

A Retrospective Study of the Prevalence and Pattern of Different Types of Malocclusion among Patients Attending ANMMCH

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Abstract:

Background: Malocclusion is a common oral health condition that can affect dental function, aesthetics, oral hygiene, and quality of life. Its prevalence and pattern vary according to age, population, dentition stage, and other factors. Local epidemiological assessment is therefore important for understanding orthodontic treatment needs.

Aim: To assess the prevalence and pattern of different types of malocclusion among patients attending ANMMCH, Gaya.

Methodology: A retrospective cross-sectional study was conducted among 80 patient records from the Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar, India. Demographic and clinical information was extracted from eligible records. Malocclusion was classified according to Angle's classification, and selected occlusal characteristics were assessed. Data were analyzed using IBM SPSS Statistics version 27.0 and expressed as frequencies and percentages.

Results: The 18–25 years age group constituted the largest proportion (43.8%), while males accounted for 52.5%. Permanent dentition was predominant (56.3%). Class I malocclusion was the most common type (53.8%), followed by Class II (31.3%) and Class III (15.0%). Class I predominated in both males (57.1%) and females (50.0%). Crowding was the most frequent occlusal characteristic (47.5%), followed by increased overjet (30.0%), spacing (26.3%), and increased overbite (23.8%).

Conclusion: Class I malocclusion and crowding were the predominant findings, highlighting the need for appropriate orthodontic assessment and timely management.

Keywords: Malocclusion; Angle's classification; Class I; Crowding; Orthodontics; Retrospective study.

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Introduction

Malocclusion is an abnormal relationship between the teeth, dental arches or underlying skeletal structures, which is one of the most common oral health conditions [1]. Normal occlusion is essential for efficient mastication, speech, periodontal health, temporomandibular joint function and oral function. Malocclusion can present as crowding, spacing, an increased overjet, deep bite, open bite, crossbite, and/or an abnormal anteroposterior relationship between the maxillary and mandibular arches. Malocclusion is not a life-threatening condition, but if severe enough, may affect oral function, facial aesthetics, psychology and quality of life.

The malocclusion is multifactorial and results from complex interplay between genetic, environmental and behavioural factors. Genetic factors contribute to craniofacial growth, size of jaws, size of teeth, and facial morphology, while some environmental

factors can alter the normal dentofacial development [2]. Some oral habits (including extended thumb sucking, tongue thrusting, mouth breathing, lip biting and unusual swallowing) can play a role in the emergence of certain malocclusion types. The normal eruption of the permanent dentition may be further affected by the premature loss of deciduous teeth, dental caries, trauma, periodontal disease and other disturbances [3]. As such, malocclusion is age, sex, ethnicity, geographical, and socio-economic status, and oral health practices dependent.

The malocclusion is often described according to Angle's classification of the relationship of the first permanent molars anteroposteriorly [4]. Class I malocclusion has a relatively normal molar relationship but can involve crowding, spacing, rotations, and/or abnormalities of tooth positioning. Class II malocclusion – the distal relationship of the first molar of

the mandible, can occur in combination with increased overjet and other dentofacial discrepancies. Class III malocclusion is defined by a mesial molar relationship and could include anterior cross bite or mandibular prognathism. While Angle's classification is generally used it is also important to evaluate vertical and transverse discrepancies, as well as deep bites, open bites and crossbites to assess occlusal abnormalities thoroughly.

It is important to note that the prevalence of malocclusion is very variable between populations as a result of differences in definition, age ranges studied, sampling procedures, genetic make-up and geographic distribution [5]. There is some predilection for Class I malocclusion while Class II or Class III malocclusion may be more common in some ethnic or regional groups. Similarly, certain individual occlusal features, including dental crowding, spacing, increased overjet, deep bite, open bite, and crossbite show high inter-population variation. Thus, it is important to undertake epidemiological studies on the population to identify the burden and distribution of malocclusion in the community.

There have been significant variations in malocclusion among different regions and population groups in India. These variations could be due to genetic differences, nutrition, socioeconomic differences, oral hygiene habits, access to dental care and knowledge of orthodontic treatment [6]. Class I malocclusion is the most common type reported from several Indian studies and Class II and Class III malocclusions occur in varying percentages. Other clinical orthodontic conditions that are important for evaluation are dental crowding, increased overjet, spacing, deep bite, open bite and crossbite which may need to be treated in selected cases.

