Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 6 (2024): June 2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i6.1237
Original Article

PREVALENCE AND PATTERN OF MALOCCLUSION AMONG PATIENTS IN SATNA MADHYA PRADESH: A CROSS-SECTIONAL STUDY BASED ON DEWEY'S MODIFICATION.

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Abstract

Aim

This study aimed to evaluate the prevalence and distribution of malocclusion among the patients reporting to the dental outpatient department (OPD) of the affiliated hospital of a Medical College in M.P.

Materials and methods

This cross-sectional study included 383 individuals aged 14–30 who satisfied the inclusion criteria. Inclusion criteria consisted of all permanent teeth with or without third molars. The occlusal relationships were recorded in the centric occlusion position (COP). The occlusion traits were assessed as normal occlusion or malocclusion using the first permanent molars described by E.H. Angle and deviation from the line of occlusion. The mean and proportions of the data were calculated using descriptive statistics.

Results

The prevalence of malocclusion in individuals aged 14–30 years was 60.84% (116 males and 117 females) Angle's Class I malocclusion (41.77%) was more common among the individuals than Angle's Class II malocclusion (15.40%) and Angle's Class III malocclusion (3.67%). The distribution of Class II Division 1 was 11.75%, whereas Class II Division 2 was 3.65%. Dewey's Class I type 1 was identified as the most common malocclusion. The prevalence of normal occlusion (as described by Angle) was 39.16% (83 males and 67 females)

Conclusion

Angle's Class I malocclusion was the most prevalent in participants followed by normal occlusion as described by Angle. Dewey's Class I type 1 was observed to be the most common malocclusion and Dewey's Class III type 3 was the least observed type of malocclusion.

Recommendations

To develop a systematic and well-organized dental health care program in a community, basic information such as epidemiological studies on malocclusion is required. This study is therefore useful for future studies on the prevalence of malocclusions in the Vindhya region of Madhya Pradesh (M.P.)

Keywords: Malocclusion; Prevalence, Angle's classification; Dewey's modification.
Submitted: *June 25,2024* ***Accepted:*** *June 28, 2024*

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Background

Malocclusion is the third major oral health problem after dental caries and periodontal disease (1). It may negatively affect an individual's self-esteem due to aesthetic, speech, functional, and psychosocial changes, thereby impairing the quality of life (2-4). Angle defines malocclusion as "any deviation from the normal occlusion of teeth" (5). It is also described as any mal-relationship of dental arches with or without an irregularity of the teeth (6)

The prevalence of malocclusion among Indian children and adolescents ranges from 28.4% to 66.7% (7). Despite these significant values, malocclusions remain unresolved in most cases.

Several malocclusion classifications have been proposed over time using different evaluation criteria; however, the utility for individual diagnosis and epidemiological studies must be analyzed. Clinically relevant occlusal classifications, such as Angle's classification (Angle, 1899), Dewey's modification of Angle's classification, and Incisor's classification (British Standard Institution, 1983), allow clinicians to communicate with one another. Despite many studies in the literature regarding the prevalence, treatment modalities, and Quality of life outcomes of malocclusion, there is a scarcity of studies on prevalence of malocclusion in Vindhya region of M.P. Therefore, this study aims to evaluate the prevalence and distribution of malocclusion using Angle's classification and Dewey's modification of Angle's malocclusion in

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patients reporting to dental OPD of a hospital affiliated to Government Medical College, Satna M.P, India.

Materials and Methods

Setting and study design

A cross-sectional observational study was done to determine the prevalence and patterns of malocclusion using Angle's classification and Dewey's modification of Angle's malocclusion among the patients attending the outpatient department of Dentistry at the affiliated hospital of Government Medical College Satna, Madhya Pradesh. The study was conducted over 5 months from January 2024 to May 2024.

Sample size and sampling procedure

Sample size calculation was done using the formula: N = z2pq/ e2 where z2= 3.84 (Z is the critical value at 95% confidence level); P = 47.5% (prevalence of malocclusion in a study by Mehta A et al.); q = 1 – p; e= absolute error of .05. Total sample size was calculated as 383(7).

Inclusion criteria

• Subjects with permanent dentition with or without the presence of third molars.
• Subjects within the age group of 14-to 30 years.

Exclusion criteria

• Subjects with missing/grossly decayed permanent maxillary/mandibular first molars
• Presence of any deciduous teeth.
• Subjects with any facial trauma.
• Subjects with any history of orthodontic treatment.
• Subjects with craniofacial anomalies, cleft lip and palate, and specific syndromes.

