

Malocclusion in Saudi Arabia: Review Article

Lujain Ahmad Alghrairy^{1*}, Waad Eidhah Alsaadi², Saud Ahmad Aleidy², Malik Hatim Alotaibi², Ali Hussain Alrizqi²

¹King Abdulaziz Medical City National Guard, Riyadh, Saudi Arabia

²King Saud bin Abdulaziz University for Health Sciences, College of Dentistry, Riyadh, Saudi Arabia

ABSTRACT

Background: Malocclusion features the third highest prevalence among oral pathologies, second to tooth decay and periodontal disease and therefore rank third among worldwide dental public health priorities.

Objectives: To analyze orthodontic malocclusion in Saudi Arabia and its components including Angle classification, facial profiles, overbite, overjet, crossbite, scissor bite, crowding, spacing, and treatment needs.

Methods: The methods which were used for this review were to search in PubMed database, using specific words "Malocclusion; Angle classification; Facial profiles; Overbite; Overjet; Crossbite; Scissor bite; Crowding; Spacing; Treatment needs; and Saudi Arabia".

Results: Angle's classifications were reviewed showing Class I angle's malocclusion to be the most common type of malocclusion. Facial profiles were investigated which presented straight facial profile to be the most common type of facial profile. Overbite and overjet were revised in literature concluding the norms and abnormalities, which showed different results. Crossbite and Scissor bite were studied identifying their prevalence, which presented variable findings. Crowding and spacing were reviewed recognizing their commonness, which disclosed their high prevalence and impact. Lastly, treatment needs were investigated which presented severe or extreme need to be the most prevalent category in relevance to orthodontic treatment needs.

Conclusion: In Saudi Arabia, orthodontic malocclusion and its components were well-discussed in literature. Malocclusion showed high prevalence and impact on Saudi population.

Key words: Malocclusion, Angle's classifications, Facial profile, Treatment needs and Saudi Arabia

HOW TO CITE THIS ARTICLE: Lujain Ahmad Alghrairy, Waad Eidhah Alsaadi, Saud Ahmad Aleidy, Malik Hatim Alotaibi, Ali Hussain Alrizqi, Malocclusion in Saudi Arabia: Review Article, J Res Med Dent Sci, 2021, 9 (3):121-125.

Corresponding author: Lujain Ahmad Alghrairy

e-mail ✉: lujainalghrairy@gmail.com

Received: 27/02/2021

Accepted: 18/03/2021

INTRODUCTION

Malocclusion and its high prevalence have made it a public health problem; it is considered now as the third highest oral health priority in the world [1,2]. A malocclusion is defined as an irregularity of the teeth or a mal-relationship between the dental arches beyond the range of what is accepted as normal [3]. Malocclusion in itself is not a life-threatening condition; however, it may unfavorably affect social interactions

and psychological well-being of patients [4]. It often causes psychosocial problems as it affects the aesthetics of the person, disturbances of oral function, such as speech, mastication and swallowing, increased susceptibility to trauma, gingival and periodontal diseases and finally the general health of the individual [5]. The etiology of malocclusion is multifactorial as the dentofacial structure can be a combination of hereditary factors including some stimulus during the formation and development of orofacial structures and environmental factors such as oral habits, social characteristics, and diet [6,7].

The aim of this study is to review malocclusion statuses in Saudi Arabia, by summarizing what

is reported in literature using its fundamental components such as Angle classification, facial profiles, overbite, overjet, crossbite, scissor bite, crowding, spacing, and treatment needs. In Saudi Arabia, few studies have evaluated the prevalence and distribution of malocclusion using an esthetic indexes. SatheeshB et al, reported the presence of 42.8% of malocclusion in Abha [8]. Another study conducted in Saudi population by Dawoodbhoy et al they found that the prevalence of malocclusion in Alkhobar was 67.6% [9].