Malocclusion has clinical significance beyond dental aesthetics. A very crowded dentition can make oral hygiene and maintenance problematic and can cause plaque build-up and periodontal disease; an overjet can lead to traumatic injury of the anterior teeth [7]. Open bite and crossbite can cause difficulty chewing food and speaking, and extreme discrepancies of the skeletons can impair facial symmetry and mandibular function. Moreover, dental irregularities can have an impact on an individual's self-esteem, social interactions and oral health-related quality of life, particularly for adolescents and young adults. It is therefore important to recognise the early signs of large malocclusion to enable timely and appropriate orthodontic assessment and intervention.

Epidemiological evaluation of malocclusion is also important for planning orthodontic services. Data about the prevalence and prevalence patterns of various types of malocclusion can guide dental institutions in planning appropriate diagnostic, prevention and treatment services. Retrospective studies based

on clinical records collected routinely can be used to identify the pattern of malocclusion among individuals attending the dental clinic for treatment [8]. These studies can also yield baseline data for future research and data that can be used for determining occlusal issues most commonly experienced in clinical practice.

ANMMCH provides dental care to patients from the surrounding population, thus allowing a proper clinical setting to evaluate the prevalence of malocclusion in people attending for dental care. Prevalence estimates based on hospitals, however, may vary from community-based estimates due to differences in age distribution, treatment seeking, referral patterns and demographic differences. Institution-specific assessment is therefore important to comprehend the orthodontic issues that occur in the specific clinical population.

Though studies on malocclusion were conducted in various populations in India, epidemiological data local to the area is significant as the pattern and prevalence of malocclusion is not uniform in all regions. Retrospective evaluation of patient records can yield data on the prevalence of Class I, II and III malocclusions, as well as the occlusal features associated with each malocclusion type seen at ANMMCH. Hence, the present study was conducted to determine the prevalence and pattern of various types of malocclusion amongst the patients who attended ANMMCH in order to give a useful baseline information on the orthodontic need of the study population.

Methodology

Study Design: A retrospective cross-sectional study was conducted to evaluate the prevalence and distribution of different types of malocclusion among patients attending the Department of Dentistry at Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar, India

Study Area: The study was conducted in the Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar, India.

Study Duration: The study was conducted over a period of one year from February 2025 to January 2026.

Study Participants: The study participants consisted of patients whose dental records contained adequate information regarding occlusal relationships and malocclusion characteristics.

Inclusion Criteria

- Patient records available in the Department of Dentistry during the specified study period.
- Patients who had undergone clinical dental and orthodontic evaluation.

- Records containing adequate information regarding age and gender.
- Records containing sufficient clinical information for classification of malocclusion.
- Patients with complete or sufficiently documented molar relationships for assessment according to Angle's classification.
- Records of patients belonging to the selected study population and meeting the predefined study requirements.

Exclusion Criteria

- Records with incomplete or missing demographic information.
- Records without adequate clinical details required for assessment of malocclusion.
- Patients who had undergone previous orthodontic treatment.
- Patients with a history of major craniofacial anomalies or syndromes affecting occlusion.
- Patients with significant systemic or local dental conditions that could interfere with assessment of the occlusal relationship.
- Records in which the molar relationship could not be reliably determined.

Sample Size: A total of 80 patient records fulfilling the predefined inclusion and exclusion criteria were included in the study. The required records were selected from the available case sheets maintained in the Department of Dentistry during the study period.

Procedure: The relevant patient case sheets were retrospectively reviewed. The required demographic and clinical information was extracted using a structured data collection format. The demographic variables included age and gender, while the clinical variables included the presence and type of malocclusion, molar relationship, anteroposterior relationship, crowding, spacing, overjet, overbite, and stage of dentition wherever these details were available in the records. The prevalence of malocclusion was assessed according to Angle's classification, based primarily on the recorded molar relationship. Other

recorded occlusal characteristics, including crowding, spacing, overjet, and overbite, were also documented to describe the pattern of malocclusion. Each eligible case sheet was assigned a study code, and patient identifiers were not included in the analytical dataset. The collected information was entered into a Microsoft Excel spreadsheet and subsequently transferred to statistical software for analysis.

