was defined according to the World Health Organization (WHO)[9] as a misalignment in the teeth position (in millimeters), using the WHO periodontal probe. It was the dependent variable and, to these analyses, it was classified as present (in one or both arcades) or absent (in neither arcade). There were two main independent variables assessing the nutritional status of adolescents: nutritional status according to the BMI and height-for-age indexes. The authors acknowledge that assessment of the nutritional status of adolescents is made difficult by variations in growth, by the extent to which the adolescents had grown in previous periods of life and by the intricate relationship between sexual maturation and hormonal factors during this period of life[10]. Nevertheless, the WHO recommends the body mass index (BMI) and height-for-age index as suitable indicators for evaluating the nutritional status of adolescents, and these were used in this study.

The SPSS data analysis software was used to perform all statistical analysis (version 15.0, SPSS Inc.). To see the association between each variables data were analyzed by using the Student's t-test and the Chi-square test.

Results:

627 school-aged children were examined (276 male and 349 female). Data were collected with structured questioner with the researchers. The return rate for questionnaires sent to adolescents and their guardian were 100%, however some question they could not answer specifically or correctly or that were not filled out completely reported as missing information.

There was a greater prevalence of dental malocclusion among adolescents with high BMI than among adolescents with normal BMI-for-age (OR = 0.66). No variation in the distribution of dental malocclusion with nutritional status as measured by height-for-age was observed (OR = 1.13). In addition, bottle feeding for more than one year acted as a statistically significant potential risk factor for dental crowding (OR = 1.42). Breast-feeding and digit sucking were kept in the multivariate models even without showing statistical significance in the multivariate model due to theoretical reasons.

The data on malocclusion, nutritional status, demographic information, behavioral information are tabulated in Table 1.

Table 1: Frequency distributions and univariate analysis of association between dental malocclusion and nutritional status, demographic, behavioral characteristic among adoloscents in Shirajgong, Bangladesh.

Variable	**Malocclusion**					
	No		**Yes**		**p Value**	**OR****
	n	%	n	%		
BMI					0.03*****	
Normal BMI for age	260	77.5	237	79.9	0.66*****	0.66
Over weight	39	14.9	36	10.0		1.00
Under weight	24	7.6	28	10.1		1.28
Height for age						
Tall/ Normal	323	76.0	223	73.8	0.30*****	1.00
Malnourished	78	24.0	78	26.2		1.13
Gender					0.68*****	
Male	141	43.6	135	44.7		1.00
Female	183	56.4	166	55.3		0.95
Breast Feeding					0.53*****	
Never up-to 12 month of age	193	72.5	193	74.7		1.00
Up-to or more then 12 month of age	73	27.5	65	25.3		0.66
No information	57	---	43	---		
Bottle Feeding					0.02*****	
Never up-to 12 month of age	49	17.9	34	13.3		1.00
Up-to or more then 12 month of age	221	82.1	218	87.6		1.42
No information	53	---	49	---		
Digit Sucking					0.80*****	
Never up-to 6 years of age	245	87.5	212	86.9		1.00
Up-to or more then 6 years of age	35	12.5	31	13.3		1.05
No information	43	---	58	---		

***** Pearson chi-square test.

******Unadjusted Odds ratio.

There was an interaction between mouth breathing and malnutrition, as measured by the anthropometric height-for-age index. So the effect of malnutrition on dental malocclusion was modified by mouth breathing. After

adjustment for confounding variables, a statistically significant association between low height-for-age and dental malocclusion (OR = 3.1) was only observed among adolescents with a history of digit sucking for a longer time (until the age of 6 or longer). (Table 2)

Table 2: Odds ratio for dental malocclusion and the respective 95% confidence intervals for combined nutritional status (according to height-for-age) and history of digit sucking.

	OR*	95%CI	p-value
No history of digit sucking up-to 6 years of age	1.28	0.78-2.09	0.32
History of digit sucking up-to after 6years of age	3.10	1.56-6.09	<0.001

*OR= odds ratio; 95%CI = 95% confidence interval.

Discussions:

In our present study we could no able to establish any relationship between under weight, under hight and malocclusion in permanent dentition. This association we observed among those had a digit sucking habit for longer period of time of more than 6years of age.