At the onset of the study, participants were informed that participation was voluntary and would not affect their eligibility to receive services at the facility. Before collecting primary data, the study objectives were explained to each candidate, and informed consent to participate in the study was obtained. The permission was obtained from parents/ guardians if the participant was less than 18 years of age. Confidentiality was ensured throughout the study. It was an observational study and no clinical intervention of any sort was performed.

The study aimed to minimize bias by retrieving data directly from examining the individual by a specialist ensuring the inclusion of all patients having malocclusion during the specified period. Additionally, all patient records were collected by one investigator to prevent duplication.

Data collection and statistical analysis:

Data were collected through clinical dental examinations conducted by a team of dental experts. Examination of the oral cavity for evaluation of occlusion was done with the patient seated on a dental chair using a sterile mouth mirror under the illumination of a chair headlight. The occlusal relationships were assessed in the centric occlusion position by asking the participant to swallow and then bite on his or her teeth together. The occlusion was assessed according to the classification using the first permanent molars as described by E.H. Angle and Dewey's Modification (**Table 1**) (5, 8, 9). The data was collected as mean and percentages. Descriptive statistics like mean and proportions were calculated.

Table 1: Assessment of Occlusal traits based on Angle and Dewey's Modification.

Normal occlusal trait	Subjects with Class I molar relationship, normal overbite and overjet, proper alignment, and minimal crowding.	
Class I (Class I molar relations)	Dewey's Type 1	Crowded incisors labially positioned canines, or both.
	Dewey type 2	Protruded maxillary incisors.
	Dewey type 3	Edge-to-edge occlusion of anterior teeth anterior crossbite or both.
	Dewey type 4	Unilateral or bilateral posterior crossbite.
	Dewey type 5	The mesial drift of molars.
Class II (Class II molar relation)	Division 1	Protruded maxillary anterior teeth and large overjet.
	Division 2	Retroclined maxillary central incisors, proclined or normally inclined maxillary lateral incisors, and deep overbite
Class III malocclusion	Dewey Type 1	Edge-to-edge relationship
	Dewey Type 2	Crowded mandibular incisors.
	Dewey Type 3	Crowded maxillary incisors and anterior cross-bite.

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Results

The study was conducted on 383 individuals aged 14–30 years who satisfied the inclusion criteria and consented to participation in the study **(Figure 1)**. Class I molar relationship, minimal overbite and overjet, proper alignment, and minimal crowding were classified as normal occlusion. Normal occlusion was evident in 150 (39.16%) participants (**Figure 2**).

Malocclusion was evident in 233 participants; hence the prevalence of malocclusion was 60.84%. Angle's Class I malocclusion was the most common (41.77%) among the individuals followed by Angle's Class II malocclusion (15.40%) and Angle's Class III malocclusion (3.67%) (**Table 2**). Class II Division 1 was more prevalent (11.75%) in comparison to Class II Division 2 which was found only in 3.65% population. Gender-wise distribution has been depicted in **Fig 3**. Dewey's Class I type 1 (characterized by Crowded incisors labially positioned canines, or both) was the most common (19.32%) type of malocclusion followed by Angles class II division 1 malocclusion (11.75%) (**Table 3**). Dewey's Class III type 3 was identified as the least prevalent malocclusion (0.53%) type, seen in only two participants.

