

Prevalence of Malocclusion in Mewat District of Haryana: A Cross-sectional Study

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ABSTRACT

Aim and objective: To determine the prevalence of malocclusion in the Mewat district of Haryana.

Materials and methods: A cross-sectional study was conducted in government/private schools of Mewat district. A total of 3,042 subjects were selected, age ranging from 11–18 years. Parameters studied were molar relationship, facial profile, overjet, overbite, reverse overjet, open bite, and supernumerary teeth. The Chi-square test was used for calculating the *p*-value.

Results: The prevalence of normal occlusion was seen in 77.4%, Angle's class I malocclusion was present in 13.5%, class II in 7.7%, and class III was seen in 2.8% of the study population which is statistically significant. Straight facial profile was observed in 91%, 7.9% had convex and 1.08% had a concave profile. Increased overjet was present in 33.5% of cases and reverse overjet was seen in 1.08%. The normal overbite was recorded in 70%, increased bite was seen in 29% and the open bite was present in 0.95% of the examined population, supernumerary teeth were seen in 18 children.

Conclusion: There is a high prevalence of normal occlusion in the Mewati population. The results may provide baseline data for research and planning orthodontic services.

Keywords: Cross-sectional study, Malocclusion, Prevalence.

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INTRODUCTION

Malocclusion is a morphological variation that is considered as third most prevalent oral pathology after dental caries and periodontal disease. Mal-relationship of arches or individual teeth beyond the normal limits is termed malocclusion. It may affect an individual's social performance and wellbeing.¹

Malocclusion is affected by many factors including genetics, ethnicity, oral and dietary habits, religion, and socio-economic factors. In India, there are significant variations in profile and malocclusion due to ethnic variations of the people from North, South, and North-East. To understand the causes of malocclusion, assessment of the prevalence of malocclusion in such groups may be helpful and it also describes the range of occlusal variations within the community in which orthodontic treatment may be undertaken.²

In April 2018, Niti Aayog (National Institute for Transforming India) acknowledged Mewat district as the most backward district of India in the National Capital Region which was renamed Nuh. According to the Niti Aayog report, 101 districts were evaluated across the country based on different development indicators such as basic infrastructure, education, health, skill development, agriculture, financial inclusion, and last position secured by the Nuh district (26%). Around 79% of Nuh's population comprises Muslims (Meo-Muslims), that are mixed followers of both Islamic and Hindu religions.³ According to census 2011, Nuh has spread over an area of 1,860 square kilometers (720 sq mi) and with a 1.09 million population. In rural areas majority of the district's population (88%) resides. Only 11.39% live in urban regions of the district. In education, only 37.6% of females are literate as compared to the 73% literacy rate among males.⁴

There have been many studies carried out on the prevalence of malocclusion in different populations but there has been no study carried out on the Mewati population of Haryana state to date.

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Therefore, the aim of our study was to evaluate the prevalence of malocclusion with respect to age and sex in the age group of 11–18 years of Mewat, Haryana, India.

MATERIALS AND METHODS

A cross-sectional study was done in government/ private schools and in Madarsas, which are local schools where Muslims prefer to send their children for economic or religious reasons. A total of 3,042 subjects was examined out of which 2,176 were boys and 866 were girls, ages ranging from 11–18 years. After the due ethical clearance by the institutional ethical committee, official permission was obtained by the District Education Officer (DEO) for conducting the survey in various schools of the district. The written approvals and informed consent were obtained from school authorities and the parents, respectively. The list of all the schools (government and private) of Mewat district was obtained from the DEO. Representative schools from all the five blocks of district Mewat were selected from this list by lottery method.

The dental examination was carried out in a spacious room with adequate sunlight. The children were comfortably seated on

a chair and were examined by a set of autoclaved mouth mirrors and explorers. The criteria of the World Health Organization (WHO) for oral health assessment were used.⁵ Only clinical examination was done without photographs or any radiographs.

Exclusion criteria:

- Medically compromised children
- Craniofacial anomalies
- Previously orthodontically treated children/who were undergoing orthodontic treatment.

The following parameters were studied:

- Molar relation
- Profile
- Overjet/reverse overjet
- Overbite
- Open bite
- Supernumerary teeth.

The molar relationship was recorded according to Angle's classification as class I, II, or III, based on the relationship between the mesiobuccal cusp of the permanent maxillary first molar and the buccal groove of the permanent mandibular first molar.⁶

The facial profile was examined in the natural head position by standing on the side of the children and asking him/her to look straight forward. It is evaluated by joining a line from the most prominent point on the forehead, base of the upper lip, and most anterior part of the chin. It can be straight, convex, and concave.⁶

Overjet is measured with the help of millimeter gauze, it is the distance between the incisal edges of the upper and lower permanent central incisors. It is registered as Ideal overjet- when equal to 2 mm, increased-more than 2 mm and decreased or reverse overjet in case of less than 2 mm. Overbite is measured as vertical overlapping of upper and lower permanent incisors. It was recorded as ideal, increased or reduced. Open bite was observed as present when there is no contact in anterior or posterior teeth.⁷