There is some evidence in animal models that support the hypothesis of association between malnutrition and malocclusion rats[8]. The authors observed that dietary deficiencies of protein and calorie have effects on the reduction of the growth of jaws and of the space available for the teeth in these animals, resulting on increase of crowding in the experimental animals[8]. It may indicate that malnutrition changes the growth pattern of the bones of the skeleton, including those of the face and oral cavity.

Though this cross-sectional study was suitable for investigating the relationship between variables, however this study result could not reveal any suitable outcome may be due to recall bias when the subject or subjects attendant are attempting to remember the prior exposures. Moreover recall bias may have may have affected aome confounding variables.

Moreover malocclusion classification in this study were conducted on occlusion relationship while examining the subject in the dental camp, it would be more specific to measure that by cephalometric analysis for that described populations[8]. Another possible reason for not having any suitable outcome might be due to the other aetiological factor of malocclusion previously described on this population[12,13].

Conclusions:

It is justified to state that poor health status and malnutrition may contribute to bad oral health and malocclusion. However our study only reveals that nutritional deficiency persistent digit sucking habit could contribute to malocclusion in future dentition. Therefore policy action should be taken to maintain improve such venerable group. Moreover due to limitations of the study, further study are needed to emphasis the finding of this study finding and improve the understanding of the subject.

References:

1. Rafique T, Hassan GS, Hasan MN, Khan SH. Prevailing status and treatment seeking

awareness among patients attending in the orthodontic department of BSMMU. BSMMU J, 2011; 4(2): 94-98.
2. Brasília MS, DF Brazil; Manual de atendimento da criança com desnutrição grave em nível hospitalar. 2005.
3. UNICEF. Progress for children: A world fit for children statistical review. UNICEF: New York, NY, USA, 2007; Available online: http://www.unicef.org/publications/files/Progress_for_Children_No_6_revised.pdf (accessed on 12 August 2014).
4. World Health Organization. Diet, Nutrition and the Prevention of Chronic Diseases: Report of a Joint WHO/FAO Expert Consultation; WHO: Geneva, Switzerland, 2003.
5. Songvasin, C. Early mal-nutrition and craniofacial growth. In Proceedings of the 72th General Session of the International Association for Dental Research, Seattle, WA, USA, 1994; JDR: Alexandria, VA, USA, 1994.
6. Weissman, S. Craniofacial growth and development in nutritionally compromised peruvian children. In Proceedings of the 71th General Session of the International Association for Dental Research, Chicago, IL, USA, 1993; JDR: Alexandria, VA, USA, 1994.
7. Hasan MN , Chowdhury SS, Khan MAA, Taleb A, Abid MMA. Tooth-size discrepancy – An important diagnostic tool to measure the outcome of orthodontic treatment completion: A Review. Bangladesh Journal of Dental Research & Education, 2011; 1(1): 27-29.
8. DiOrio LP, Miller SA, Navia, JM. The separate effects of protein and calorie malnutrition on the development and growth of rat bones and teeth. J. Nutr. 1973, 103, 856–865.
9. World Health Organization. Oral Health Surveys: Basic Methods, 4th ed.; ORH/EPID: Geneva, Switzerland, 1997.
10. World Health Organization. Physical Status: The Use and Interpretation of Anthropometry; WHO: Geneva, Switzerland, 1995.
11. Hasan MN, Hassan GS, Rafique T, Taleb A. Comparisons of craniofacial profiles evaluations of Bangladeshi adults by lateral cephalometry with down's analysis. Bangladesh Journal of Dental Research & Education, 2014;4(1): 12-15.
12. Khan SH, Hassan GS, Rafique T, Hasan MN , Russel SH. Mesiodistal crown dimension of permanent teeth in bangladeshi population; BSMMU J, 2011; 4(2): 81-87.
13. Hasan MN, Chowdhury SS, Khan MAA, Taleb A, Abid MMA. Tooth-size discrepancy – An important diagnostic tool to measure the outcome of orthodontic treatment completion: A Review. Bangladesh Journal of Dental Research & Education, 2011; 1(1): 27-29