

# A cross sectional study to assess the prevalence of malocclusion in 08-12 years old school age children of the selected urban & rural community of Bangladesh

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## ABSTRACT:

**Objective:** To determine the prevalence of malocclusion in school-age children from a selective area of the urban and rural community of Bangladesh.

**Methods:** A cross-sectional descriptive survey was conducted among 748 children aged 08-12 years old were examined from October 2019 to September 2020 in Sylhet Sardar Upazila, Bangladesh. Angle's classification was used for recording molar relationship with malocclusion traits. The study participants were examined by disposable dental tools (calibrated prods and mirror) including torchlight. After the collection of all data, it was compiled and analyzed by Statistical Package for the Social Sciences (SPSS) Windows version 23. Chi-square test was used for categorical variables. P values <0.05 was considered as statistically significant.

**Result:** The prevalence of malocclusion in urban school-age children was 237(63.4%) and in rural 213(57.0%). In urban area, the prevalence of malocclusion was 109(58.3%) in boys and 128(68.4%) in girls group. The majority (70.5%) were found Angle's class I in urban group and 148(69.5%) in rural. One forty three (60.3%) patients were found increased overbite with malocclusion in urban group and 124(58.2%) in rural. Angle's class-I malocclusion and Increased overbite were the most commonly occurring malocclusion.

**Conclusion:** Prevalence of malocclusion was more in urban school age children when compared with rural. Malocclusion was significantly more in girls than boys in both urban and rural area. Angle's class-I malocclusion and Increased overbite were the most commonly occurring malocclusion of school age children from a selected urban and rural community of Bangladesh.

**KEYWORDS:** rural, urban, angle's classification, malocclusion, overbite.

## INTRODUCTION

Malocclusion as a word means bad bite<sup>1</sup>. Malocclusion can be defined as an occlusion in which there is a mal-relationship between the arches in any of the planes or where there are anomalies in tooth position, number, form, and developmental position of teeth beyond normal limits<sup>2</sup>. The term malocclusion is a derivative of occlusion which is the contact relationship between upper and lower teeth when the mouth is fully closed as well as the relationship of the teeth within the same jaw. It may be primary which arise in the developing dentition or secondary, which arise in the adult as a result of tooth loss and consequent adjacent tooth movement<sup>3</sup>. The factors responsible for malocclusion include genetic and environmental factors, or a combination of both along with various local factors such as adverse or deleterious

oral habits<sup>4</sup>. Malocclusion ranks second among the common dental diseases in children and young adults, next to dental caries<sup>5</sup>. Malocclusion is not a disease, but a developmental condition representing biological diversity. It is basically the clinically significant variations from normal morphology and range of growth. Malocclusion may be the result of a combination of minor variations from the normal and these combinations add on to produce a clinical problem<sup>6</sup>. Malocclusion can cause psychosocial problems related to impaired dentofacial esthetics<sup>7</sup>. It may also lead to problems of oral cavity (traumatic bite and cheek bite), and it may also be one of the factors of social embarrassment. The uptake of orthodontic treatment is influenced by the desire to look attractive, self-esteem, and self-perception of dental appearance<sup>8</sup>.

An Indian study reported the prevalence of malocclusion to be higher in urban (20.8%) than rural (14.8%) and more prevalent in Girls school children (21.8%) than Boys (13.2%)<sup>9</sup>. Another study in district Peshawar reported the difference in prevalence of malocclusion in rural and urban areas. The distinction in predominance of malocclusion in rural and urban younger students (60% versus 55%) was non-significant. In rural region, the predominance of malocclusion was 50.67% in Boys and 72.73% in Girls, while in urban it was 44.20% in Boys and 67.21% in Girls. The distinction in the commonness of malocclusion in boys and girls of two regions (rural and urban) was profoundly huge significant. The most common traits of malocclusion were Angle's class I and overcrowding. The least malocclusion was Angle's class III (3.85% & 6.29%)<sup>10</sup>.

