

DENTAL MALOCCLUSION AND PREVALENCE OF DENTAL MALOCCLUSIONS IN DIFFERENT GEOGRAPHICAL AREAS

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Abstract:

Malocclusion often develops when a child begins transitioning into mixed dentition. Malocclusion can cause speech problems, difficulty eating, changes in facial structure, and tongue and cheek biting. Since there is no known etiology behind malocclusion, an interprofessional team approach is crucial to allow for an earlier diagnosis. Diagnosis is standardized with the use of classification systems and radiographs. Orthodontists use several methods to treat malocclusion, including palatal expanders, spacers, braces, and clear aligners. This activity defines and distinguishes the different types of malocclusion seen in orthodontics and highlights the role of the interprofessional team in diagnosing and utilizing various techniques to treat malocclusion.

Keywords: Prevalence, Malocclusion, Population, Class I malocclusions, Class II Division 1, Class III malocclusions.

Objective:

- Understand the pathophysiology of malocclusion.
- Describe the etiology behind malocclusion.
- Identify the different classes of malocclusion.
- Apply best practices when treating malocclusion.

Considering that the available studies on prevalence of malocclusions are local or national-based, this study aimed to pool data to determine the distribution of malocclusion traits worldwide in mixed and permanent dentitions.

Methods: The sample comprised 2329 teenagers (1125 boys and 1204 girls), aged between 12 and 17 years (mean age: 14.6 yrs). Occlusal anteroposterior relationships were assessed using the Angle classification. Other variables examined were overjet, overbite, crowding, midline diastema, posterior crossbite, and scissors bite. **Results:** In permanent dentition, the global distributions of Class I, Class II, and Class III

malocclusion were 74.7% [31 - 97%], 19.56% [2 - 63%] and 5.93% [1 - 20%], respectively. In mixed dentition, the distributions of these malocclusions were 73% [40 - 96%], 23% [2 - 58%] and 4% [0.7 - 13%]. Regarding vertical malocclusions, the observed deep overbite and open bite were 21.98% and 4.93%, respectively. Posterior crossbite affected 9.39% of the sample. Africans showed the highest prevalence of Class I and open bite in permanent dentition (89% and 8%, respectively), and in mixed dentition (93% and 10%, respectively), while Caucasians showed the highest prevalence of Class II in permanent dentition (23%) and mixed dentition (26%). Class III malocclusion in mixed dentition was highly prevalent among Mongoloids.

Conclusion: Class II Division 1 malocclusion is the most prevalent occlusal pattern among the Central Anatolian adolescents and the high values (25.1% and 18.3%) of increased overjet and overbite were a reflection of the high prevalence of Class II malocclusion.

Worldwide, in mixed and permanent dentitions, Angle Class I malocclusion is more prevalent than Class II, specifically among Africans; the least prevalent was Class III, although higher among Mongoloids in mixed dentition. In vertical dimension, open bite was highest among Mongoloids in mixed dentition. Posterior crossbite was more prevalent in permanent dentition in Europe.

INTRODUCTION

Orthodontics seeks to achieve esthetic and functional improvement via mechanical therapy that moves teeth into a more ideal position. Determining the ideal dental position for each patient depends on several factors, such as the facial profile, facial balance, and aesthetic concerns.

Classification of Malocclusion

Acknowledged as the "father of modern orthodontics," Dr. Edward Hartley Angle established three classes of malocclusion according to the position of the mesiobuccal cusp of the upper first molar concerning the buccal groove of the lower first molar. Angle class I molar classification (also known as neutroclusion) is determined by the mesiobuccal cusp of the maxillary first molar occluding with the buccal groove of the mandibular first molar. A class II molar classification (mesocclusion) is determined by the mesiobuccal cusp of the maxillary first molar, occluding mesial to the buccal groove of the mandibular first molar. Lastly, a class III molar classification is determined by the mesiobuccal cusp of the maxillary first

molar occluding distal to the buccal groove of the mandibular first molar (distocclusion).

In Ackerman and Profitt's classification system, malocclusion is divided into classes I, II, III, IV, V, and VI. These categories are based on the relationship between the maxillary and mandibular teeth and the jaw position.

