

## Dental Occlusion and Malocclusion: Prevalence, Types and Treatment

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### Abstract

Occlusion represents a multidisciplinary term with different clinical and scientific factors, affecting mandibular function, are involved. For a comprehensive understanding of this term, we have performed a literature review searching all possible aspects. Dental occlusion includes much more than just the physical contact of the biting surface of opposing teeth or the replacements. Morphologic features can widely vary still represent the normal. There was a high prevalence of malocclusion with variations between different geographic regions and age groups. It can reach up to 87.5% in some adult populations and 93% in children. Treatment of the malocclusion should be defined on individual bases based on the specific physiologic needs of the various tissue systems within the masticatory system rather than on a preconceived and universal basis.

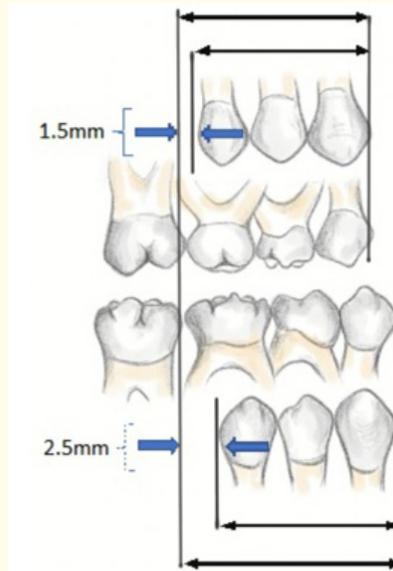
**Keywords:** Occlusion; Malocclusion; Prevalence; Types; Treatment

### Introduction

The literal meaning of occlusion means “closing”. In a dental context, occlusion means “contact” between teeth or more technically, the relationship between upper (maxillary) and lower (mandibular) teeth; as occurs during rest (static) or movements (dynamic) [1,2]. In the treatment of dental patients, the occlusion of the teeth is frequently overlooked or taken for granted despite its importance in oral function [3]. The successful restoration of the oral function is mainly dependent on occlusal integrity [3].

The baby (primary) teeth begin to erupt around 6 months of age, the mandibular and maxillary teeth start to occlude with each other. The erupting teeth are held into position by the cheeks, the tongue, and lips during development. Lower and upper primary teeth will be correctly aligned and occluding after two years. They continue to develop, with full root development complete by three years of age. One year after the completion of teeth development, the jaws continue to grow to form “diastema” which is the spacing found between some of the teeth. The aforementioned effect is greatest in the front (anterior) teeth and can be seen by the age of 4 to five years [2]. This spacing allows space the adult (permanent) teeth to erupt into the correct occlusion and crowding of the permanent dentition can occur without this spacing.

Occlusion represents a multidisciplinary term with different clinical and scientific factors, affecting mandibular function, are involved. The dynamics of premolar teeth in the mixed dentition stage (when both permanent and primary teeth are present) is needed to fully understand the development of malocclusion and occlusion. Around nine to twelve years of age, the permanent premolars start to erupt, replacing the primary molars. Leeway Space is the one between the primary molars and their successors, resulting from the small size of the erupting premolars compared to the teeth they are replacing (1.5 mm for maxillary, 2.5 mm for mandibular) [4] (Figure 1). This allows the drift of permanent molars medially into the spaces, developing a Class I occlusion [4]. Since the primary goal of dentistry is to maintain the functional integrity of the masticatory system, we are conducting a literature review for a better understanding of these aspects.



**Figure 1:** Leeway space is the size differential between the primary posterior teeth (C, D, E) and the permanent teeth (canine, first and second pre-molar). Maxillary space of 1.5 mm, mandibular 2.5 mm can be seen [1].

### Types of occlusion

There are many types and terms used to describe occlusion including; static, dynamic, balanced, morphologic and physiologic/functional occlusion [3]. Morphologic occlusion is the most common type used where the cusp interdigitation pattern of the 1<sup>st</sup> molar teeth is used anterior-posterior arch relationships, which was originally developed by Angle [3]. The marker of this classification is the location of the meiso-facial cusp of the 1<sup>st</sup> maxillary molar in relation to 1<sup>st</sup> mandibular molar [3]. According to Angle’s classification, there are three classes defined according to the aforementioned relationship. Class I is the most common molar relationship with the maxillary meiso-facial cusp located in the meiso-facial development groove of the 1<sup>st</sup> mandibular molar. In the same context, class II describes the contact of the maxillary molar to the facial embrasure between the second premolar and the first molar. Finally, class III where the meiso-facial cusp of the 1<sup>st</sup> maxillary molar being settled in the disto-facial groove of the 1<sup>st</sup> mandibular molar.

Additionally, static occlusion refers to changes in occlusal contacts with the position of the mandible as seen in bruxism, while dynamic one refers to teeth contact with the mandibular movement as seen in gliding and sliding. On the other hand, balanced occlusion is the term describing the balancing and working cusps of all posterior teeth being in contact with their antagonists across all mandibular movements. Finally, physiologic/functional occlusion, usually used in restorative dentistry, refers to an occlusion which is free of interference to smooth gliding of the mandible without any pathology presence [3]. Potential contact areas of the occlusal surface are shown in figure 2.



