

# Prevalence of Malocclusion Traits in Saudi Males Seeking Orthodontic Treatment in Najran in Saudi Arabia

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## ABSTRACT

**Aim:** To study the prevalence of different malocclusion traits in Najran in Saudi adolescents and adults seeking orthodontic treatment in Najran in Saudi Arabia.

**Materials and methods:** Two hundred and fifty male patients in the age group of 12–35 years who visited faculty of dentistry in Najran University for orthodontic treatment were examined and were divided into two age groups, adolescents and adults. The patients were examined and classified into Class I, Class II, and Class III malocclusions. They were also examined for overjet, overbite, open bite, crossbite, scissor's bite, crowding, and spacing.

**Results:** The prevalence of Angle's malocclusion Classes I, II, and III was 52.8%, 31.6%, and 15.6%, respectively. The most common anomaly was moderate overbite followed by lateral open bite. Posterior crossbite was found to be more prevalent than anterior crossbite.

**Conclusion:** Angle's Class I malocclusion was most prevalent type, followed by Class II, and then Class III.

**Clinical significance:** The findings of this study can be used to formulate an appropriate preventive and orthodontic treatment measures pertaining to the population of adolescent and adult Saudi males.

**Keywords:** Adolescents, Adults, Malocclusion, Prevalence, Saudi males.

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## INTRODUCTION

Malocclusion refers to any type of irregular contact between the upper and lower teeth. It can manifest as an overbite, open bite, under bite, or crossbite. Malocclusion can be defined as an occlusion in which there is a malrelationship between the arches in any of the planes or in which there are anomalies in tooth position, number, form, and developmental position of teeth beyond normal limits.<sup>1</sup>

Facial appearance has a long lasting implication on an individual. Malocclusion is a highly prevalent dental deformity, which was shown to have several consequences: physical, economic, social, and psychological impacts.<sup>2</sup> An unacceptable dental appearance has often been associated with a negative effect on self-image, career advancement, and peer-group acceptance. The adolescents often get subjected to teasing and intimidation which produces a feeling of inferiority leading to an incompetent social and intellectual well-being.

Angle's classification of malocclusion in 1890s was an important step in the development of orthodontics because it not only subdivided major types of malocclusion but also included the first clear and simple definition of normal occlusion in the natural dentition.<sup>3</sup>

The prevalence of malocclusion has increased in the past few years and is one of the most common dental problems today. It varies widely and these variations are difficult to explain. It may depend on differences in recording approaches, ethnic origin, social class, or age of the examined subjects.<sup>4</sup> However, diagnostic criteria are the key factors determining the prevalence of malocclusion.<sup>5</sup>

Malocclusion also has a large impact on both individuals and society in terms of discomfort, quality of life, and social and functional limitations.<sup>6,7</sup>

The aim of this study was to determine the distribution of malocclusion traits based on Angle's classification in adolescent

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and adult male patients seeking orthodontic treatment in faculty of dentistry in Najran, Saudi Arabia

## MATERIALS AND METHODS

The sample consisted of 250 Saudi male patients in the age group of 12–35 years who visited faculty of Dentistry in Najran University for orthodontic treatment. The selected sample was divided into two age groups: Adolescents (patients belonging to the age group of 12–17 years) and adults (patients belonging to the age group of 18–35 years). Accordingly, the sample consisted of 151 adults and 99 adolescents. The objectives and benefits of the study were clearly mentioned to the patients, and a written form of informed consent was taken. For patients below the age of 18 years, consent was obtained from their parents or guardians.

The patients included in this study had not undergone previous orthodontic treatment. The assessment was performed independently by a single investigator so as to eliminate any inter-examiner variations. The patients were examined and classified into Class I, Class II, and Class III malocclusions according to Angle's

classification. They were also examined for overjet, overbite, open bite, crossbite, scissor's bite, crowding, and spacing according to the method used by Bjork et al.<sup>8</sup>

### Sagittal Dimension

Sagittal relationship were classified as Class I, Class II, and Class III according to Angle's classification.<sup>9</sup>

Overjet is the horizontal overlap between maxillary incisors and mandibular incisors. Overjet between 4 mm and 6 mm was considered moderate and more than 6 mm was considered severe. An edge-to-edge overbite was considered when upper and lower teeth meet in a straight line with zero overjet. Anterior crossbite was considered when maxillary incisors were lingual in position in relation to the mandibular incisors.