- Class I: The maxillary teeth are slightly forward of the mandibular teeth, and the jaw is aligned properly.
- Class II: The maxillary teeth are significantly forward of the mandibular teeth, and the jaw is underdeveloped.
- Class III: The mandibular teeth are significantly forward of the maxillary teeth, and the jaw is overdeveloped.
- Class IV: The maxillary teeth are significantly behind the mandibular teeth.
- Class V: The maxillary teeth are significantly forward of the mandibular teeth, and the jaw is overdeveloped.
- Class VI: The mandibular teeth are significantly behind the maxillary teeth.

[The etiology of malocclusion is often multifactorial, mainly influenced by genetic and environmental factors. Inherited factors are also believed to be involved, but their exact role is yet to be fully understood. While most malocclusion cases have an unknown etiology, the correlation between genetics and malocclusion has been studied extensively. Data suggests that a specific malocclusion, Class III mandibular prognathism, is passed down through generations via specific growth factors and genetic markers. Dating back to the 1300s, the heritability pattern of mandibular prognathism can be seen in the European royal Hapsburg family. Nicknamed the “Hapsburg Jaw,” interbreeding between different family members allowed the genes encoding mandibular prognathism to be expressed over multiple generations. Angle introduced his famous classification of malocclusion in 1899.¹ Now the World Health Organization estimates malocclusions as the third most prevalent oral health problem, following dental caries and periodontal diseases. Many etiological factors for malocclusion have been proposed. Genetic, environmental, and ethnic factors are the major contributors in this context. Epidemiological studies play a pivotal role in terms of determining the size of the health problems, providing the necessary data and generating and analyzing hypotheses of associations, if any. Through these valuable information, the priorities are set and the health policies are developed.



MATERIALS AND METHODS

A literature search in PubMed, Embase, and Google Scholar search engines was conducted up to December 2016. The following search terms were used: 'Prevalence', 'Malocclusion', 'Mixed dentition', and 'Permanent dentition'. In addition, an electronic search in websites of the following journals was conducted: Angle Orthodontist, American Journal of Orthodontics and Dentofacial Orthopedics, Journal of Orthodontics, and European Journal of Orthodontics.

Studies that fulfilled the following criteria were included:

- 1) Population-based studies.
- 2) Sample size greater than 200 subjects.
- 3) Studies that evaluated malocclusion during mixed and/ or permanent dentitions.
- 4) Studies that used Angle's classification of malocclusion.
- 5) Studies that considered the following definitions of the specified malocclusion characteristics: "abnormal overjet" if more than 3mm; "reverse overjet" when all four maxillary incisors were in a crossbite; "abnormal overbite" if more than 2.5 mm (for deep bite) and if less than 0 mm (for open bite); and "posterior crossbite" when affecting more than two teeth. The malocclusion traits included were: Angle Classification (Class I / II / III), overjet (increased / reversed), overbite (deep bite / open bite), posterior crossbite, based on the above mentioned definitions for these traits.

RESULTS

In permanent dentition, the global distributions of Class I, Class II, and Class III were 74.7%, 19.56% and 5.93%, respectively. Increased and reverse overjet was recorded in 20.14% and 4.56%, respectively. Regarding vertical malocclusions, the observed deep overbite and open bite were 21.98% and 4.93%, respectively. Considering the transverse occlusal discrepancies, the posterior crossbite affected 9.39% of the total examined sample. Regarding the distribution of malocclusion in adults according to geographical location, four continents classification system was considered, in which Americas are considered as one continent. In permanent dentition, Europe showed the highest prevalence of Class II and posterior crossbite (33.51% and 13.8%, respectively), and the lowest prevalence of Class I (60.38%). This was applied to mixed dentition regarding Class I and Class II. No statistically significant differences in prevalence of Class III, increased overjet, reversed overjet, deep bite and open bite between the four geographic areas were reported. In

permanent stage of dentition by ethnic groups, the highest prevalences of Class I malocclusion and open bite (89.44% and 7.82%, respectively) were reported among African population, although the difference of the latter was not statistically significant. The global distributions of Class I, Class II, and Class III in mixed dentition stage were 72.74%, 23.11% and 3.98%, respectively.