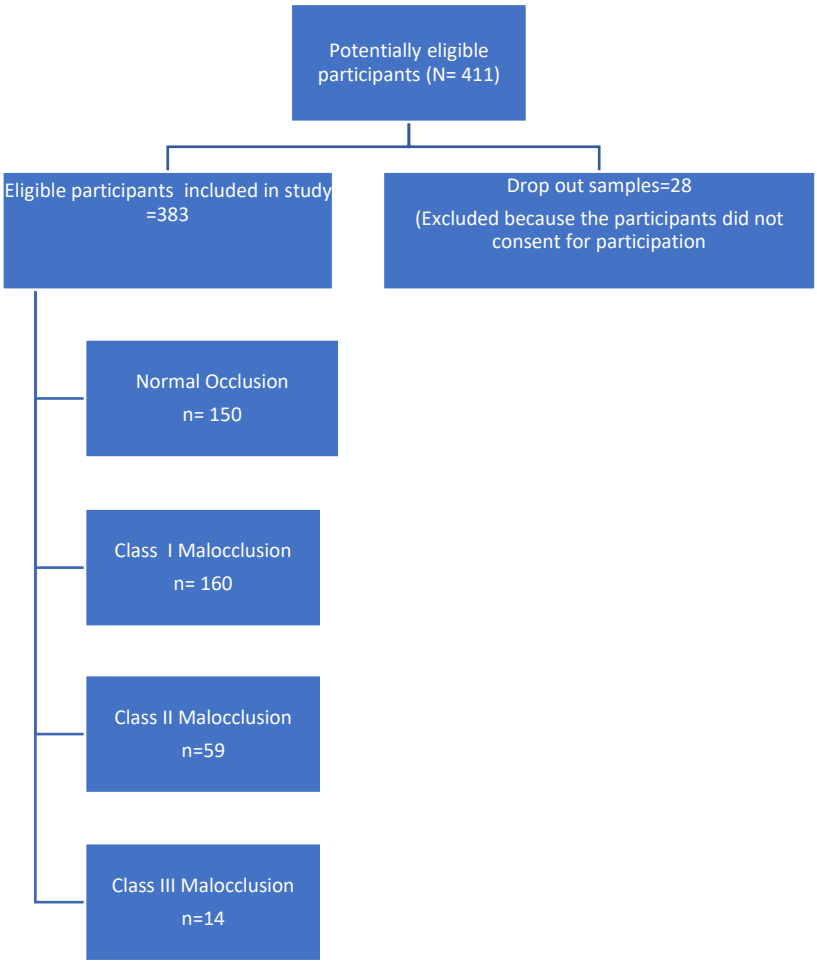

Figure 1: Study participant flow diagram.

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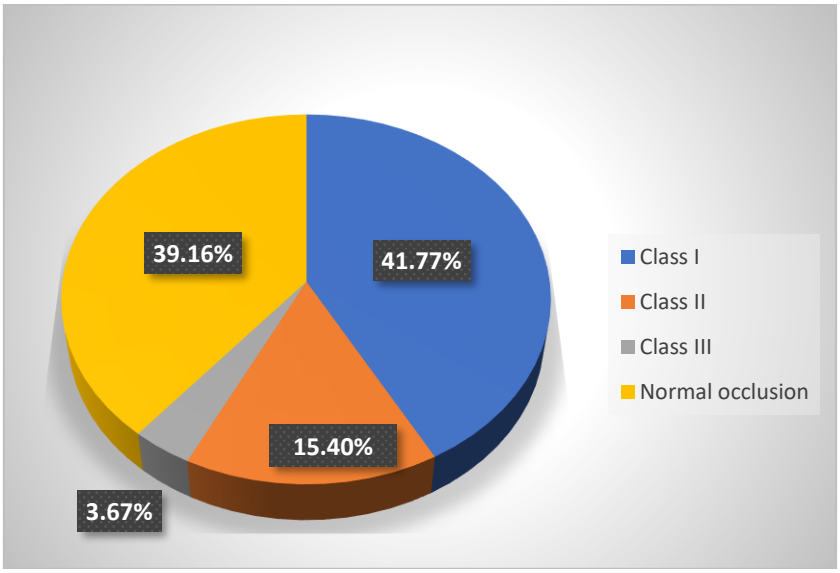

Figure 2: Distribution of occlusal traits according to Angle's classification.

Table 2: Distribution of patients according to Angle's classification (N=383)

Type	Number of participants (n)	Percentage (%)
Class I	**160**	**41.77%**
Class II	**59**	**15.40%**
Class II Division 1	45	11.75%
Class II Division 2	14	3.65%
Class III	**14**	**3.67%**
Normal occlusion	**150**	**39.16%**

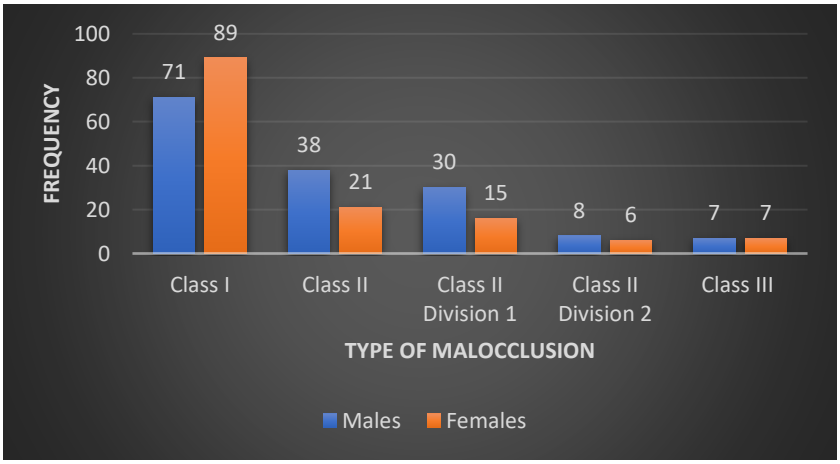

Figure 3: Gender distribution of patients according to Angle's classification.