### Vertical Dimension

Overbite is the vertical overlap between maxillary and mandibular incisors. Overbite between 4 and 6 mm was considered moderate and greater than 6 mm was considered severe.

An open bite (anterior) was registered if the space between upper and lower incisors was 1 mm or more than 1 mm and lateral open bite was considered if at least two pairs of antagonist teeth fail to meet unilaterally or bilaterally.

### Transverse Dimension

A posterior crossbite was registered when the buccal cusps of the maxillary premolars and/or molars occluded lingual to the buccal cusps of the mandibular antagonists (at least one pair of teeth, uni-, or bilateral).

A scissor bite was recorded when any of the maxillary premolars or molars occluded with the buccal surface of the mandibular antagonist teeth (uni- or bilateral).

### Alignment Anomalies

Space in upper and lower arches exceeding 2 mm was considered spacing.<sup>10-13</sup>

Crowding was recorded in upper arch and lower arch. Crowding was considered if there was 2 mm or more in each dental arch. Scissor bite was recorded when palatal surface of maxillary posterior teeth occluded buccal to the buccal cusp of lower posterior teeth.

Data analysis was performed using SPSS 16.0 and the distribution for occurrence of different malocclusion traits was determined in female adolescent and adult patients. Pearson's Chi-square test was done to determine *p* value.

## RESULTS

This study consisted of 250 male patients. The age range in this study was 12–35 years. The study sample was divided into two age groups: age group of 12–17 years (adolescents) and age group of 18–35 (adults). Adults constituted 60.4% of the sample, while adolescents represented the remaining 39.6% (Fig. 1).

Table 1 shows that Angle Class I classification was found to be most prevalent (52.8%) followed by Class II (31.6%) and Class III (15.6%). The total number with Angle's Class I malocclusion ( $N = 250$ ), was distributed as 53.2% adults and 47% adolescents. This was not the case for Class II malocclusion where only 75.9% of adults and 24.1% adolescents showed it. On the contrary, 53.8% and 46.2% of the total number of Class III were adults and adolescents, respectively.

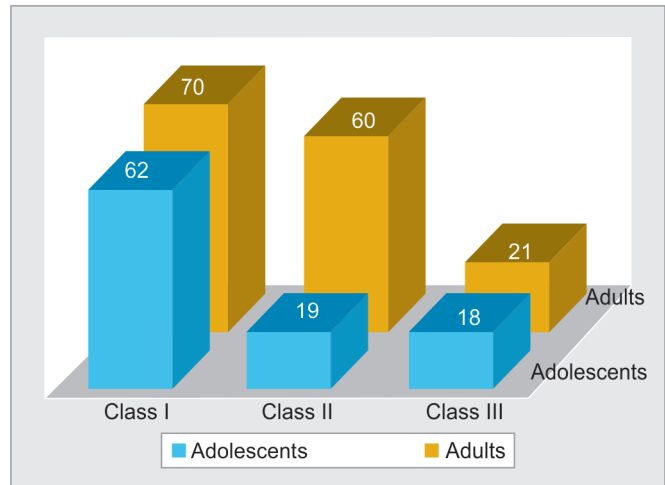


Fig. 1: Percentage and distribution of Angle's classification in adolescents and adults

Among the adolescents, it was observed that Class I was the most prevalent followed by Class II and then Class III. The same pattern was observed in adults with Class I being the most prevalent followed by Class II and then Class III.

The percentage distribution of different malocclusion traits in adolescents and adults has been recorded in Table 2.

With regard to overjet, 42.8% and 33.3% of the adolescents exhibited moderate and severe overjet while 57.2% and 66.7% of the adults showed moderate and severe overjet, respectively.