RESULTS

Angle's classification

In 1900s Edward H. Angle classified occlusion basically by using maxillary and mandibular 1st molars. His classification was divided into three types (Class I, Class II, and Class III). First of all, normal occlusion which can be defined as mesiobuccal cusp of the maxillary 1st molar occludes on buccal groove of the mandibular 1st molar. Second, Class I is the same as normal occlusion but it has crowding, rotation, or other irregularities. Third, Class II which is mesiobuccal cusp of the maxillary 1st molar occludes anterior to the buccal groove of the mandibular 1st molar. Lastly, Class III which is mesiobuccal cusp of the maxillary 1st molar occludes posterior to the buccal groove of the mandibular 1st molar. Study conducted in northern border of Saudi Arabia by Gudipaneni RK et al. [10] reported that (52.8%) of patients had Angle's Class I, (31.8%) had Angle's Class II and (15.4%) had Angle's Class III. Another Study conducted in Riyadh among 12-16 years old patient by Asiry MA. [11] reported that Class I molar relationship was found in (60.11%) of the subjects. Additionally, Study conducted in Asser region by AlQarni MA et al. [12] reported that (75%) of the participants had Angle's Class I followed by Angle's Class II and III. Also, in study conducted among Saudi orthodontic patient by Abdullah M. Aldrees. [13] reported that the most common dental malocclusion is Angle Class I and there is no gender difference was seen in the distribution of the molar relationship. In conclusion, Majority of studies conducted in Saudi Arabia have the same results, class I is the most common type of Angle's Classification in Saudi Arabia followed by class II then class III. Class I is considered as a normal type except that it accompanies some positional irregularities.

Overbite and overjet

Normally the maxilla is larger than the mandible where they make normal overjet and overbite. Overjet defined as horizontal overlap of the maxillary central incisor over mandibular central incisor. Also, overbite defined as vertical overlap of the maxillary central incisor over mandibular central incisor. The normal overjet and overbite range is (2-4mm) as reported by Kinaan BK et al. [14] Study conducted in northern border of Saudi Arabia by Gudipaneni RK et al. [10] reported that (66.4%) of patients had normal overjet, (22.2%) of patients had excessive overjet and (11.4%) of patients had reduced overjet. Also, the same study reported that (64.4%) of patients had normal overbite, (23.4%) of patients had excessive overbite and (12.2%) of patients have reduced overbite. In addition, Study conducted in Riyadh among 12-16 years old patient by Asiry MA. [11] reported that (67%) had normal overjet between 1-3 mm, (10%) of the subjects exhibited negative overjet or edge to edge relationship, (15%) had overjet between 4-6 mm, and only (1.2%) had overjet of more than 6 mm. Regarding overbite, the majority of the subjects (76%) had normal overbite with 1-3 mm overlap, while (6.52%) showed 4-6 mm overlap and only (0.16%) with more than 6 mm overbite. Another study conducted in Riyadh By Albakri FM. [15] reported that the normal overjet was seen in (75.4%) of the sample. An increase in overjet (4:6mm) was seen in (15.2%) while more increase in overjet was seen in (6.6%) of the sample, (2.8%) was reverse overjet. Majority of studies conducted in Saudi Arabia have approximately the same results, more than (60%) of the population have normal overjet or overbite.

Facial profiles

It represents the outline form of the face from the lateral view, which can be decided by three points (Glabella, Subnasale, Pogonion). There are three types of facial profiles, when all the 3 points are in vertical position the profile is said to be straight profile. When the pogonion point is placed behind the profile is said to be convex profile. When the pogonion is placed forward the profile is said to be concave profile. Study conducted in northern border of Saudi Arabia by Gudipaneni RK et al. [10] reported that (49.2%) of patients had a straight profile, (42.6%) of patients had convex profile and (8.2%) of

patients had a concave profile. Most of the studies in Saudi Arabia shows approximately the same regarding the straight and convex profile followed by concave profile.