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Table 3: Gender distribution of patients according to Dewey's modification of Angle's classification of malocclusion (N=383).

Angle's Classification	Dewey's modification	Males	Females	Total
Angle's Class I	**Type 1**	31	43	74 (19.32%)
	Type 2	18	14	32 (8.36%)
	Type 3	6	17	23 (6.0%)
	Type 4	9	8	17 (4.44%)
	Type 5	7	7	14 (3.65%)
Angles Class II Division 1	-	30	15	45(11.75%)
Angle's class II Division 2	-	8	06	14 (3.65%)
Angle's Class III	**Type 1**	2	4	6 (1.57%)
	Type 2	3	3	6 (1.57%)
	Type 3	2	0	2 (0.53%)

Discussion

This study provides a comprehensive survey to assess the distribution and pattern of malocclusion using Angle's classification and Dewey's modification. These classifications are used as they are universally standardized and epidemiologically accepted (6,9,10,11).

The prevalence of normal occlusion in this study was 39.16% which was greater than the studies by Kumar Nath S., et al and Trehan M et al., who reported that normal alignment of teeth was observed in 29.14% and 33.3% of participants respectively (12,13). In an epidemiological study by Das et al., a prevalence of 71% was reported in the 8-12 years age group in Bangalore which was higher than the prevalence (60.84%) reported in this study (14). Kharbanda et al. found a prevalence of 45.7% in the 10-13 years age group in New Delhi which was less than the 60.84% reported in this study (15).

In the present study, the most common malocclusion was Angle's Class I (41.77%) followed by Angle's Class II malocclusion (15.40%) and Angle's Class III malocclusion (3.67%) which was by other studies in the literature. In a study by Balina S et al., Angle's Class I malocclusion was seen in 67% participants, Class II malocclusion in 30.1% and Angle's Class III malocclusion in 2.1% participants (11). In a study by Sharma K et al., class I malocclusion was observed in 52.57% of participants, class II division 1 malocclusion in 12.57%, class II division 2 in 8%, and Class III malocclusion in 1.42% of participants (16). Cenzato N et al in their study on the prevalence of malocclusions in different geographical areas included 14 articles for qualitative synthesis and concluded that the prevalence of Angle's class I malocclusion ranged from 34.9% to 93.6%, class II from 4.4% to 44.7% and class III from 1.4% to 19.4% (17).

Angle's class I Dewey's modification type 1 was the most common (19.32%) type of Angle's class 1 malocclusion followed by Dewey's type 2 modification in 8.36% of participants.

This finding of Class I type 1 modification being the most common type of Angle's Class I malocclusion was similar to the study by Devagiri V (18). However other studies in literature have reported different findings. Ballina S et al. found that Dewey's Class I type 2 was most evident (43.6%) in participants (11). Similarly in another study by Tripathi T et al., it was reported that Class I type 2 malocclusion was found to be more common (30.9%) than Class II Division 1 (27.5%) (19).

Study limitations

Malocclusion has a multifactorial etiology, being caused by hereditary factors and/or environmental factors (20). The limitation of the study was the small sample size and the fact that the effect of environmental & genetic factors on the prevalence of malocclusion was not taken into account. Future studies should conduct oral examinations of the patients to explore the role of genetic and environmental factors that contribute to malocclusion.

Conclusion

Adverse implications of malocclusion are projected in the quality of life, social interactions, and psychological development of the patients. The role of malocclusion is also implicated in the development of periodontitis, dental caries, temporomandibular disorders, and trauma.

Though reports suggest that malocclusion is the third most common dental disorder affecting people, there is inadequate implementation of preventive oral healthcare programs. To date, continuous surveillance of oral disease in India has yet to be achieved, thus pooling data from prevalence studies should be prioritized for estimation of the nation's oral disease burden.

Recommendation

It is emphasized that early attention should be paid to oral health and focus should be laid on early diagnosis and treatment of malocclusion.

Source of support

The study was not funded.

Conflict of interest

There was no conflict of interest.

List of abbreviations

M.P. – Madhya Pradesh
OPD- Outpatient department

Source of funding

This study was not funded.

Author's contributions

Dr. Divashree Sharma: Research activity planning and execution, data collection, data interpretation, manuscript drafting, editing, and review.
Dr. Ambrish Mishra: Conceptualization, designing of study methodology, statistical analysis, data interpretation, manuscript drafting, and review.
Dr. Monica Chaurasia: Conceptualization, Data collection, data interpretation, manuscript drafting, editing, and review.

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