Anterior crossbite was observed in only 53.3% of adults and 46.6% of adolescents. As for posterior crossbite, 69.4% of the adults and 30.6% of the adolescents showed unilateral crossbite. A vast majority of the adults 69.2% showed bilateral crossbite while only 30.8% adolescents showed it. Unilateral scissor bite was observed in 1.51% of the adults and 2.27% of the adolescents. However bilateral scissor bite was not observed both in adolescents and adults.

Table 2 shows that higher percentage of adults showed anterior crossbite and posterior crossbite (uni- and bilateral). Unilateral crossbite showed a higher percentage than bilateral type. In addition, unilateral scissor bite was more frequently observed in as compared to bilateral scissor bite, which was absent in both adolescents and adults.

Overbite: 57.1% adults and 42.9% adolescents exhibited edge-to-edge overbite. Moderate overbite was observed in 100% of the adolescents. In contrast, none of the adults showed moderate overbite. This was in contrast to severe overbite where a majority of the adults, 69.2% manifested severe overbite while only 30.8% of the adolescents exhibited it.

Anterior open bite was present in 52.4% of the adults and 47.6% of the adolescents. However, lateral open bite was more frequent in adolescents and 87.5% of adolescents showed it, whereas only 12.5% of the adults showed lateral crossbite.

With regard to crowding and spacing, adolescents showed 38.8% and 30.8% crowding in maxillary and mandibular arches, respectively. As for the adults, crowding was present in 61.2% and 69.2% of the maxillary and mandibular arches, respectively. In adults, higher percentage of mandibular spacing was seen (64%) than maxillary spacing (57.9%). This was reversed in adolescents where maxillary spacing was more prevalent (42.1%) than mandibular (36.0%).

**Table 1:** Percentage and distribution of Angle's classification in adolescents and adults

Angle's classification	Total (250)		Adolescents		Adults	
	Number	(%)	Number	(%)	Number	(%)
Class I	132	52.8	62	47.0	70	53.2
Class II	79	31.6	19	24.1	60	75.9
Class III	39	15.6	18	46.2	21	53.8

**Table 2:** Percentage and distribution of malocclusion traits in both adolescents and adults

Malocclusion	Adolescents		Adults		Total
	Number	(%)	Number	(%)	Number
Overjet					
Normal	29	35.8	52	64.2	81
Moderate 4–6 mm	62	42.8	83	57.2	145
Severe >6 mm	8	33.3	16	66.7	24
Anterior crossbite					
Normal	85	38.6	135	61.4	220
Anterior crossbite	14	46.7	16	53.3	30
Posterior crossbite					
Normal	84	41.8	117	58.2	201
Unilateral	11	30.6	25	69.4	36
Bilateral	4	30.8	9	69.2	13
Scissors bite					
Unilateral	3	2.27	2	1.51	5
Bilateral	–	–	–	–	–
Overbite					
Normal	25	16.6	126	83.4	151
Edge-to-edge	12	42.9	16	57.1	28
Moderate 4–6 mm	58	100.0	0	0	58
Severe >6 mm	4	30.8	9	69.2	13
Open bite					
Normal	82	37.1	139	62.9	221
Anterior	10	47.6	11	52.4	21
Lateral	7	87.5	1	12.5	8
Crowding					
Normal	40	52.6	36	47.4	76
Maxillary	26	38.8	41	61.2	67
Mandibular	33	30.8	74	69.2	107
Spacing					
Normal	66	39.3	102	60.7	168
Maxillary	24	42.1	33	57.9	57
Mandibular	9	36.0	16	64.0	25

## DISCUSSION

The prevalence of malocclusion varies widely depending on the population, race, and age, and it is very important in determining and planning orthodontic treatment. The data collected in this study will help in understanding the distribution of the traits of malocclusion in the Saudi male population (Najran area) and establish a proper preventive and orthodontic treatment programs.