Table 1: Gender distribution

	Total no. of subjects (N)	N (%)
Male	2,176	71.53
Female	866	28.47
Total	3,042	100

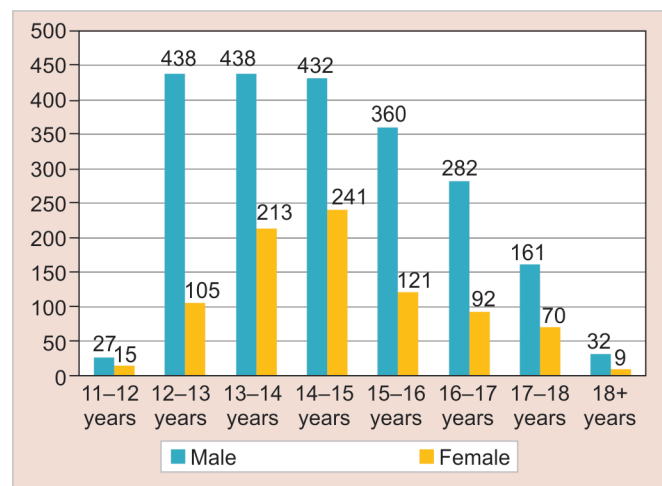


Fig. 1: Distribution of age and gender

STATISTICAL ANALYSIS

The duration of the study was over 1 year and the examination was carried out by one examiner. The validation of the examiner reliability test was checked by reinvestigating 100 subjects after an interval of 1 month which came out to be satisfactory. The data were collected, entered into a computer excel, and analyzed with the SPSS software package (version 22.0, SPSS Inc., Chicago, Ill., USA). The Chi-square test was used for calculating the *p*-value and level of significance at 0.05.

RESULTS

Among the 3,042 children examined for the prevalence of malocclusion, 71.53% were boys and 28.4% were girls (Table 1). A maximum number of examined children was in the range of 14–15 years. The age and gender distribution of the children examined are shown in Figure 1.

Normal occlusion was seen in 77.4% of the examined population whereas Angle's class I, II, III malocclusion were present in 13.5%, 7.7%, and 2.8%, respectively. The difference in malocclusion was statistically significant (Fig. 2).

A straight facial profile was observed in 91% of the study population, out of which 71.8% were male. 7.9% had convex and only 1.08% had a concave profile. The distribution of profiles among the study population was statistically significant (Table 2).

Normal overjet (0–2 mm) was seen in 65.4%, increased overjet (>2 mm) was present in 33.5% cases, and reduced/ reverse overjet was 1.08%. Similarly, overbite of 0–2 mm was recorded in 70%, Deep bite/ increased bite was seen in 29% and the open bite was present in 0.95% of examined population. The data was statistically significant (Tables 3 and 4).

Supernumerary teeth were seen in 18 (0.59%) children, out of which 13 were males.

DISCUSSION

The prevalence of malocclusion varies from one country to another, it is prevalent in 88.1% in Colombia, 62.4% in Saudi Arabia, and 20–35% in the United States.⁸ Whereas in India, the prevalence rate of malocclusion is in the range of 20–43%.⁹ These differences in prevalence rates of malocclusion may also help to understand the etiology of malocclusion.

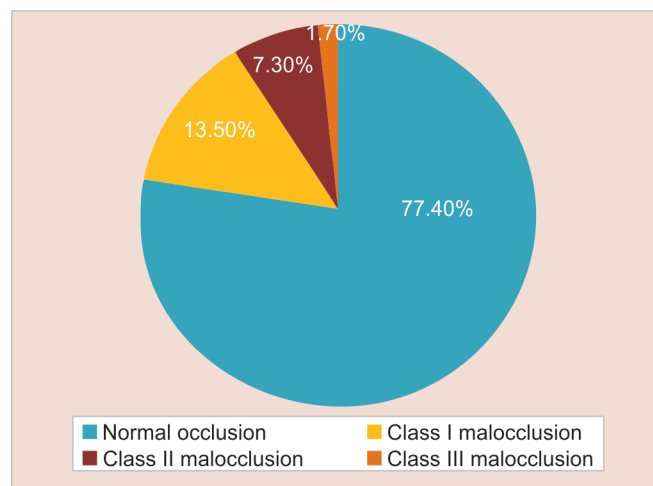


Fig. 2: Prevalence of malocclusion

Table 2: Distribution of facial profile

Gender	Straight	Convex	Concave	p-value
Male	1,987	163	26	<0.05
Female	780	79	7	
Total	2,767 (91%)	242 (7.8%)	33 (1.08%)	

Chi-square test $p < 0.05$; Df = 1**Table 3:** Frequency of over-jet

Gender	Normal	Increased	Reverse	p-value
Male	1,476	675	25	<0.05
Female	513	345	8	
Total	1,989 (65.4%)	1,020 (33.5%)	33 (1.08%)	

