

Original Investigation

Prevalence of Malocclusion among Adolescent Children Visiting Dental Department in a Tertiary Care Centre

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ABSTRACT

INTRODUCTION: Malocclusion is defined as an irregularity concerning teeth alignment and/or their relationship during dental occlusion beyond the range of what is accepted as normal. The study was conducted in order to identify prevalence of malocclusion in adolescents visiting dental department of a tertiary care centre at Dhanusha district of Madhesh Pradesh. **MATERIALS AND METHODS:** A descriptive cross-sectional study was conducted at Out-Patient Department of dental department of Janaki Medical College and Teaching Hospital (JMCTH) with participants aged 13-19 years irrespective of gender. Total of 600 adolescents were examined for malocclusion like overjet, overbite, spacing, crowding, rotation and missing tooth. Angle's Classification was used to define malocclusion in participants. **RESULTS:** 93.8% of participants had some sort of malocclusion. Highest prevalence of Angle's Class I (68%) followed by Class II (21.3%) and Class III (4.5%) was found. 40.5% had increased overjet, 33.5% have deep overbite and 31.2% have crowding. 37.25% of participant had rotation of tooth. **CONCLUSIONS:** The study concludes with the fact that Angle's Class I Malocclusion is the major malocclusion presenting in OPD of JMCTH. High percentage of adolescents with permanent dentition having some sort of malocclusion also seems to be concern which can affect future self confidence and much more expenditure on treatment and maintenance.

Keywords: Adolescents, Malocclusion, Angle's Classification, Madhesh Pradesh



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INTRODUCTION

Malocclusion is defined as an irregularity concerning teeth alignment and/or their relationship during dental occlusion beyond the range of what is accepted as normal[1]. Malocclusion has the 3rd highest prevalence among oral pathologies, following dental carries and periodontal diseases across the globe[1,2]. With multiple etiologies of malocclusion, singular or more commonly in combination includes genetics, environment, oral habits, numerical anomalies, form and developmental position[3]. Malocclusion has been associated with negative effect on daily based activities, including chewing, swallowing, speaking abilities, facial and dental aesthetics, self-confidence and social interactions[1,3,4]. Multiple studies concerning malocclusion has been conducted in Nepal which have shown variety in prevalence of malocclusion. These include study in Western Nepal by Baral P.[5] featuring multiple age groups, in Eastern Nepal by Singh and Sharma [2] concerning school going children of age 12-15 and at Kathmandu by Bajracharya et al.[6] comprising 6-13 years old school going children. Such studies have not been conducted in the premise of Dhanusha district or Madhesh Pradesh itself yet. Earlier Identification and utilization of corrective methods against malocclusion will eliminate the above mentioned negative effects on oral health and regular development of individual affected[3].

This descriptive cross-sectional research was carried out in order to find the prevalence of malocclusion in adolescents visiting dental Out-Patient Department (OPD) of Janaki Medical College and Teaching Hospital (JMCTH), Dhanusha, Nepal.

MATERIALS AND METHODS

Study Design and Setting

The study is a descriptive cross-sectional study conducted at dental department of Janaki Medical College and Teaching Hospital (JMCTH), Ramdaiya Bhawadi, Dhanusha, Nepal. The study was conducted between March 2021 to December 2022.

Participant, Sample size and Sampling Technique.

Participant of the study were adolescents aged 13 to 19 years visiting the dental Out-Patient Department of JMCTH irrespective of gender. Participant with all permanent teeth except third molar teeth eruption were included in the study. Adolescents with previous history

of extraction, orthodontic treatment or with craniofacial anomalies were excluded from the study.

The sample size was calculated using Cochran's Formula for cross sectional studies, $n = (z^2 * p * q) / d^2$. Where $p = 40.7\%$ [6], $d = 5\%$ leading to sample size of 371. 20% was added to 371 for non-response rate leading to sample size of 445. On data collection, sample size of 600 was achieved. Random sampling technique was used to select participants fulfilling the selection criteria. Sample was taken for very alternate day of OPD.

Data collection procedure and study variables

The dental examination was done by a single examiner (Principal Investigator) himself on a dental chair with illumination using disposable gloves, mouth mirror and diagnostic instruments.

The molar relation in sagittal plane was recorded based on Angle's classification [7] which states:

1) Angle's class I molar relation as mesiobuccal cusp of maxillary first permanent molar occluding in the buccal groove of mandibular first permanent molar. 2) Angle's class II molar relation as distobuccal cusp of maxillary first permanent molar occluding in the buccal groove of mandibular first permanent molar. 3) Angle's class III molar relation as mesiobuccal cusp of maxillary permanent first molar occluding in the interdental space between mandibular permanent first and second molars.

Possible discrepancies in malocclusion:

Increased or negative overjet, deep overbite, open bite, spacing, crowding, rotation, missing teeth or crossbite.