The sample used for this study consisted of adolescents and adults belonging to the age group of 12 to 35 years as these are the most frequent age group for those seeking orthodontic treatment. This is similar to the studies by al-Emran et al.<sup>14</sup> and Nashashibi et al.<sup>15</sup>

Angle's classification has been used in this study as it is a universally accepted system that is reliable and repeatable and that minimizes examiner subjectivity.<sup>16</sup> Distribution of different types of malocclusion may show great variability even in a population of same origin.<sup>17</sup>

This study revealed that Angle Class I malocclusion was considered the most prevalent type of malocclusion with 52.8% followed by Class II with 31.6% and Class III with 15.6% among the orthodontic patients examined. This was in agreement with the study conducted by Meer et al.,<sup>18</sup> al Emran et al.,<sup>14</sup> and Al-Balkhi and Zahrani<sup>19</sup> who reported that the most common type of malocclusion was Class I, followed by Class II, and then Class III

in the Saudi patients. Gudipani et al.<sup>20</sup> in a study conducted on Northern border region of Saudi Arabia also found that Angle Class I was the most prevalent malocclusion with 52.8% followed by Angle's Class II (31.8%) and Angle's Class III (15.4%). The results of this study are also in accordance with the research conducted by AlQarni et al.<sup>21</sup> in Asser region of Saudi Arabia in which Class I malocclusion (75%) was found to be most common, followed by Angle's Class II malocclusion (14%) and Angle's Class III malocclusion (11%). Another study conducted in the population of Dammam city by Al-Shahrani et al.<sup>22</sup> found that the Class I malocclusion was most prevalent (61.6%), followed by Class II (31.8%) which is similar to the findings of this study. When compared to other countries, Nigeria<sup>23</sup> reported 76.5% and Turkey<sup>24</sup> reported 74% cases of Angle's Class I malocclusion in their population. In Pakistan,<sup>10</sup> Angle's Class II malocclusion (70.5%) was more prevalent amongst orthodontic patients. In urban Iranian population<sup>25</sup> and Jordanian school children,<sup>26</sup> Angle's Class I malocclusion was found to be more prevalent by 41.8% and 55.3%, respectively. In a recent systematic review conducted by Alhammedi et al.,<sup>27</sup> the highest prevalence of Class I malocclusion was reported in the African population, whereas the Caucasians and Europe population showed the highest prevalence of Class II malocclusion.

The different types of malocclusion anomalies that were observed were overjet, crossbite, overbite, open bite, crowding, and spacing. Similar occlusal anomalies were observed in a study by Hosam Baeshen.<sup>28</sup>

Among the different malocclusion traits which were observed, the most common anomaly was moderate overbite which was found to be 42.8% in adolescents and 66.7% in adults followed by lateral open bite which was found to be 87.5% in adolescents and 12.5% in adults. Gudipani et al.<sup>20</sup> reported excessive overbite in 23.4% and reduced overbite in 12.2% in Northern border region of Saudi Arabia. In the similar study, excessive overjet was found to be 22.2% and reduced overjet was found to be 11.4% of population. Albakri et al.<sup>29</sup> in a study conducted in Riyadh, Saudi Arabia, concluded that deep bite was found in 9.6% and open bite was present in 4% of the population. In the same study, the normal overjet was seen in 75.4%, slight increase in overjet was found in 15.2%, and severe increase in overjet was found in 6.6% of the population.

In this study, posterior crossbite was found to be more prevalent than anterior crossbite. Albakri et al.<sup>29</sup> reported 4.6% bilateral crossbite and 1.4% unilateral crossbite in the population of Riyadh, Saudi Arabia.

With regard to crowding, adolescents showed more crowding in the maxillary arch (38.8%) compared to mandibular arch (30.8%). In adults, the findings were opposite to that of adolescents. Mandibular crowding (69.2%) was more frequently present than maxillary crowding (61.2%) in adults. This can be attributed to large teeth, small jaw, or a combination of both. Gudipani et al.<sup>20</sup> reported crowding in 47.2% of patients in Northern border region of Saudi Arabia. AlQarni et al.<sup>21</sup> reported crowding in 40% of patients in Asser region of Saudi Arabia. Albakri et al.<sup>29</sup> found 23.2% crowding in maxilla and 28% crowding in mandible in Riyadh, Saudi Arabia.

