

# Pattern Distribution of Angle's Class II Division 2 Malocclusion among Orthodontic Patients Attending a Tertiary Care Hospital in Bangladesh: A Cross-sectional Study

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## ABSTRACT

**Introduction:** Angle's Class II Division 2 malocclusion represents a clinically distinct subgroup of Class II malocclusion characterized mainly by retroclined maxillary central incisors and increased vertical overlap of anterior teeth. Evaluation of variation in pattern distribution within this malocclusion group is important for improving orthodontic diagnosis and treatment planning. However, information regarding its distribution among Bangladeshi orthodontic patients remains limited.

**Methods:** This descriptive cross-sectional study included 59 patients diagnosed with Angle's Class II Division 2 malocclusion who attended the Orthodontics Department of Bangladesh Medical University (BMU), Dhaka. Pretreatment study models and clinical records were assessed using a structured data collection format. Based on dentoalveolar characteristics, the malocclusion patterns were categorized into Type A, Type B and Type C. Data were analyzed using SPSS version 26.0 and expressed as frequency and percentage.

**Results:** Most participants belonged to the 18–30 years age group (66.1%). Female participants constituted a larger proportion (62.7%) compared with male (37.3%). Among the identified subtypes, Type B pattern showed the highest frequency (55.9%), followed by Type A (33.9%) and Type C (10.2%). There was no statistically significant difference in the distribution of malocclusion types in age group and sex in this study.

**Discussion:** Type B pattern appeared to be the predominant presentation of Angle's Class II Division 2 malocclusion within the study population. The observed predominance among young adults and female patients reflects treatment-seeking trends commonly reported in orthodontic department. The findings provide baseline epidemiological information regarding subtype distribution of this malocclusion among Bangladeshi population.

**KEYWORDS:** Angle's classification, Class II Division 2 malocclusion, Pattern distribution.

## INTRODUCTION

The normal relationship between the teeth's occlusal inclined planes is known as occlusion when the jaws are closed. On the other hand, occlusion that is unsightly both in terms of appearance and functionality is referred to as malocclusion.[1] Malocclusion is a common condition that can significantly impact oral health, despite the availability of preventive and therapeutic strategies. It affects dental function, aesthetics, self-esteem, and overall well-being, and is associated with an increased risk of periodontal disease and temporomandibular joint disorders.[2] With increasing urbanization and awareness of oral health and aesthetics, understanding malocclusion patterns across populations has become increasingly important.[3]

According to the World Health Organization, malocclusion is the third most common dental condition after periodontal disease and dental caries.[4] It typically becomes evident during early adolescence, coinciding with the eruption of permanent teeth. One of the most widely used methods for assessing malocclusion is Angle's classification, which is based on the positional relationship of the upper first molar.[5] Class II Division 2 malocclusion was first described by Edward Angle in 1899 and is characterized by retroclined maxillary central incisors with a Class II molar relationship, while lateral incisors may be proclined or normally positioned.[6] Later, Van der Linden classified it into three types based on incisor and canine alignment: Type A, where all four maxillary incisors are palatally

tipped with well-aligned canines; Type B, with palatally tipped central incisors and labially tipped lateral incisors; and Type C, where all four incisors are palatally tipped and the canines are buccally placed.[7]

Class II Division 2 malocclusion is a distinct and relatively rare type of Class II malocclusion, characterized by retroclined incisors and a strong familial tendency, accounting for about 4.3% of cases in Bangladesh.[8] It presents with unique dental and craniofacial features, including a round or square facial form and a horizontal growth pattern. Key features include distal molar occlusion with retruded upper incisors, while deep bite often results from infra-occluded molars, allowing lower incisors to contact the palatal vault and upper incisors to overlap the lower gingiva. Severity varies from mild dental involvement to more pronounced skeletal and occlusal features.[9]

Internationally, several studies have examined Class II Division 2 malocclusion, including research in Portugal, India, Israel, and Lebanon focusing on incisor retroclination patterns, cephalometric characteristics, and dentoalveolar variations.[10-13] In contrast, research in Bangladesh remains limited, with only a few studies addressing general malocclusion patterns, such as analyses of occlusal traits and dentofacial characteristics among orthodontic patients.[14,15] However, specific investigations on the pattern of Angle's Class II Division 2 malocclusion in the Bangladeshi population are scarce, highlighting a clear gap in the literature.[16]

Understanding the distribution of dentoalveolar pattern variations within this subgroup is important because these variations may influence both treatment planning and biomechanical strategy during orthodontic correction. Despite its clinical relevance, published data describing the distribution pattern of Angle's Class II Division 2 malocclusion among Bangladeshi orthodontic patients remain scarce. Therefore, the present study was undertaken to evaluate the distribution pattern of Angle's Class II Division 2 malocclusion among patients attending an orthodontic department of a tertiary care hospital in Bangladesh.