**Figure 2:** Normal marginal ridge, fossa and cusp relationship [3,5].

### Prevalence of malocclusion

The prevalence of malocclusion was reported in many studies. The prevalence varies according to geographical base, age, sex, and urbanization. Gudipani, *et al.* [6] demonstrated that the most common type of malocclusion is Angle's Class 1 which affects nearly half of the population. Similarly, class 1 malocclusion was the common malocclusion type reported in a population-based study in Lebanon, Hanna, *et al* [7]. Furthermore, Al-Emran, *et al.* [8] indicated that malocclusion affects 62% of Saudi Arabian children aged 14 years old and the most common occlusal abnormalities in was large maxillary (> 5 mm) followed by poslnonnal occlusion revealing a prevalence of 18% and 16%, respectively. In addition, the most frequent space anomalies were lack of space (mandible > 2 mm) that affects 23% of children affected by a malocclusion. Interestingly, the prevalence of malocclusion was 87.5% in Saudi Arabian study conducted by Basyouni, *et al* [9]. The high prevalence of malocclusion can be explained through the recruited diseased infants with sickle cell disease in which it induces craniofacial abnormalities. Despite the absence of significance of maxillary dental arch measurement in males and females of Yemeni children with normal occlusion, there was a significant association between male sex and maxillary dental arch measurement in children with class 1 malocclusion [10]. Moreover, 33% of Indian children aged between 12 and 15 years have malocclusion and need orthodontic treatment. Remarkably, males have a significant higher prevalence of incisal segment crowding, midline diastema and largest anterior maxillary irregularity Tak, *et al* [11]. Akin to that, the prevalence of malocclusion was 32% of Brazilian school children and the prevalence of malocclusion was associated with the history of bottle feeding and harmful oral habits Corrêa-Faria, *et al* [12]. Mtaya, *et al.* [13] study which recruited Tanzanian schoolchildren, 64% of the population have at least one type of malocclusion, of these class 1 malocclusion was the frequent type affecting 93% of children with malocclusion affection. Similarly, females have a high prevalence of type 1 and 3 but not type 2 malocclusion rather than females in Nigerian school children [14]. Despite that, 84% of children were affected with malocclusion, no significant difference in malocclusion prevalence between males and females [15]. In contrast, class 2 malocclusion was the most common malocclusion type in orthodontic Turkish patients, of these the highest prevalence, was reported in patients above 35 years old [16]. Furthermore, the prevalence of malocclusion varies between several studies in Iranian populations [17-24]. In addition,

malocclusion prevalence in Kenyan children shows many variations based upon the site of patients recruitment [25-27]. Preliminary reports from Sweden indicate that the prevalence of malocclusion ranges from 35% to 60% of school children [28-30]. Malocclusion was demonstrated also in Argentina, in which class I malocclusion is the most common type presenting in Argentinian individual [31-33]. Moreover, many reports were published for malocclusion prevalence in Finland which vary according to the age of patients [34-38].

### Types of malocclusion

Malocclusion is classified into 3 types based upon Angle's classification. Malocclusion type I is characterized by a normal relationship between molar tooth; however, there are sorts of crowding, spacing, over or under eruption. Type II malocclusion is divided into division I which is characterized by the discrepancy in the relation between upper and lower first molar resulting in open bite, while division II is associated with retroclined maxillary incisors. Maxillary malposition results in type III malocclusion. Despite this classification is widely used, the reliability is tested and showed variations between different examiners [39] (Figure 3).



Figure 3: Types of malocclusion. A: Class I type 2; B: Class II. C: Class III [40,41].

### Treatment of malocclusion

The harmony between the nervous system, blood supply, and proper dental occlusion is essential for developing the normal masticatory process. Therefore, any interruption of teeth positions leads to malocclusion and consequently interruption of mastication. Derived from that though, dental occlusion treatment constitutes a major issue for both the patient and the dentist. Furthermore, correction of malocclusion is preferred in younger age for the restoration of proper occlusion within normal skeletal growth of the body. Treatment of malocclusion depends on the type of malocclusion. Orthodontics is used for the treatment of class 1 malocclusion while the fixed appliance is used in severe cases [42]. Class II malocclusion treatment varies according to the malocclusion subtype. For Class II division I,

appliances are considered an efficient therapy especially in younger age [43]. Moreover, correction of malocclusion can be more effective through a combination between appliances and headgear [44]. Despite being one of the management routes of class II division II which is characterized by a deep overbite, extraction is not preferred as a line of treatment. Meanwhile, non-extraction techniques such as functional appliance therapy or removal appliance therapy allows good correction of deep overbite if it was applied through adequate time manner [45]. Restoration of functional overbite is clinically important for class III malocclusion therefore surgery is favored for those patients and combination therapy has no role since the surgical option is sufficient alone [46].

### Conclusion

Dental occlusion includes much more than just the physical contact of the biting surface of opposing teeth or the replacements. Morphologic features can widely vary still represent the normal. The prevalence of malocclusion is relatively high requiring proper screening programs to detect these defects as early as possible. Treatment of the malocclusion should be defined on individual bases based on the specific physiologic needs of the various tissue systems within the masticatory system rather than on a preconceived and universal basis.

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### Conflict of Interest

None.

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