DISCUSSION

Global, regional and racial epidemiological assessment of malocclusions is of paramount importance, since it provides important data to assess the type and distribution of occlusal characteristics. Such data will aid in determining and directing the priorities in regards to malocclusion treatment need, and the resources required to offer treatment - in terms of work capacity, skills, agility and materials to be employed. In addition, assessment of malocclusion prevalence by different populations and locations may reflect existence of determining genetic and environmental factors. In line with that, the hypothesized tendency of changing prevalence of a specific type of malocclusion, such as Class II, from mixed to permanent dentition stage may give an indication about the effect of adolescent growth in correction of this problem. Finally, the availability of such global data will be important for educational purposes. Regional and/or racial-specific malocclusion may change the health policy toward developing the specialists' skills and offering the resources required for that malocclusion. The pooled global prevalence of Class I was the highest ($74.7 \pm 15.17\%$), ranging from 31% (Belgium) to 96.6% (Nigeria). It was higher among Africans (89.44%), but equivalent among Caucasians and Mongoloids (71.61% and 74.87%, respectively). The overall global prevalence of Class II was 19.56%. However, it was interesting to see a wide range from 1.6% (Nigeria) to 63% (Belgium). The global prevalence of Class III was the lowest among all Angle's classes of malocclusion ($5.93 \pm 4.69\%$). The lowest prevalent malocclusion traits globally were reversed overjet and open bite (4.56 and 4.93, respectively). An interesting finding was the higher prevalence of Class II malocclusion in the mixed dentition than in the permanent dentition.

CONCLUSIONS

- 1) Consistent with most of the included individual studies, Class I and II malocclusions were the most prevalent, while Class III and open bite were the least prevalent malocclusions.



- 2) African populations showed the highest prevalence of Class I and open bite malocclusions, while Caucasian populations showed the highest prevalence of Class II malocclusion.
- 3) Europe continent showed the highest prevalence of Class II among all continents.
- 4) Class III malocclusion was more prevalent in permanent dentition than mixed dentition, conversely finding for Class II, while all other malocclusions variables showed no difference between the two stages.

REFERENCES

1. Angle EH. Classification of malocclusion. Dent Cosmos. 1899;41:248–264. [Google Scholar]
2. Guo L, Feng Y, Guo HG, Liu BW, Zhang Y. Consequences of orthodontic treatment in malocclusion patients clinical and microbial effects in adults and children. BMC Oral Health. 2016;16(1):112–112. [PMC free article] [PubMed] [Google Scholar]
3. 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(6):580–585. [PubMed] [Google Scholar]
4. Brook PH, Shaw WC. The development of an index of orthodontic treatment priority. Eur J Orthod. 1989;11(3):309–320. [PubMed] [Google Scholar]
5. Foster TD, Menezes DM. The assessment of occlusal features for public health planning purposes. Am J Orthod. 1976;69(1):83–90. [PubMed] [Google Scholar]
6. Massler M, Frankel JM. Prevalence of malocclusion in children aged 14 to 18 years. Am J Orthod. 1951;37(10):751–768. [PubMed] [Google Scholar]
7. Goose DH, Thompson D.G, Winter F.C. Malocclusion in School Children of the West Midlands. Brit Dent J. 1957;102:174–178. [Google Scholar]
8. Mills LF. Epidemiologic studies of occlusion IV. The prevalence of malocclusion in a population of 1,455 school children. J Dent Res. 1966;45:332–336. [PubMed] [Google Scholar]
9. Grewe JM, Cervenka J, Shapiro BL, Witkop CJ., Jr Prevalence of malocclusion in Chippewa Indian children. J Dent Res. 1968;47(2):302–305. [PubMed] [Google Scholar]



10. Helm S. Malocclusion in Danish children with adolescent dentition an epidemiologic study. Am J Orthod. 1968;54(5):352–366. [PubMed] [Google Scholar]
11. Thilander B, Myrberg N. The prevalence of malocclusion in Swedish schoolchildren. Scand J Dent Res. 1973;81(1):12–21. [PubMed] [Google Scholar]
12. Foster TD, Day AJ. A survey of malocclusion and the need for orthodontic treatment in a Shropshire school population. Br J Orthod. 1974;1(3):73–78. [PubMed] [Google Scholar]
13. Ingervall B, Mohlin B, Thilander B. Prevalence and awareness of malocclusion in Swedish men. Community Dent Oral Epidemiol. 1978;6(6):308–314. [PubMed] [Google Scholar]
14. Helm S, Prydso U. Prevalence of malocclusion in medieval and modern Danes contrasted. Scand J Dent Res. 1979;87(2):91–97. [PubMed] [Google Scholar]
15. Orthodontics, Malocclusion .Rea Ghodasra; Melina Brizuela.