Crossbite and Scissor bite

When the posterior teeth of the upper arch are in outward position, and the posterior teeth of the lower arch are in inward position is said to be Scissor bite. However, the opposite of this condition will lead to crossbite which include anterior and posterior crossbites. Study conducted in Asser region by AlQarni MA et al. [12] reported that Only (20%) had anterior crossbite whereas (30.2%) had posterior crossbite. Only (8%) of participants had open bite whereas about (5%) had scissor bite. Another study conducted in northern border of Saudi Arabia by Gudipaneni RK et al. [10] reported that anterior crossbite was present in only (4.8%) of patients, while posterior crossbite was present in only (9.4%) of them. Also, study conducted in Riyadh among 12-16 years old patient by Asiry et al. [11] reported that (8.4%) presented with anterior cross bite while posterior cross bite was found in (8.9%), respectively. Scissor bite was not observed in any subject participated in this study. In addition, study conducted in western region of Saudi Arabia by Hassan et al. [16] conducted that (44.5%) had crossbite. As most of the studies shown that the Most common crossbite in Saudi Arabia is posterior crossbite, scissor bite is rare.

Crowding, spacing and open bite

The discrepancy between the jaw size and teeth size will lead to crowding, such as small jaw with large teeth. In contrast when you have interdental spaces and lack of contact point between the teeth that will lead to spacing which is divided to generalized and localized depend on the teeth that is involve in the problem. Study conducted in northern border of Saudi Arabia by Gudipaneni et al. [10] reported that crowding was present in (47.2%) of patients, while spacing was present in (27.2%) of them, open bite was present in only (4.6%) of patients. Another study conducted in Riyadh among 12-16 years old patient by Asiry MA. [11] reported that (38%) of the subjects had crowding, respectively, On the other hand, (26.6%) of the subjects had spacing, the study also shows that (5.47%) of the sample had open bite. In addition, study conducted in Riyadh by

Albakri et al. [15] reported that anterior open bite in the Saudi sample show is (4%). Moreover, study conducted in Asser region by AlQarni et al. [12] reported that Around (40%) of the participants showed crowding in their dentition and (42%) of the participants shows Spacing.

Treatment needs

Study conducted in Saudi Arabia by Al-Hummayani et al. [17] reported that According to the IOTN-DHC (24.3%) of the cases required severe/extreme need for orthodontic treatment. The highest number of cases fell into the no/slight need category (51.3%), and IOTN-AC grades. It reveals that the highest number of cases fell in the no/slight need of treatment (65.8%), followed by moderate/borderline need (26.6%), and severe/extreme need of treatment was last (7.6%). Another study conducted in Saudi Arabia by Al-Jobair et al. [18] reported that The most common orthodontic problem was displacement (96%), followed by increased overjet (64.7%), Class II or III molar relationship (64%), crossbite (36%), overbite (36%), and open bite (31%), (13%) had no or slight treatment need, (18.3%) had moderate to borderline need, and (68.7%) had great treatment need.

DISCUSSION

The aim of this study is to review and summarize what is reported in literature regarding malocclusion in Saudi Arabia. Malocclusion is divided into several fundamental components which include Angle classification, facial profiles, overbite, overjet, crossbite, scissor bite, crowding, spacing and treatment needs. Various studies have been conducted in various countries describing malocclusion. Comparing the results of these studies is not easy, because malocclusion varies depending on the country, sex, age.

Angle's classification

The most common type of malocclusion was Class I angle's malocclusion in Saudi Arabia [12]. In comparison, a higher percentage of Angle's Class I malocclusion was observed in Turkey 74% [19] and Nigeria 76.5% [20]. On the other hand, Angle's Class II malocclusion was the most common type in Pakistan among orthodontic patients [21].

Facial profile

Saudi Adults generally had increased facial convexity associated with retruded mandible, more obtuse lower face-throat angle, increased bimaxillary lip protrusion, increased mentolabial sulcus, decreased vertical lip-chin ratio, and increased maxillary incisor exposure than European-Americans [22]. Moreover, in Saudi population females had a reduced lower vertical height-depth ratio, smaller lower lip distance more obtuse nasolabial angle and decreased interlabial gap than males [22].