In this study, in adults, spacing was more prevalent in mandibular arch (64%) compared to maxillary arch (57.9%). In the adolescent group, it was observed that the space discrepancies were more common in the maxilla (42.1%) than in the mandible (36%). This finding can be associated to the hereditary factors in tooth size–arch length discrepancies. The findings of this study

are in accordance with the study conducted by Albakri et al.<sup>29</sup> who reported maxillary spacing (11.6%) more frequently than mandibular spacing (8.8%) in the population of Riyadh, Saudi Arabia. On the contrary, al-Emran et al.<sup>14</sup> reported higher frequency of spacing in the mandibular arch. This could be due to the differences in age and gender distribution in this study.

The current study achieved its objective by identifying the prevalence of various malocclusion traits in the adolescent and adult male population of Saudi Arabia. Limitations of the study lie in the fact that only male population were included in the study. Moreover, Saudi Arabia due to its ethnically mixed cosmopolitan population has mixed races. Hence, further large-scale studies involving more population are required to provide accurate malocclusion traits of Najran area in the Saudi population.

## CONCLUSION

In this study, the prevalence of Angle's Class I, Class II, and Class III malocclusions was found to be 52.8%, 31.6%, and 15.6%, respectively in the adolescent and adult males in Najran population. The most common anomaly was found to be moderate overbite followed by lateral open bite. Posterior crossbite was found to be more prevalent than anterior crossbite.

The epidemiological data of this study can help in understanding the prevalent traits of malocclusion pertaining to the population of adolescent and adult Saudi males in Najran. to formulate an appropriate preventive and orthodontic treatment measures. The authors recommend the utilization of these data in formulating an appropriate preventive and orthodontic treatment measures for the required population.

## REFERENCES

- Houston WJ. Walther's Orthodontic Notes, ch. 6. 4th ed., The Stonebridge Publishers; 2000. pp. 46–50. Available from: <http://www.alibris.com/search/books/isbn/9780723606703>.
- Bedi R, Gulati N, McGrath C. A study of satisfaction with dental services among adults in the United Kingdom. *Br Dent J* 2005;198(7):433–437. DOI: 10.1038/sj.bdj.4812198.
- McLain JB, Proffitt WR. Oral health status: prevalence of malocclusion. *J Dent Educ* 1985;49(6):386–397.
- Thilander B, Pena L, Infante C, et al. Prevalence of malocclusion and orthodontic treatment need in children and adolescents in Bogota, Colombia, an epidemiological study related to different stages of dental development. *Eur J Orthod* 2001;23(2):153–167. DOI: 10.1093/ejo/23.2.153.
- Sidlauskas A, Lopatiene K. The prevalence of malocclusion among 7-15-year-old Lithuanian school children. *Medicina (Kaunas)* 2009;45(2):147–152. DOI: 10.3390/medicina45020019.
- Shivakumar KM, Chandu GN, Subba Reddy VV, et al. Prevalence of malocclusion and orthodontic treatment needs among middle and high school children of Davangere city, India by using dental aesthetic index. *J Indian Soc Pedod Prev Dent* 2009;27(4):211–218. DOI: 10.4103/0970-4388.57655.
- Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics. 4th ed., India: Mosby, Health Science imprints of Elsevier; 2008. pp. 3–23.
- Bjork A, Krebs A, Solow B. A method for epidemiological registration of malocclusion. *Acta Odontol Scand* 1964;22(1):27–41. DOI: 10.3109/00016356408993963.
- Angle E. Malocclusion of the teeth. In: Moyers RE. Handbook of Orthodontics. 4th ed., Chicago: Yearbook Med Publ Inc.; 1988. pp. 186–188.
- Gul-E-Erum, Fida M. Pattern of malocclusion in orthodontic patients: a hospital based study. *J Ayub Med Coll Abbottabad* 2008;20(1):43–47.

