Prevalence of Malocclusion in Saudi Arabia Children: A Literature Review

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Abstract

There is a wide range of reported prevalence of malocclusions in Saudi Arabia, which reflects variations in study populations with respect to ethnicity and age and also lack of conformity of methods of registration. Age has an impact on the prevalence of different malocclusions. We performed an extensive literature search of the Medline, Cochrane, and EMBASE databases on the 1st of October in 2019 using the medical subject headings (MeSH) terms "Malocclusion" AND "Saudi Arabia". Papers discussing the prevalence of malocclusion among Saudi children were screened for relevant information. The search date was limited to the last 10 years to get the most updated evidence. Class I molar, canine, and incisal relationships was a dominant feature among Saudi children. Crowding was the most prevalent malocclusion trait, followed by spacing and overbite. Dental trauma, oral hygiene, and oral habits (e.g. digit sucking) are important factors to predict malocclusion prevalence. These findings will help in understanding the occlusion status in order to plan for prevention and treatment of malocclusion among Saudi children.

Keywords: Malocclusion; Saudi Arabia; Children

Introduction

Normal or ideal occlusion is a concept constructed by the orthodontic profession. In the 1890's Edward H Angle introduced the first clear and simple definition of normal occlusion for the permanent dentition [1]. Malocclusion (or malalignment) is defined as a disruption

in the teeth regularity or in the relationship of the dental arches beyond the normal range [2]. This implies that normal occlusion may have minor variations (within a range) and is not a fixed value. The etiology of different malocclusions is complex and varied, it includes specific causes, hereditary and environmental factors [3]. A disturbances in the embryological process which can result in cleft lip or palate or other cranio-facial defects [3]. A relatively high heritability of craniofacial dimensions and low heritability of dental arch variations has been described [5,6] but it is still unclear how this relates to the development of malocclusions which have both skeletal and dental components [3,4].

Hereditary factors are reported to have a stronger influence on mandibular prognathism or posterior rotation of the mandible and large anterior face height, described as a long face pattern [3]. Environmental factors such as sucking habits have been associated with anterior open bite and posterior crossbite [5]. Mouth breathing, due to allergies, hypertrophic adenoids, and/or enlarged tonsils has been associated with a posterior crossbite, anterior open bite, posterior rotation of the mandible and large anterior face height [6,7]. Snoring and nocturnal breathing disturbances may also have negative effects on the occlusion, as they also lead to mouth breathing and depression of the tongue during sleep [6,8,10]. Thus, not only hereditary factors but also environmental components have the potential to impact on the developing dentition. Because of this complex developmental pattern, it is difficult not only to predict the development of malocclusion, but also to prevent its development.

There is a wide range of reported prevalence of malocclusions in Saudi Arabia, which reflects variations in study populations with respect to ethnicity and age and also lack of conformity of methods of registration [11]. Age has an impact on the prevalence of different malocclusions. In early childhood, malocclusions are commonly related to sucking habits, anterior open bite, and posterior crossbite, while in school-age children, crowding and displacement of teeth are more prevalent [12-17]. In this paper we aim to review the reported prevalence of malocclusion among Saudi children, over the last 10 years.

Methods

We performed an extensive literature search of the Medline, Cochrane, and EMBASE databases on the 1st of October 2019 using the medical subject headings (MeSH) terms "Malocclusion" AND "Saudi Arabia". Papers discussing the prevalence of malocclusion among Saudi children were screened for relevant information. The search date was limited to the last 10 years to get the most updated evidence.

Prevalence of malocclusion among children in Riyadh city

Riyadh city found to be a well-represented region in literature of malocclusion among children and majority of the studies were based on children aged 12 to 15 years [18-20]. The largest study was conducted between September 2012 and June 2013, with total of 1825 children (from 20 schools) were included in the study [20]. This study can be used as a good representation of Riyadh city for random selection, large sample size and sample selection from different areas of Riyadh City [20]. Most of the examined children (12 to 16 years old) had symmetric molar relationship and symmetric canine relationship with 77.4% and 78%, respectively [20]. However, about 22.6% and 22.13% of the children had asymmetric molar and canine relationships, respectively. Class I molar relationship was the most prevalent (60.1%) followed by Class II (10.13%), while Class I canine relationship was the most prevalent (54.13%) followed by Class II (12.4%) [20]. The prevalence of different malocclusion traits was crowding (45.4%), Spacing (26.9%), excessive overjet (16.4%), excessive overbite (6.68%), posterior crossbite (8.9%), and anterior open bite (8.4%) [20]. Additionally, there was no significant difference between males and females regarding malocclusion prevalence [20].

In 2018, Albakri., *et al.* have conducted a study of 500 school children, aged 12 to 15 years, categorized into five regions of Riyadh city; Central, Eastern, Western, Northern and Southern areas [19]. Similarly, Class I molar relationship was the most prevalent (71.2%) followed by Class II (23%), while Class I canine relationship was the most prevalent (68%) followed by Class II (26.8%) [19]. The prevalence of different malocclusion traits was maxillary crowding (23.3%), mandibular crowding (28%), maxillary spacing (11.6%), mandibular spacing (8.8%), excessive overjet (2.8%), and anterior overbite/open bite (4%) [19].