Chi-square test $p < 0.05$; Df = 1**Table 4:** Frequency of over-bite

Gender	Normal	Increased (deep bite)	p-value
Male	1,505	644	<0.05
Female	624	236	
Total	2,129 (70%)	880 (29%)	

Chi-square test $p < 0.05$; Df = 1

The present study was conducted among 3,042 school-going children aged 11–18 years, out of which the male: female ratio was 2.5:1. The highest number of females was under the 14–15 years of age group in the examined population. According to the 2011 census, only 36% is the female literacy rate in the Mewat district of Haryana which is way below Haryana's average female literacy rate of 67%. There is a large gender gap in literacy because women are spending significant time collecting wood and fetching water for fuel. This is the reason for their low literacy rate as they finally dropped out of school at a very young age for these household chores,¹⁰ which was observed in our study as well where female participation was only 28.4%.

In a study by Singh et al.¹¹ in the rural population of Faridabad district of Haryana it was found that the prevalence of class I, II, III malocclusion was 43.6%, 9.8%, and 0.6%, respectively. Trehan et al.¹² did a study on the Jaipur population and found 33% had normal occlusion, and 66.3% had malocclusion, out of which the majority of the population (57.9%) had class I malocclusion while class III malocclusion was seen in only 1.4%. Mahajan et al.¹³ found that 83% of the Jammu population had malocclusion, Class I malocclusion (67%) was more prevalent. These findings were contrary to our results as in our study 77.4% had normal occlusion, a comparatively higher value than the above-mentioned studies. Only 22.6% of the sample population had malocclusion out of which 13.5% had class I malocclusion followed by class II (7.3%) and class III (1.7%) malocclusion. It has been proven that multiple factors play an important role in the etiology of Malocclusion. According to Graber et al.¹⁴ both heredity and environmental factors holds a significant role in determining the factors which cause malocclusion. The predominant ethnic group of Mewat is Meo Muslims. They are believed to have converted to Islam in the 14th century and are believed to trace their ancestry to the Rajputs or the Yaduvanshis. Mostly, they are nonvegetarian and take beef (both cow and buffalo) and other kinds of meat. They take plenty of fish.¹⁵ Their diet is basically hard and coarse. There are studies^{16,17} concluded that a hard food diet decreases malocclusion as it increases tooth wear.

Whereas there is less chewing requirement with soft and cooked type food which causes the small size of jaws but the tooth size will remain same, that will lead to malocclusion and dental crowding. Reduction in tooth wear prevents contemporary people from attaining attritional occlusion. Meo-Muslims do not marry out of their community so the same genetic pattern of occlusion is transmitted through many generations. In our study, the increased number of normal occlusion in examined population may be due to the above-mentioned reason.

Damle et al.² did a study in rural areas of Ambala district of Haryana state and found 72.5% of the examined children had normal overjet, whereas reverse overjet and the anterior open bite was seen in 0.83% and 0.37%, respectively in the examined population, which is in accordance with our study that showed normal overjet was present in 65.4% cases, reverse overjet was 1.08% and the anterior open bite was found to be 0.95% of examined population. Shiva Kumar et al.¹⁸ performed a study in Davangere city of Karnataka state showed almost similar findings as ours. However, the study by Burden and Holmes¹⁹ on the United Kingdom children population reported a higher percentage of reverse overjet. This difference can be attributed to variation in growth and disproportion for the dentofacial alveolar width and genetic predisposition.

The deep bite was seen in 29% of our study population. The study done by Al Jadidi et al.²⁰ in Omani adolescents showed a prevalence of deep bite was 16.3% which is lower as compared to our study.

In India, the most prevalent malocclusion is class I rather than class II and class III. But prevalence rate of malocclusion may vary depending upon the different ethnic groups and geographical areas, for example, the bi-maxillary protrusion is more common in the south Indian population, whereas, there is a high prevalence of class II malocclusion in north Indians.²¹

The prevalence rate of malocclusion also differs in urban and rural population. Suma S²² in her study on rural areas of Nalgonda (Andhra Pradesh) observed that there is more prevalence of malocclusion in urban Indian population than in rural and tribal population. Similar findings were seen by Sidhu SS²³ in Tribal children of Mandu (Central India).

CONCLUSION

The result of our study concludes that:

- The prevalence of Normal occlusion (77.40%) is significantly higher than the malocclusion (22.6%) in the Mewati population of Haryana which is a noteworthy finding.
- Prevalence of increased overjet and overbite was 33.5% and 29%, respectively.

Malocclusion is not only a single entity but rather a collation of situations; each in itself constitutes a problem that may further be complicated by a multiplicity of genetic and environmental causes. It is difficult to compare the published studies, as different authors used variable methods and indices. This was the first study to be undertaken on the Mewati population that provides baseline data about the prevalence of malocclusion, which may help in planning orthodontic treatment services in this region.

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