A cross sectional study was carried out to explore the prevalence of malocclusion among the age group of 15-25 years in Bangladeshi population. Among the respondent 82.6% have class I molar relation, 12.06% class II and 5.34 % class III molar relation<sup>11</sup>. In another Bangladeshi study revealed that among the study population females were 57.1% and the males were 42.1%. Among them, 6.7% belonged to 6 to 11 years, 20.5% belonged to 12 to 17 years and the remaining 72.8% were of 18-35 years of age. Angles Class I malocclusion was seen to be the most prevalent (64.2%). In incisor classification, Class I malocclusion was seen to be the most prevalent (38.3%). Increase in overjet, deep overbite, crossbite, crowding and spacing were found in 35.34%, 40.3%, 24.3%, 58.2% and 38.5% of the patients respectively in the department of Orthodontics and Dentofacial Orthopedics in Sapporo Dental College and Hospital from January 2013 to February 2018<sup>12</sup>.

Developing nations like Bangladesh face numerous difficulties in rendering oral human services as most of the populace lives in rural regions where oral health projects and preventive measures are a long way from fulfilling needs. Bangladesh being a developing country, there are still remote villages unaware of the advances in various fields; one such being

orthodontics. The objective of this study to assess prevalence of malocclusion in rural and urban school children of selected community of Bangladesh. Planning and implementation of future school based awareness program can be carried out and their population can be benefitted by this study. So that preventive and early orthodontic treatment can be given earlier to school age children.

## METHODOLOGY

A total of 748 school going children from two different area urban (city) and rural (village) area of Sylhet Sadar Upazila in Sylhet district under Sylhet division of Bangladesh which consists of 374 children in each area from October 2019 to September 2020 were selected in this cross sectional study. The study was conducted under the guidance in the Department of Orthodontics, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. The inclusion criteria were 1) School- age children 08- to 12 year old in selected school irrespective of sex without the history of previous orthodontic treatment. 2) Participants with completely erupted first permanent molars. The exclusion criteria were 1) Unwillingness of participants as well as their legal guardians in the study. 2) Mentally compromised participants and participants with craniofacial anomalies. Four primary school (Girls and Boys) were randomly selected from a total 115 primary schools (Girls/Boys) of sylhet Sadar Upazilla. Out of four schools, two were urban and two was in rural areas. The study subjects were selected from a list of 08- to 12-year old children by using stratified random sampling procedures in each school. Boys and Girls were equally distributed. The participants were selected by criterion random sampling method which fulfills the predetermined selective criteria. A prior notification and written consent form were sent to the head of the school for permission to carry out the study. A written assent form was given to the participant prior to the commencement of the study. A written consent form was given to the participant's legal guardian. Materials and instruments required: 1) Informed written assent and consent forms from study participants along with their legal guardians, 2) Preformed Data collection sheet 3) Pens 4) Torch light 5) Disposable diagnostic materials (calibrated probe, mirror) 6) Mask and 7) Gloves.

The study sample along with their guardians was requested to give their agreement to participate in the study. The teacher was given a brief introduction about the investigator to the children. The investigators were addressing any concerns or clarification that the students may require before carrying out the data collection. Their data was collected by the dental health checkup. The oral health education lecture was given to all the children in the school to create awareness about dental health and Orthodontic treatment. After taking informed

written consent from the guardians of study participants, assent from the minors and approval from the ethical committee of BSMMU, school children were examined in ordinary chair using torch light and disposable diagnostic tools (periodontal probe, mirror, measurement scale). Study models and radiograph was not taken. Class I, Class II and class III molar relationship and various traits of malocclusion was recorded by using Angle's classification. Over jet was measured by periodontal pocket measuring calibrated probe. It was increased when the horizontal space between upper and lower incisors are more than 3 mm or normal. The normal value of overbite is 1 to 3 mm but it varies with the length of incisors. When space remain between upper and lower teeth in centric occlusion then open bite was noted. Crossbite was recorded when there are an abnormal labiolingual or buccolingual relationship of the upper and lower teeth when the mouth was closed in normal occlusal position. Crowding was noted when there was overlying of two or more teeth or minimum 2mm space lack in each quadrant. Spacing was collected when diastema was present between two nearby teeth or extra space of at least 2mm was existing in each quadrant.