In 2019, a similar study with 500 school children (aged 12 to 15 years) and a random stratified selection has been conducted [18]. The results showed that Class I molar relationship was the most prevalent (right = 74.9% and left = 72.6%) followed by Class II (right = 20.5% and left = 22.4%), while Class I canine relationship was the most prevalent (right = 68.9% and left = 69.4%) followed by Class II (right = 25.8% and left = 24.8%) [18]. The same order was noticed in the canine teeth with Class I present in 66.7% of the children followed by class II (29.3%) [18]. The prevalence of different malocclusion traits was maxillary crowding/spacing (33.2%), mandibular crowding/spacing (29.7%), anterior open bite (12.9%), posterior overbite (11.9%), anterior overbite (18.8%), reverse overjet (14.8%), and anterior crossbite (9.6%) [18]. Noteworthy, only 8.7% of the children had good oral hygiene and 13.2% never brushed their teeth [18].

For children aged 4 to 12 years, a cross-sectional, with 90 orphan children and 90 non-orphan controls, was conducted in Riyadh City [18,21]. The results showed that Class I molar relationship was the most prevalent (orphans = 76.7% and non-orphans = 82.2%) followed by Class II (orphans = 17.8% and non-orphans = 13.3%) [21]. The prevalence of different malocclusion traits was open bite (orphans = 17.8% and non-orphans = 7.8%), cross-bite (orphans = 13.3% and non-orphans = 7.8%), increased over-jet (orphans = 39.9% and non-orphans = 30.0%), and increased over-bite (orphans = 25.6% and non-orphans = 35.6%) [21]. Noteworthy, digit sucking habit and dental trauma were significantly associated with prevalence of malocclusion [21].

Prevalence of malocclusion among children of Makkah and Medina

For children age 12 to 15 years, a cross-sectional study of 400 schoolchildren, from different regions of Makkah, has been conducted [22]. Class I molar relationship was the most prevalent (52.3%) followed by Class II (25%), while Class I canine relationship was the most prevalent (56.5%) followed by Class II (27.8%) [22]. The prevalence of different malocclusion traits was crowding (74%), spacing (21.5%), overbite (45%), cross-bite (22.3%), abnormal overjet (28.8%), scissor bite (2.5%).

For adolescents aged 13 to 17 years, a randomized cross-sectional study of 289 participants has been conducted [23]. Class I malocclusion was the most prevalent (67.13%) followed by class II (25.23%) [23]. The prevalence of different malocclusion traits was crowding (63%), overbite (52.6%), anterior crossbite (17%), and posterior crossbite (21.4%) [23].

A cross-sectional study of 360 schoolchildren has been conducted in Medina [24]. The mean age of the participants was 12.1 and all of them were males [24]. The majority of respondents had a class I jaw relationship (82.5%) [24]. The authors have also concluded that oral hygiene awareness programs are recommended for Medina children [24].

Prevalence of malocclusion among children of Asir province

A randomized cross-sectional study of 1820 boys aged 15 to 17 years has been conducted in Abha region [25]. Class I molar relationship was the most prevalent (62.3%) followed by Class II (28.4%) [25]. The prevalence of different malocclusion traits was crowding (43.8%), deep bite (21%), spacing (16.7%), anterior crossbite (12.6%), and anterior open bite (7.2%) [25]. For children aged 10 to 15 years, a total of 835 schoolchildren were recruited from 16 schools in Aseer region [26]. The authors concluded that there is a good degree of awareness regarding orthodontic treatment; however some misconception is still present [26].

For the age group of 2 to 13 years, a total of 82 children (41 children with SCD and 41 control group) were recruited from Abha and Khamis Mushait cities [27]. The results show that the overall prevalence of malocclusion was 24.4% with no significant difference of malocclusion between patients with SCD and control subjects [27].

Prevalence of malocclusion among children of Eastern Province

A cross-sectional study of 307 male schoolchildren, aged 9 to 11 years, has been conducted in Dammam city [28]. The results showed that Class I malocclusion was the most prevalent (right = 61.6% and left = 61.3%) followed by Class II (right = 31.8% and left = 31.8%) [28]. The prevalence of different malocclusion traits was abnormal overjet (60.9%), abnormal overbite (56.9%), crossbite (26.8%), anterior open bite (10.9%), and posterior open bite (3.6%) [28].

A comparative cross-sectional study has been conducted to compare healthy Saudi adolescents with those with sickle cell disease (SCD) [29]. The participants aged 12 to 18 years and the study took place in Al Khobar and Dammam cities [29]. The overall malocclusion prevalence was 69.9% and Class I canine relationship was the most prevalent (SCD = 65.2% and non-SCD = 72.6%) followed by Class II (SCD = 34.8% and non- SCD = 27.4%) [29]. The prevalence of different malocclusion traits was abnormal overjet (SCD = 41% and non-SCD = 22.5%), abnormal overbite (SCD = 75% and non-SCD = 58.9%), and posterior cross bite (SCD = 67% and non-SCD = 37.1%) [29].

Prevalence of malocclusion among children of Ha'il province

Using a simple randomization method, 520 Saudi participants between 7 and 12 years from Ha'il city were recruited [30]. Class I molar relationship was the most prevalent (70.4%) followed by Class II (21.3%), while Class I incisal relationship was the most prevalent (72.5%) followed by Class II (19.8%) [30]. The prevalence of different malocclusion traits was abnormal overjet (28.8%), abnormal overbite (16.2%), anterior open bite (7.7%), posterior open bite (0.6%), anterior crossbite (5.2%), and posterior crossbite (13.3%) [30].

Conclusion

Class I molar, canine, and incisional relationships was a dominant feature among Saudi children. Crowding was the most prevalent malocclusion trait, followed by spacing and overbite. Dental trauma, oral hygiene, and oral habits (e.g. digit sucking) are important factors to predict malocclusion prevalence. These findings will help in understanding the occlusion status in order to plan for the prevention and treatment of malocclusion among Saudi children.

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Conflicts of Interest

No conflicts related to this work.

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