The normal occlusion was considered when there was Class I canine and molar relation bilaterally, normal overjet, normal overbite, no spacing, no crowding, no rotation, no any teeth missing, no crossbite.

The normal overjet was recorded when it was between 1 to 3 mm. More than 3 mm was considered as increased overjet. Similarly, negative overjet was considered when both left and right maxillary central incisors were palatally placed.

The overbite of 0 to 3 mm was considered as normal overbite. More than 3 mm overbite was considered deep overbite. Less than 0 mm overbite was considered as open bite.

Spacing was recorded when there was more than 2mm of gap in the arch.

Crowding was recorded if there was more than two mm of overlapping between adjacent teeth.

Absence of any teeth in the arch mesial to the first molars were recorded as missing. Rotation of any teeth within its axis was recorded as rotation.

Angle's class I malocclusion was considered when there was class I molar relation bilaterally and any of the above-mentioned discrepancy was present.

Angle's class II malocclusion was considered when there was class II molar relation bilaterally and any of the above-mentioned discrepancy was present.

Angle's class III malocclusion was considered when there was class III molar relation bilaterally and any of the above-mentioned discrepancy was present.

Statistical analysis and data management

The data were entered in excel and transferred in SPSS (Statistical Package for the Social Sciences) version 20 version to analyze data. Descriptive indices, including frequency and percentage, were used to express data for all variables. The data was tested for independence and p-value was calculated.

Ethical consideration

Ethical approval was obtained from the Institutional Review Committee of Janaki Medical College (Ref: IRC/09/2078-079). Prior Consent as well as assent (for >14 years) regarding involvement of the selected adolescent in the study was received from the respective parents and care takers. Permission was taken from hospital administration to access the data of the participants and their information was kept confidential and anonymous.

RESULTS

Among 600 participants, 350 (58.3%) were male remaining being female. 339 (56.5%) of total participants were below 16 years of age among the participants. Age and gender distribution of participant along with dentition status are shown in Table 1.

On examination of participants, it was found that 93.8% of the adolescents presented in OPD of JMCTH have some form of malocclusion as shown in figure 1.

Among 350 of male adolescents, 92.6% had some form of malocclusion whereas 95.6% of female adolescents had some form of malocclusion. Gender based distribution of malocclusion was not statistically significant as in Table 2.

Most common form of malocclusion was Angle's Class -I with 68% of total adolescents with the malocclusion followed by Angle's Class-II. Angle's Class-III was least in count, comprising 4.5% of total participants. The gender distribution was statistically significant for the distribution of malocclusion and normal occlusion ($p < 0.05$) as in Table 3.

More than half (55%) of adolescents have normal overjet followed by 40.5% with increased overjet and 4.5% having negative overjet. Gender based distribution of overjet is presented in Table 4.

Normal overbite was present in 61% of total participants

Age group	Gender, n (%)		Total, n (%)
	Male	Female	
13-15.9 years (Early permanent dentition)	173 (51.0)	166 (49.0)	339 (100)
16-19 years (Permanent dentition)	177 (67.8)	84 (32.2)	261 (100)
Total	350 (58.3)	250 (41.7)	600 (100)

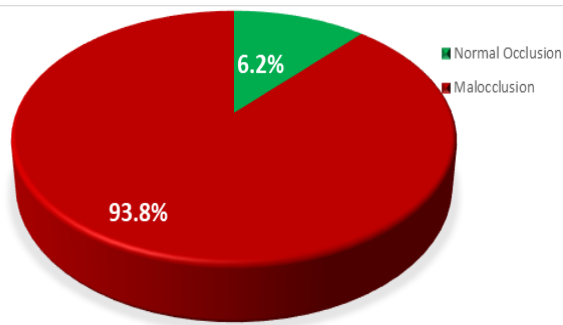


Figure-1| Prevalence of malocclusion among adolescent (n=600)

followed by 33.5% with deep overbite and 5.5% with open bite. Gender based distribution of overbite is presented in Table 5.

Gender	Total, n (%)	Malocclusion, n (%)		p-value
		Presence	Absence	
Male	350 (58.3)	324 (92.6)	26 (7.4)	0.128
Female	250 (41.7)	239 (95.6)	11 (4.4)	
Total	600	563 (93.8)	37 (6.2)	

Spacing between teeth, crowding of teeth, rotation of axis of tooth and missing teeth were included in intra arch malocclusion with 37.2% with rotation of tooth, followed by 31.2% with crowding of teeth, 30% with spacing between teeth. Gender distribution in missing tooth was significant with 85% of total missing (10% of all intra arch malocclusions) present in male. Gender based distribution of intra arch malformation is presented in Table 6.

Distribution of malocclusion across age was not statistically significant with 56.4% of malocclusion in Early Permanent dentition group (age <16 years). Distribution among cases by age is presented in Table 7.