#### ETHICAL CONSIDERATIONS:

Prior to the commencement of this study, ethical approval by the Institutional Review Board (IRB) of BSMMU was taken. The study was maintaining all the ethical principles in all procedures according to the declaration of Helsinki. The aim and objectives of the study along with its procedure, risks and benefits was explained to the participants an essay understandable local language. Data was collected maintaining confidentiality and privacy of the participants strictly. It was assured that all information and records was kept confidentially and the procedure was helpful for both the clinician and the participants in making rational approach of the case management. All participants were having a case number to maintain their confidentiality; all date was represented by their case number, not by their name or any other personal information that may leak their confidentiality. A written and signed informed consent was obtained from all participants. The written informed consent was containing the study name, type of study, risk and benefit of the participants, confidentiality and their right to withdraw from the research. The informed consent was taken from the participants with their legal guardians who also was sign on the consent form. This study was not involve any drugs, placebo, records (hospital, medical, birth, death or other), organs, tissues, body fluids, the fetus, or the abortions. The participants were not getting any financial benefit.

#### STATISTICAL ANALYSIS

A database was prepared and statistical analyses were carried out by using the Statistical Package for Social Sciences (SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM

Corp. 2015). Continuous data were expressed as mean  $\pm$  standard deviation (SD) and categorical data were expressed as frequency and percentages. Mean and standard deviation was computed for quantitative variables and was analyzed by unpaired "t" test. Chi square test was used for categorical variables. P values  $<0.05$  were considered statistically significant.

#### RESULTS

Figure 1 shows that almost two third (63.4%) participants were found malocclusion in urban group and 213(57.0%) in rural group. The difference was not statistically significant ( $p>0.05$ ) between two groups. Figure 2 shows that majority (70.5%) participants were found Angle's class I in urban group and 148(69.5%) in rural group. The difference was not statistically significant ( $p>0.05$ ) between two groups. In urban area, 109(58.3%) participants were found malocclusion in Boys and 128(68.4%) in Girls group. The difference was statistically significant ( $p<0.05$ ) between two groups (Table-1). In rural area, 96(51.3%) participants were found malocclusion in Boys and 117(62.6%) in Girls group. The difference was statistically significant ( $p<0.05$ ) between two groups (Table-2). Regarding malocclusion in urban and rural school age children 70(29.5%) participants were found increased overjet of malocclusion in urban group and 43(20.2%) in rural group. The difference was statistically significant ( $p<0.05$ ) between two groups. 143(60.3%) participants were found increased overbite of malocclusion in urban group and 124(58.2%) in rural group. 12(5.1%) participants were found open bite of malocclusion in urban group and 13(6.1%) in rural group. 21(8.9%) participants were found cross bite of malocclusion in urban group and 18(8.5%) in rural group. 120(50.6%) participants were found crowding of malocclusion in urban group and 101(47.4%) in rural group. 59(24.9%) participants were found spacing of malocclusion in urban group and 46(21.6%) in rural group (Figure-3).

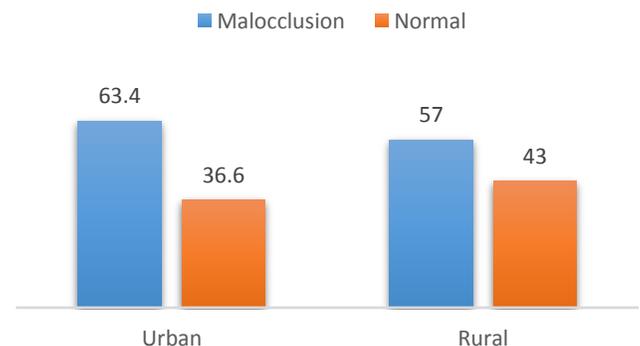


Figure 1: Prevalence of malocclusion in urban and rural school age children according to Angle's classification

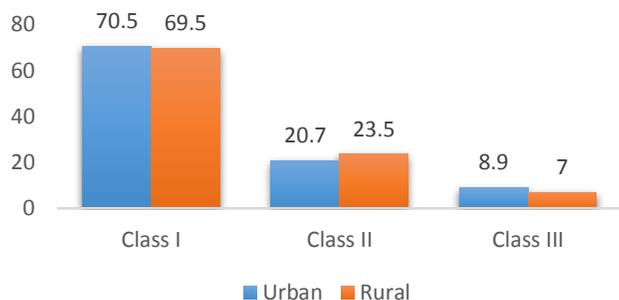


Figure 2: Frequency of malocclusion in Urban and Rural school age children according to Angle's classification