Statistical Analysis: The collected data were entered, coded, and analyzed using IBM SPSS Statistics version 27.0. Categorical variables such as gender, type of malocclusion, and other occlusal characteristics were expressed as frequencies and percentages. The distribution of different types of malocclusion was assessed descriptively. Associations between categorical variables, where applicable, were evaluated using the Chi-square test. A p-value <0.05 was considered statistically significant."

Result

Table 1 presents the distribution of study participants according to demographic characteristics among the 80 participants included in the study. Regarding age, the largest proportion of participants belonged to the 18–25 years age group, comprising 35 (43.8%) participants, followed by the 13–17 years group with 27 (33.8%) participants. The 6–12 years age group accounted for 18 (22.5%) participants, indicating that younger participants constituted the smallest proportion of the study population. Overall, the majority of participants (77.6%) were between 13 and 25 years of age. In terms of gender, males constituted 42 (52.5%) participants, whereas females accounted for 38 (47.5%) participants. Thus, the study population showed a relatively balanced gender distribution, with a slight predominance of males. Overall, the findings indicate that the study participants were predominantly adolescents and young adults, with the 18–25 years age group representing the largest proportion of the total study population.

Table 1: Distribution of study participants according to demographic characteristics (N=80)			
Variable	Category	n	%
Age group (years)	6–12	18	22.5
	13–17	27	33.8
	18–25	35	43.8
Gender	Male	42	52.5
	Female	38	47.5
Total		80	100

Table 2 presents the distribution of study participants according to the stage of dentition among the 80 participants included in the study. The majority of participants belonged to the permanent dentition stage, comprising 45 (56.3%) participants. This was followed by those in the late mixed dentition stage,

which included 21 (26.3%) participants. Early mixed dentition was observed in 14 (17.5%) participants, representing the smallest proportion of the study population. Overall, more than half of the participants had reached the permanent dentition stage, while the remaining participants were distributed

between the early and late mixed dentition stages. The findings indicate that the study population was predominantly composed of individuals with permanent dentition, with approximately one-fourth

having late mixed dentition and less than one-fifth having early mixed dentition. Thus, the distribution reflects greater representation of participants in the later stage of dental development.

Table 2: Distribution of study participants according to stage of dentition (N=80)

Stage of dentition	n	%
Early mixed dentition	14	17.5
Late mixed dentition	21	26.3
Permanent dentition	45	56.3
Total	80	100

Table 3 presents the distribution of different types of malocclusion according to Angle's classification among the 80 study participants. Class I malocclusion was the most frequently observed type, accounting for 43 (53.8%) participants and representing more than half of the study population. Class II malocclusion was the second most common type, observed in 25 (31.3%) participants. Class III malocclusion was identified in 12 (15.0%) participants, constituting the smallest proportion of the study

population. Overall, the findings demonstrate that Class I malocclusion was predominant, followed by Class II and Class III malocclusions. The distribution indicates that approximately one-third of the participants had Class II malocclusion, whereas Class III malocclusion was comparatively less frequent. Thus, among the 80 participants evaluated, Angle's Class I pattern constituted the major type of malocclusion, while Class III represented the least commonly observed classification."

Table 3: Distribution of different types of malocclusion according to Angle's classification (N=80)

Type of malocclusion	n	%
Class I	43	53.8
Class II	25	31.3
Class III	12	15
Total	80	100

"Table 4 presents the distribution of malocclusion according to gender among the 80 study participants. Among the 42 male participants, Class I malocclusion was the most frequently observed type, accounting for 24 (57.1%) participants, followed by Class II in 12 (28.6%) and Class III in 6 (14.3%) participants. Similarly, among the 38 female participants, Class I malocclusion was predominant, occurring in 19 (50.0%) participants, followed by Class II in 13 (34.2%) and Class III in 6 (15.8%)

participants. Overall, Class I malocclusion was the most common type in both males and females, representing 43 (53.8%) of the total participants. Class II malocclusion accounted for 25 (31.3%), while Class III was observed in 12 (15.0%) participants. The distribution was therefore broadly similar between both genders, with Class I being predominant and Class III being the least frequent malocclusion type.