11. Gelgor IE, Karaman A, Ercan E. Prevalence of malocclusion among adolescents in Central Anatolia. *Euro J Dent* 2007;1:125–131.
12. Vibhute AH, Vibhute NA, Daule R. Prevalence of malocclusion characteristic and chief motivational factors for treatment in orthodontic patients from Maharashtra, India. *J Orthodont Res* 2013;1(Issue 2):62–65. DOI: 10.4103/2321-3825.116285.
13. Mugonzibwa EA, Eskeli R, Laine-Alava MT, et al. Spacing and crowding among African and Caucasian children. *Orthod Craniofac Res* 2008;11(2):82–89. DOI: 10.1111/j.1601-6343.2007.00416.x.
14. al-Emran S, Wisth PJ, Bøe OE. Prevalence of malocclusion and need for orthodontic treatment in Saudi Arabia. *Community Dent Oral Epidemiol* 1990;18(5):253–255. DOI: 10.1111/j.1600-0528.1990.tb00070.x.
15. Nashashibi I, Darwish SK, El Khalifa R. Prevalence of malocclusion and treatment needs in Riyadh (Saudi Arabia). *Odontostomatol Trop* 1983;6(4):209–214.
16. Silva RG, Kang DS. Prevalence of malocclusion among Latino adolescents. *Am J Orthod Dentofacial Orthop* 2001;119(3):313–315. DOI: 10.1067/mod.2001.110985.
17. Sayin MO, Türk kahraman H. Malocclusion and crowding in an orthodontically referred Turkish population. *Angle Orthodont* 2004;74(No. 5):635–639.
18. Meer Z, Sadatullah S, Wahab MA, et al. Prevalence of malocclusion and its common traits in Saudi males of Aseer region. *J Dent Res Rev* 2016;3(3):99–102. DOI: 10.4103/2348-2915.194834.
19. Al-Balkhi KM, Zahrani AA. The pattern of malocclusions in Saudi Arabian patients attending for orthodontic treatment at college of King Saud University, Riyadh. *Saudi Dent J* 1994;6(3):138–144.
20. Gudipaneni RK, Aldahmeshi RF, Patil SR, et al. The prevalence of malocclusion and the need for orthodontic treatment among adolescents in the northern border region of Saudi Arabia: an epidemiological study. *BMC Oral Health* 2018;18(1):16. DOI: 10.1186/s12903-018-0476-8.
21. AlQarni MA, Banihuwaiz AH, Alshehri FD, et al. Evaluate the malocclusion in subjects reporting for orthodontic treatment among Saudi population in Asser Region. *J Int Oral Health: JIOH* 2014;6(4):42.
22. Al-Shahrani N, Al-Amri A, Hegazi F, et al. The prevalence of premature loss of primary teeth and its impact on malocclusion in the eastern province of Saudi Arabia. *Acta Odontol Scand* 2015;73(7):544–549. DOI: 10.3109/00016357.2014.939709.
23. Onyeano CO, Aderinokun GA, Arowojolu MO. The pattern of malocclusion among orthodontic patients seen in dental centre, University College Hospital, Ibadan, Nigeria. *Afr J Med Med Sci* 2002;31(3):207–211.
24. Sayin MO, Türk kahraman H. Malocclusion and crowding in an orthodontically referred Turkish population. *Angle's Orthod* 2003;74:635–639.
25. Borzabadi-Farahani A, Borzabadi-Farahani A, Eslamipour F. Malocclusion and occlusal traits in an urban Iranian population. An epidemiological study of 11- to 14-year-old children. *Eur J Orthod* 2009;31(5):477–484. DOI: 10.1093/ejo/cjp031.
26. Elham SJ, Abu Alhajja ES, Al-Khateeb SN, et al. Prevalence of malocclusion in 13–15 year-old north Jordanian school children. *Community Dent Health* 2005;22:266–271.
27. Alhammadi MS, Halboub E, Fayed MS, et al. Global distribution of malocclusion traits: a systematic review. *Dental Press J Orthod* 2019;24(3):113. DOI: 10.1590/2177-6709.24.3.113.err.
28. Baeshen H. The prevalence of major types of occlusal anomalies among Saudi middle school students. *J Contemp Dent Pract* 2017;18(2):142–146. DOI: 10.5005/jp-journals-10024-2005.
29. Albakri FM, Ingle N, Assery MK. Prevalence of malocclusion among male school children in Riyadh city. *Open Access Maced J Med Sci* 2018;6(7):1296. DOI: 10.3889/oamjms.2018.207.