Occlusion	Total, n (%)	Cases, n (%)		p-value
		Male	Female	
Normal	37 (6.2)	26 (74.3)	11 (25.7)	0.027
Angle's Class-I	408 (68)	250 (61.0)	158 (39.0)	
Angle's Class-II				
Div-I	111 (18.5)	54 (48.6)	57 (51.4)	
Div-II	17 (2.8)	8 (47.1)	9 (52.9)	
Angle's Class-III	27 (4.5)	12 (44.4)	15 (55.6)	
Total	600	350 (58.3)	250 (41.7)	

Overjet	Total, n (%)	Cases, n (%)		p-value
		Male	Female	
Normal	330 (55.0)	221 (67.0)	109 (33.0)	<0.001
Increased	243 (40.5)	117 (48.1)	126 (51.9)	
Negative	27 (4.5)	12 (44.4)	15 (55.6)	
Total	600	350 (58.3)	250 (41.7)	

Overbite	Total, n (%)	Cases, n (%)		p-value
		Male	Female	
Normal	366 (61.0)	224 (61.2)	142 (38.8)	<0.001
Deep	201 (33.5)	122 (60.7)	79 (39.3)	
Open	33 (5.5)	4 (12.1)	29 (87.9)	
Total	600	350 (58.3)	250 (41.7)	

Intra-arch malocclusions	Total, n (%)	Cases, n (%)		p-value
		Male	Female	
Spacing	180 (30.0)	99 (55.0)	81 (45.0)	0.278
Crowding	187 (31.2)	108 (57.8)	79 (42.2)	0.846
Rotation	223 (37.2)	131 (58.7)	92 (41.3)	0.875
Missing	60 (10.0)	51 (85.0)	9 (15.0)	<0.001

*Multiple response data

DISCUSSION

The research was conducted with aim to identify prevalence of malocclusion across adolescents visiting Dental department of a Tertiary care Centre, herein being Janaki Medical College and Teaching Hospital.

The study showed high prevalence of malocclusion (93.8%) compared to worldwide prevalence of 56% [1] but comparable to study done by Shrestha et al. in medical students of Institute of Medicine (90.4%) [12], study done by Parajuli et al in Gandaki Medical College Pokhara (94.2%) [13] and Latino students of United States (>93%) [8]. This high prevalence maybe based on the ground that only 50.2% household in Nepal go for regular dental checkup but only for pain or dental problems as in a community based survey conducted in Kaski district [9]. This reflects the fact that most of these malocclusions go unnoticed until or unless severe. One study conducted in Jhapa showed only 19% of population sample has ever visited a dentist clarifying the high incidence in this

study[10].

Age group	Total, n (%)	Malocclusion, n (%)		p-value
		Presence	Absence	
Early Permanent	339 (56.5)	318(93.8)	21(6.2)	0.974
Permanent	261 (43.5)	245(93.9)	16(6.1)	
Total	600	563(93.8)	37(6.2)	

This study also revealed that 68% of adolescents have Angle's class I type of malocclusion, concurrent with a study conducted in western Nepal by Baral P.(71.5%)[5], at Kathmandu by Bajracharya M et al.(67%) and at south eastern Nepal by Acharya A et al.(63.33%)[11] but higher than that by Singh VP and Sharma A(48.50%)[2].

Angle's Class II malocclusion was 21.3% comparable to a study conducted in western Nepal by Baral P.(24.6%)[5], at Kathmandu by Bajracharya M et al.(20%) but lower than study conducted in south eastern Nepal by Acharya A et al.(37%)[11] and by Singh VP and Sharma A(32.68%)[2].

Angle's Class III malocclusion was 4.5%, similar to studies conducted by Baral P.(4.1%)[5], Singh VP and Sharma A (4.32%)[2] but much lower than study conducted by Bajracharya M et al.(13%)[6].

The study also identified that 40.5% of adolescents have increased overjet, 33.5% have overbite, and 31.2% have crowding comparing to Asian average of 24%, 35%, 11.8% respectively[1]. 30% of adolescents had spacing between teeth, comparable to 35 % of global average [1].

The limitation of the study is infact that it was only performed in hospital setting undermining the fact that many cases remain unreported. But it cannot be undermined that the study itself presents that a lot of adolescents have some sort of malocclusion which needs immediate intervention. The study also reports the need of intervention programs surrounding oral health and nation-wide surveys identifying these malocclusions.

CONCLUSION

The study concludes with the fact that Angle's Class I Malocclusion (68%) is the major malocclusion presenting in OPD of JMCTH. The most common intra-arch malocclusion includes rotation of tooth (37.2%) followed by crowding (31.2%). High percentage of adolescents with permanent dentition having some sort of malocclusion (41% of total participants) also seems to be concern which can affect future self confidence and much more expenditure on treatment and maintenance.

ADDITIONAL INFORMATION AND DECLARATIONS

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Data Availability: Data will be available upon request to corresponding authors after valid reason.

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