Table 1: Sex wise distribution of malocclusion of urban school age children

Occlusion	Sex		Total n (%)	p value
	Boys n (%)	Girls n (%)		
Malocclusion	109 (58.3)	128 (68.4)	237 (63.4)	0.041 <sup>s</sup>
Normal	78 (41.7)	59 (31.6)	137 (36.6)	
Total	187(100.0)	187(100.0)	374(100.0)	

s= significant

P value reached from chi square test

Table 2: Sex wise distribution of malocclusion of rural school age children

Occlusion	Sex		Total n (%)	p value
	Boys n (%)	Girls n (%)		
Malocclusion	96 (51.3)	117 (62.6)	213 (57.0)	0.028 <sup>s</sup>
Normal	91 (48.7)	70 (37.4)	161 (43.0)	
Total	187 (100.0)	187(100.0)	374(100.0)	

s= significant

P value reached from chi square test

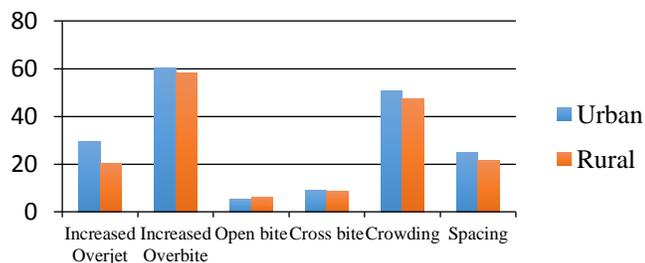


Figure 3: Malocclusion traits in urban and rural school age children according to Angle's classification

### DISCUSSION

In Bangladesh, most of the population does not have access to orthodontic treatment care. The orthodontic treatment by specialists is even less nearby for those who cannot afford private sector care, entry to orthodontic treatment is quite possible, essentially in public hospital or medical universities, but these cannot encounter the full ultimatum for care. Many studies on the prevalence of malocclusion in different populations have been published through world along with Bangladesh. But there are little previous information regarding comparison of prevalence of malocclusion between urban versus rural school- age children in Bangladesh.

This cross sectional descriptive survey was conducted among urban (374) and rural (374) school- age children aged 08-12 year old of Sylhet Sadar Upazila in Bangladesh. Boys and girls were equally distributed. The children were examined for Class I, Class II, Class III molar relationship, increased over jet, increased over bite, open bite, crowding, cross bite and spacing according to Angle's classification.

In current study, it was observed that (63.4%) of participants in urban and 213(57.0%) rural area had some sorts of malocclusions. However, the difference was not statistically significant (p>0.05) between two groups. The prevalence of malocclusion in urban school age children was higher than rural in this study. Similar observation was found in the study by Kaur et al<sup>13</sup>. They reported that malocclusion was widely spread among population of Karnataka state (South India), with greater prevalence in urban population than rural. Interestingly the prevalence of malocclusion in rural school children was higher than urban in Peshawar district reported by Khan et al<sup>10</sup>.

In this present study it was observed that majority (70.5%) participants were found Angle's class I in urban group and 148(69.5%) in rural group. Prevalence of malocclusion according to Angle's classification: In urban area, the prevalence of Angle's Class-I, II and III malocclusion was 167 (70.5%), 49 (20.7%) and 21 (8.9%) respectively while in rural area, the values were 148 (69.5%), 50 (23.5%) and 15 (7.0%). In India study by Kaur et al<sup>13</sup>. also reported similar observation they showed that Angle's class I was the most prevalent malocclusion which was (89.45%). The result also agreement in Bangladeshi study by Rita et al<sup>12</sup>, they reported that Angles Class I malocclusion was seen to be the most prevalent (64.2%). However, contraindicated observation was found by Abu Alhaija et al<sup>14</sup> they reported Angles class II was the most commonly occurring malocclusion in north Jordanian school children.