Overbite and overjet

In Saudi Arabia, it was found that 76% of subjects had 1-3 mm overbite, 6,52% had 4-6 mm overbite, while only 0.16% had more than 6 mm overlap [11]. Regarding overjet, 67% had 1-3 mm overjet, 15% have overjet between 4-6 mm, while only 1.2% had overjet of more than 6 mm [11]. In Iranian population, A normal overbite was observed in 60.4%, while 34.5% had 4-6 overbite and 2.2% a very deep overbite (more than 6 mm) [23]. Additionally, 3.5 mm or more overjet was present in 28.1%, an overjet of more than 6 mm in 3.6%, and reverse overjet in 4.2% [23].

Crossbite and scissorbite

In Saudi Arabia, 4.8% of the population had anterior crossbite, while 9.4% had posterior crossbite [15,10]. Anterior cross bite showed lesser values among Icelandic [24] and Croatian [25] populations. While It was higher among Iranian [23], Colombian [26] and German [27] populations. Posterior crossbite showed Lesser values among Iranian [23], Hungarian [28], Colombian [26] and Caucasian populations. Regarding scissorbite, the results recorded in Saudi Arabia were 5% to 10.9% of the population [12,16]. In comparison, scissorbite was less prevalent in Turkey and Finland [29,30].

Crowding and spacing

In Saudi Arabia, studies found in the literature showed that crowding is prevalent as 40% to 47.2% of the population [12,17]. compared to studies conducted in other countries such as Pakistan, it showed lesser values [17]. Additionally, spacing was present in 26.6% to 42% of the Saudi population. In contrary, it was higher in other countries such as in Icelandic [24], and Croatian [25] populations, and lesser then that found among Hungarian [28], Colombian [26] and Iranian populations [23].

Treatment needs

In Saudi Arabia, 15.2% of the population conformed to little or no need for treatment, 13.2% were assessed as in borderline need and 71.6% were assessed as in need for treatment [16]. Compared to a study conducted in India, it showed a less prevalence of treatment need 32.8% compared to Saudi Arabia [31].

There is some lack of studies conducted in Saudi Arabia regarding malocclusion. More studies and researches should be done in the future, in order to provide the best treatment possible.

CONCLUSION

To sum up, malocclusion is considered to be the third highest prevalence among oral pathologies. In Saudi Arabia, various studies investigated malocclusion and its various components. In this study, we reviewed malocclusion and its different components in Saudi Arabia. Angle's classifications were reviewed showing Class I angle's malocclusion to be the most common type of malocclusion. Facial profiles were investigated which presented straight facial profile to be the most common type of facial profile. Overbite and overjet were revised in literature concluding the norms and abnormalities, which showed different results. Crossbite and Scissor bite were studied identifying their prevalence, which presented variable findings. Crowding and spacing were reviewed recognizing their commonness, which disclosed their high prevalence and impact. Lastly, treatment needs were investigated which presented severe or extreme need to be the most prevalent category of orthodontic treatment needs.

REFERENCES

1. Marques LS, Pordeus IA, Ramos-Jorge ML, et al. Factors associated with the desire for orthodontic treatment among Brazilian adolescents and their parents. BMC Oral Health 2009; 9:34.
2. Tak M, Nagarajappa R, Sharda AJ, et al. Prevalence of malocclusion and orthodontic treatment needs among 12-15 years old school children of Udaipur, India. Eur J Dent 2013; 7:S45-S53.
3. Gupta DK, Singh SP, Utreja A, et al. Prevalence of malocclusion and assessment of treatment needs in β -thalassemia major children. Prog Orthod 2016; 17:7.
4. Mtaya M, Brudvik P, Astrøm AN. Prevalence of malocclusion and its relationship with socio-demographic factors, dental caries, and oral hygiene in 12- to 14-year-old Tanzanian schoolchildren. Eur J Orthod 2009; 31:467-476.