## MATERIALS AND METHODS:

This descriptive cross-sectional study was conducted over one year at the orthodontic outpatient departments of Bangladesh Medical University (BMU), Dhaka, following Institutional Review Board approval (Approval No: BSMMU/2024/198). The study included 59 participants (aged 12–30 years) with Class II Division 2 malocclusion selected through simple random sampling from pre-treatment records and dental casts. Inclusion criteria comprised Bangladeshi patients with permanent dentition, intact first molars, no prior orthodontic treatment, and complete records, while those with craniofacial anomalies, missing or heavily restored anterior teeth, or inadequate records were excluded.

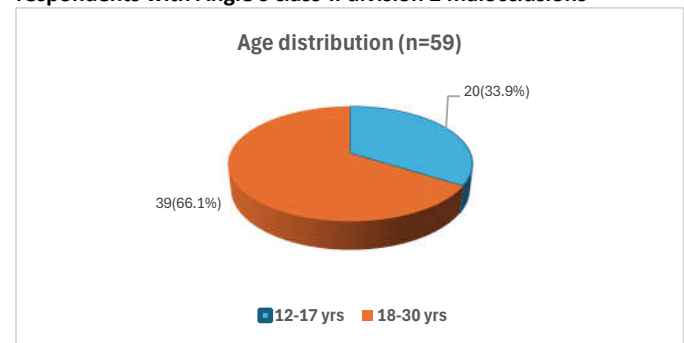
Data were collected from case records and dental casts using standard clinical measurements. Malocclusion was classified using Angle's classification, and patterns were further categorized according to Van der Linden's types (A, B, C). Type A, where all four maxillary incisors are palatally tipped with well-aligned canines; Type

B, with palatally tipped central incisors and labially tipped lateral incisors; and Type C, where all four incisors are palatally tipped and the canines are buccally placed. Socio-demographic factors related to participants included age; sex was collected from case records. Individuals were split into two groups: 12–17 years old and 18–30 years old, because of according to Shahzad (2020), In girls, maxillary growth is completed by the age of 15 years, and mandibular growth by 16 years. In boys, maxillary and mandibular growth is completed by the age of 18 years. Data were recorded in structured forms and analyzed using SPSS version 26.0. Descriptive statistics (frequency and percentage) were calculated, and chi-square tests were applied to assess associations between variables, age and gender. Ethical standards were maintained throughout, with informed consent and assent obtained and confidentiality strictly preserved.

## RESULTS

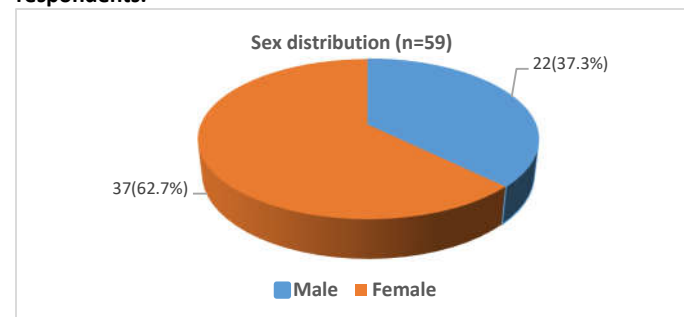
According to the study, most participants belonged to the 18–30 years age group (66.1%) (Figure-1). Female participants constituted a larger proportion (62.7%) compared with male (37.3%) (Figure-2). Among the identified subtypes, Type B pattern showed the highest frequency (55.9%), followed by Type A (33.9%) and Type C (10.2%) (Figure-3) and there was no statistically significant difference in the association of Angle's class II division-2 malocclusion type according to age group and sex in this study (Table-1) and (Table-2).

**Figure-1: Pie diagram showing the age distribution of the study respondents with Angle's class-II division 2 malocclusions**



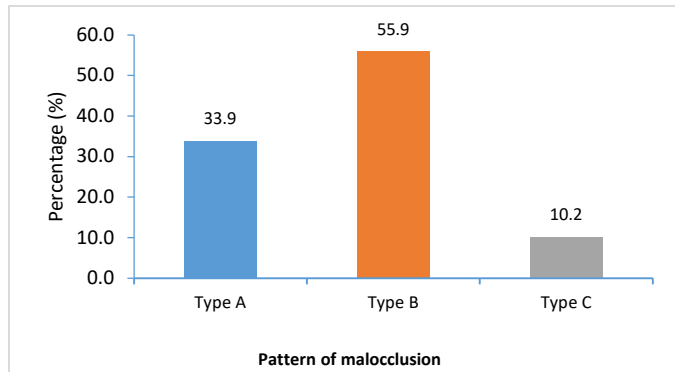
The Pie diagram shows that 33.9% of respondents were between the ages of 12 and 17, while 66.1% were between the ages of 18 and 30. This suggests that most prevalence age group seeking orthodontics treatment is 18-30 years.

**Figure-2: Pie diagram showing the sex distribution of the study respondents.**



The Pie diagram shows that among the study respondents with Angle's class-II division 2 malocclusion, 62.7% are female and 37.3% are male. This indicates a higher prevalence of this malocclusion in females compared to males.