Table 4: Distribution of malocclusion according to gender (N=80)

Gender	Class I n (%)	Class II n (%)	Class III n (%)	Total
Male	24 (57.1)	12 (28.6)	6 (14.3)	42 (100.0)
Female	19 (50.0)	13 (34.2)	6 (15.8)	38 (100.0)
Total	43 (53.8)	25 (31.3)	12 (15.0)	80 (100.0)

Table 5 presents the distribution of selected occlusal characteristics among the 80 study participants. Crowding was present in 38 (47.5%) participants, while 42 (52.5%) participants did not exhibit crowding, indicating a relatively comparable distribution. Spacing was observed in 21 (26.3%) participants and was absent in 59 (73.8%) participants, making spacing less frequently observed than crowding. Increased overjet was present in 24 (30.0%) participants, whereas 56 (70.0%) participants did not show

increased overjet. Similarly, increased overbite was observed in 19 (23.8%) participants and was absent in 61 (76.3%) participants. Overall, among the assessed occlusal characteristics, crowding was the most frequently observed finding, followed by increased overjet, spacing, and increased overbite. These findings indicate that crowding represented the most common occlusal characteristic in the study population, while increased overbite was comparatively less frequently observed.

Table 5: Distribution of selected occlusal characteristics among study participants (N=80)			
Occlusal characteristic	Category	n	%
Crowding	Present	38	47.5
	Absent	42	52.5
Spacing	Present	21	26.3
	Absent	59	73.8
Increased overjet	Present	24	30
	Absent	56	70
Increased overbite	Present	19	23.8
	Absent	61	76.3

Discussion

This is a retrospective descriptive study of the distribution of both types and degrees of malocclusion in 80 patients attending ANMMCH. The study population was mostly adolescents and young adults with 43.8% of population aged between 18-25 years and 33.8% aged between 13-17 years. So, 77.6% of respondents were between 13-25 years. The large percentage of adolescents and young adults is clinically important because most permanent teeth have erupted within this age range, making established occlusal relationships and orthodontic abnormalities easily detected. A comparison of prevalence of the various study literature, however, should be interpreted with caution due to the substantial differences in the age range, sampling method, study setting, diagnostic criteria, and type of occlusal index. In a large epidemiological study of children and adolescents in the city of Bogotá, Thilander et al., 2001 [9] noted that prevalence estimates varied with respect to dental development stages and the definition of malocclusion."

"The gender distribution of the present study was relatively balanced with men amounting to 52.5% and women 47.5%. Overall, Class I malocclusion was the most common type in males (57.1%) and females (50.0%), Class II malocclusion was present in 28.6% of the males and 34.2% of the females, and Class III malocclusion was present in 14.3% of males and 15.8% of females. The rather even distribution across sex seems to indicate that the predominance of Class I was not restricted to one sex. In a study of 600 participants [10] by Aslam et al., 2014, Class I was also found to be the most established malocclusion of Angle and they went on to examine the distribution of the same with age and gender. Their results thus confirm the overall trend found in the present research, except for certain limitations in the ability to make direct comparisons in terms of percentages due to differences in sample selection and age intervals.

The most significant finding of the present study was the high number of Angle's Class I malocclusion (53.8%) followed by Angle's Class II (31.3%) and Class III (15.0%). This is similar to several epidemiological studies that found Class I to be the most common malocclusion. In Jammu, Kaul et al., 2017

[11] investigated 696 individuals (aged 13-14) and found that 83% had malocclusion, with 67% having Class I, 8% Class II Division 1, 6% Class II Division 2, and 2% Class III. Consequently, their results of Class I predominance align with the present study, although the percentage of Class I was greater than the percentage found at ANMMCH (53.8%). In the same way, Gudipani et al. (2018) [12] found Class I in 52.8%, Class II in 31.8% and Class III in 15.4% of the 500 adolescents aged 14 to 18 years from the northern region of Saudi Arabia. Although the distribution of the Angle's malocclusion categories differs slightly (31.3% vs 30.3% for Class II, and 15.0% vs 16.6% for Class III), the values are very close to that seen in the current study, supporting the idea that the malocclusion categories of angles are the same across both geographic and population characteristics.