5. Bellot-Arcís C, Montiel-Company JM, Almerich-Silla JM. Psychosocial impact of malocclusion in Spanish adolescents. *Korean J Orthod* 2013; 43:193–200.
6. Masood Y, Masood M, Zainul NN, et al. Impact of malocclusion on oral health related quality of life in young people. *Health Qual Life Outcomes* 2013; 11:25.
7. Dimberg L, Lennartsson B, Arnrup K, et al. Prevalence and change of malocclusions from primary to early permanent dentition: A longitudinal study. *Angle Orthod* 2015; 85:728–734.
8. Peres KG, Barros AJ, Peres MA, et al. Effects of breastfeeding and sucking habits on malocclusion in a birth cohort study. *Rev Saude Publica* 2007; 41:343–350.
9. Heimer MV, Tornisiello Katz CR, Rosenblatt A. Non-nutritive sucking habits, dental malocclusions, and facial morphology in Brazilian children: A longitudinal study. *Eur J Orthod* 2008; 30:580–585.
10. Gudipani 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; 18:1-6.
11. Asiry MA. Occlusal status among 12-16 year-old school children in Riyadh, Saudi Arabia. *J Int Oral Health* 2015; 7:20.
12. 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* 2014; 6:42.
13. Aldrees AM. Pattern of skeletal and dental malocclusions in Saudi orthodontic patients. *Saudi Med J* 2012; 33:315-320.
14. Kinaan BK. Overjet and overbite distribution and correlation: A comparative epidemiological English Iraqi study. *Br J Orthodont* 1986; 13:79-86.
15. Albakri FM, Ingle N, Assery MK. Prevalence of malocclusion among male school children in Riyadh City. *J Med Sci* 2018; 6:1296.
16. Hassan AH. Orthodontic treatment needs in the western region of Saudi Arabia: A research report. *Head Face Med* 2006; 2:2.
17. Al-Hummayani FM, Taibah SM. Orthodontic treatment needs in Saudi young adults and manpower requirements. *Saudi Med J* 2018; 39:822.
18. Al-Jobair AM, Baidas LF, Al-Hamid AA, et al. Orthodontic treatment need among young Saudis attending public versus private dental practices in Riyadh. *Clinical Cosmetic Investigational Dent* 2016; 8:121.
19. Sayin M, Türkkahraman H. Malocclusion and crowding in an orthodontically referred Turkish population. *Angle Orthodont* 2004; 74:635-639.
20. Onyeaso C, Aderinokun G, Arowojolu M. The pattern of malocclusion among orthodontic patients seen in dental centre, university college hospital, Ibadan, Nigeria. *Af J Med Med Sci* 2002; 31:207-211.
21. Fida M. Pattern of malocclusion in orthodontic patients: A hospital based study. *J Ayub Med College* 2008; 20:43.
22. AlBarakati SF. Soft tissue facial profile of adult Saudis. Lateral cephalometric analysis. *Saudi Med J* 2011; 32:836-842.
23. 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 Orthodont* 2009; 31:477-484.
24. Jonsson T, Arnlaugsson S, Karlsson KO, et al. Orthodontic treatment experience and prevalence of malocclusion traits in an Icelandic adult population. *Am J Orthodont Dentofac Orthop* 2007; 131:8-e11.
25. Lauc T. Orofacial analysis on the Adriatic islands: an epidemiological study of malocclusions on Hvar Island. *Eur J Orthodont* 2003; 25:273-278.
26. 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 Orthodont* 2001; 23:153-168.
27. Tausche E, Luck O, Harzer W. Prevalence of malocclusions in the early mixed dentition and orthodontic treatment need. *Eur J Orthodont* 2004; 26:237-244.
28. Gábris K, Márton S, Madléna M. Prevalence of malocclusions in Hungarian adolescents. *Eur J Orthodont* 2006; 28:467-470.
29. Gelgör İE, Karaman Aİ, Ercan E. Prevalence of malocclusion among adolescents in central anatolia. *Eur J Dent* 2007; 1:125.
30. Keski-Nisula K, Lehto R, Lusa V, et al. Occurrence of malocclusion and need of orthodontic treatment in early mixed dentition. *Am J Orthodont Dentofac Orthop* 2003; 124:631-638.
31. Kumar P, Londhe SM, Kotwal A, et al. Prevalence of malocclusion and orthodontic treatment need in schoolchildren—An epidemiological study. *Med J Armed Forces India* 2013; 69:369-374.