**Figure-3: Bar diagram showing the distribution by pattern of Angle's class II division-2 malocclusion**



The Bar diagram shows the distribution of different patterns of Angle's class II division 2 malocclusion among the study respondents. Type B is the most common, accounting for 55.9% of cases. Type A follows with 33.9%, while type C is the least common at 10.2%. This indicates that Type B is the predominant pattern of malocclusion in this study group.

**Table-1: Association of Angle's class II division-2 malocclusion according to age group (n=59)**

| Angle's Class II division-2 malocclusion | 12-17 yrs (n=20) | 18-30 yrs (n=39) | p-value |
|------------------------------------------|------------------|------------------|---------|
| Type A                                   | 4(20.0%)         | 16(41.0%)        | 0.106   |
| Type B                                   | 15(75.0%)        | 18(46.2%)        |         |
| Type C                                   | 1(5.0%)          | 5(12.8%)         |         |
| Total                                    | 20(100.0%)       | 39(100.0%)       |         |

p-value obtained by Chi-square test,  $p < 0.05$  considered as a level of significant

The table shows the association between the pattern of Angle's class II division 2 malocclusions and age group. Type A is more common in the 18-30 age group (41.0%) compared to 20.0% in the 12-17 age group, though this difference is not statistically significant ( $p = 0.106$ ). Type B is more prevalent in the 12-17 age group (75.0%) compared to the 18-30 age group (46.2%). Though the overall differences are not statistically significant.

**Table-2: Association of Angle's class II division-2 malocclusion according to sex (n=59)**

| Angle's Class II division-2 malocclusion | Male (n=22) | Female (n=37) | p-value |
|------------------------------------------|-------------|---------------|---------|
| Type A                                   | 8(36.4%)    | 12(32.4%)     | 0.227   |
| Type B                                   | 10(45.5%)   | 23(62.2%)     |         |
| Type C                                   | 4(18.2%)    | 2(5.4%)       |         |
| Total                                    | 22(100.0%)  | 37(100.0%)    |         |

p-value obtained by Chi-square test,  $p < 0.05$  considered as a level of significant

The table shows the association of Angle's class II division 2 malocclusion patterns with sex. Among males, Type A is seen in 36.4% of cases, Type B in 45.5%, and Type C in 18.2%. In females, Type A is observed in 32.4% of cases, Type B in 62.2%, and Type C in 5.4%. The p-value of 0.227 suggests that there is no statistically significant difference in the distribution of malocclusion types between males and females in this study.

## DISCUSSION

Malocclusion remains a persistent public health issue, and understanding its causes, prevalence, and treatment needs is essential for effective care planning and workforce allocation. Although many epidemiological studies describe its patterns across regions, comparisons are limited by variations in assessment methods and indices.[3] Within this spectrum, Angle's Class II Division 2 malocclusion is a distinct clinical entity characterized by retroclined maxillary incisors and increased vertical overlap of anterior teeth. Evaluating dentoalveolar variations within this subgroup is important for improving treatment planning and clinical outcomes.[7] Many studies have examined the prevalence and types of malocclusions, but comparisons are difficult due to differences in assessment methods, age groups, examiner subjectivity, study aims, and data size.[17] This study's methodology draws on prior research.[3,12-14] While most focused on overall patterns, this study specifically investigates Class II Division 2 malocclusion due to its distinct characteristics.[7]

Angle's classification is widely accepted for its reliability and reduced examiner subjectivity.[18] In this study, Van der Linden's system was used to assess Class II Division 2 malocclusion based on canine and maxillary incisor positioning. A total of 59 participants were divided into two age groups: 12–17 and 18–30 years, based on growth completion patterns.[19] Of them, 33.9% were aged 12–17 and 66.1% were 18–30. The older group more frequently sought orthodontic treatment, though the difference was not statistically significant, consistent with previous studies.[20] Females (62.7%) were more likely than males (37.3%) to seek orthodontic treatment. This aligns with previous studies. The difference may reflect greater aesthetic concerns among females or parental considerations regarding marriage.[14] Although there is no statistically significant difference in the distribution of malocclusion types between males and females in this study. Although many studies have examined malocclusion, none have focused on patterns of Angle's Class II Division 2 in Bangladeshi orthodontic patients. In this study, Type B was most prevalent (55.9%), followed by Type A (33.9%), while Type C was least common (10.2%). This indicates Type B as the dominant pattern, likely influenced by genetic and environmental factors.[7] Malocclusion arises from a combination of genetic and environmental factors. Key contributors include skeletal growth disturbances, muscle dysfunction, lip posture, and disruptions in dental or embryologic development, along with habits such as soft diets, mouth breathing, tongue thrusting, sleeping posture, and sucking behaviors. [21]

## CONCLUSION

Type B pattern was identified as the most prevalent presentation of Angle's Class II Division 2 malocclusion among the orthodontic patients studied, followed by Type A and Type C patterns. A female predominance and a higher representation of young adult patients were observed, likely reflecting local treatment-seeking trends. These findings provide important clinical baseline data that may assist orthodontists in clinical assessment and treatment planning for patients presenting at tertiary care facilities in Bangladesh.

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**CONFLICT OF INTEREST:** The authors declare that there is no conflict of interest regarding the publication of this paper.

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