The findings of other Indian populations also support the predominance of Class I in the present study. Among 432 dental and nursing students from 7 north eastern states of India, Devi et al 2021 [13] reported 36.8% Class I malocclusion, 10.4% Class II and 4.4% Class III with 48.4% showing normal occlusion. In the previous study the percentages were smaller, but the rank order Class I > Class II > Class III was the same as the present study. Importantly, the average age of the study population in their study was 21.42 years, close to the mean age of the major age group in the present study. However, Bilgic et al. (2015) [14] in their study on 2329 adolescents aged 12–16 years in Central Anatolia, found that among these adolescents Class II Division 1 was the most common (40.0%), Class I was 34.9% and Class III was 10.3%. This is compared with the present study, where Class I is definitely predominant. The disparity could reflect ethnic, age, population selection, and/or method of occlusal assessment differences.

The results of dentition stage should be taken into account. Twenty-six percent of the study population presented with late mixed dentition, 17.5% presented with early mixed dentition, and 56.3% presented with permanent dentition. The age group that is most common among participants (18-25) matches this distribution. Previous studies have shown that the occlusal morphology of both the mixed and permanent dentitions can be significantly

different. Thilander et al. (2001) considered malocclusion in particular, by examining the prevalence of malocclusion by developmental stage and offered suggestions as to when this should be taken into account. Also, some abnormalities may be present in early mixed dentition that are related to the eruption, the spacing, oral habits, and the development of arch relationships, while other abnormalities may develop after permanent eruption.

Crowding (47.5%), increased overjet (30.0%), spacing (26.3%), and increased overbite (23.8%) were the most common occlusal characteristics noted in the present study. Gudipani et al. (2018) concluded that the most prevalent malocclusion in their study on Saudi adolescents was crowding, with a prevalence of 47.2%, which is very similar to the findings of this study (47.5%). Similarly, Devi et al. (2021) mentioned anterior crowding as its highest prevalent feature with Class I occlusion. Sundareswaran and Kizhakool 2019 [15] observed a higher prevalence of crowding among 1554 adolescent children in Kerala (66.6%) and spacing (15.3%) and increased overjet (11.8%). The overall prevalence of malocclusion was 89.9%, with Class I (74.4%), Class II (17.6%) and Class III (8.0%). This was significantly higher than the prevalence represented by the distribution in the present sample.

The present results are also different from Alajlan et al. 2019 [16] who found 70.4% of Saudi children aged 7-12 years had Class I molar relationship, 21.3% had Class II, and 8.3% had Class III. More than half of their cases had an increased overjet (14.4%) and deep overbite (16.2%) which were lower than the percentage present in the present study for these two characteristics (30.0% and 23.8%, respectively). It is possible that the age distribution in the present study and the increased number of permanent teeth may account for some of the higher values. Overall, the findings of the present study indicate that Class I malocclusion and dental crowding are significant components of the occlusal pattern in the patients attended at ANMMCH compared with Class III malocclusion and increased overbite which were comparatively less common. The comparison of some Indian and international studies, in addition to the differences found in other populations, strengthens the findings that age, dentition stage, population characteristics and the method of evaluation have an impact on the epidemiology of malocclusion."

Conclusion

The present retrospective study concluded that malocclusion was commonly observed among patients attending the Department of Dentistry, ANMMCH, with adolescents and young adults constituting the major proportion of the study population. Angle's Class I malocclusion was the predominant type (53.8%), followed by Class II (31.3%) and Class III

(15.0%). The distribution of malocclusion was broadly comparable between males and females, with Class I predominating in both genders. Permanent dentition represented the largest dentition stage (56.3%). Among the assessed occlusal characteristics, crowding was the most frequently observed finding (47.5%), followed by increased overjet (30.0%), spacing (26.3%), and increased overbite (23.8%). These findings highlight the substantial burden and varied pattern of malocclusion in the studied population and emphasize the importance of early identification, appropriate orthodontic assessment, and timely management.

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