The present study found 109(58.3%) participants had malocclusion in boys and 128(68.4%) in girls group. The difference was statistically significant (p<0.05) between two groups. Prevalence of malocclusion in girls was more than boys

in both urban and rural area. This statement also similar to Khan et al<sup>14</sup>. They showed the prevalence of malocclusion higher in girls in comparison to boys.

This present study showed that 70(29.5%) participants were found increased overjet with malocclusion in urban group and 43(20.2%) in rural group. The difference was statistically significant ( $p < 0.05$ ) between two groups. An Indian study by Kaur et al<sup>13</sup>. reported excessive overjet was seen in 33.71%. The difference between urban and rural population was statistically significant ( $P = 0.000$ ) with urban population having more of an increased overjet that result is an agreement with our finding. However Khan et al<sup>10</sup>. reported that the distribution of increased overjet was more in rural (28.21%) than urban (18.18%) among school children of Peshawar. This statement was different from our study.

In current study it was observed that 143(60.3%) participants were found increased overbite with malocclusion in urban group and 124(58.2%) in rural group. The difference was not statistically significant ( $p > 0.05$ ) between two groups. In an Indian study by Kaur et al<sup>13</sup>. reported deep-bite was seen in 35.97% of total sample with no statistically significant difference between urban and rural population ( $P = 0.083$ ). The result of this study was different from Khan et al<sup>10</sup>. study who reported that the distribution of increased over bite in rural school children (24.36%) was more than in Urban(14.69%) of Peshawar district.

In this study it was reported that 12(5.1%) participants were found open bite in urban group and 13(6.1%) in rural. The difference was not statistically significant ( $p > 0.05$ ) between two groups. But the result of study was different from the study of Khan et al<sup>10</sup>. The distribution of open bite in school children of Peshawar district was more in rural 10.26% than Urban (23.78%).

In this study it was observed that 22(8.9%) participants were found crossbite with malocclusion in urban Group and 18(8.5%) in rural group. The difference was statistically significant ( $p > 0.05$ ) between two groups. The result of our study was almost similar to the study by Kaur et al<sup>13</sup>. who reported that Urban population had 8.25% and rural had 8.56% anterior crossbite with no statistically significant difference ( $P = 0.816$ ). In Peshawar district, Khan et al<sup>10</sup>. reported that rural school children had 17.95% crossbite while in urban 9.79%.

In this study it was found that 120(50.6%) participants had crowding with malocclusion in urban group and 101(47.4%) in rural group. The difference was not statistically significant ( $p > 0.05$ ) between two groups. Kaur et al<sup>13</sup>. reported frequency of crowding was 58.12%. Khan et al<sup>10</sup>. reported the distribution of various traits of malocclusion in rural school children were crowding 54.41% while in urban 55.25%.

In this study it was found that 59(24.9%) participants had spacing with malocclusion in urban group and 46(21.6%) in

rural group. The difference was not statistically significant ( $p > 0.05$ ) between two groups. Khan et al<sup>10</sup>. reported the distribution of various traits of malocclusion in rural school children were spacing 11.54% while in urban 12.59% of Peshawar district. Planning and implementation of future school based awareness program can be carried out and their population can be benefited by this study. So that preventive, early orthodontic treatment can be given earlier to school age children.

## CONCLUSION

Prevalence of malocclusion was found more in urban school-age children when compared with rural. Malocclusion was significantly more in girls than boys in both urban and rural area. Angle's class-I malocclusion and Increased overbite were the most commonly occurring malocclusion of school age children from a selected urban and rural community of Bangladesh.

## RECOMMENDATION

School-based education specially orthodontics treatment awareness needs to be introduced in collaboration with orthodontist, school teachers, parents, and community health educators. A purpose-oriented orthodontics study has to be included in rural and urban schools from all divisions of Bangladesh. Other landmarks of occlusion can be included for further study. Directorate General of Health Services (DGHS) may include preventive, early orthodontic treatment and dental health awareness programs for school children in NCDC projects.

## CONFLICT OF INTEREST:

The author declared no conflict of interest

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