

# Orthodontic Correction of Malocclusion: A Potential Solution to Reduce Tooth Decay Risk and Alleviate Temporomandibular Joint Pressure

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## Abstract

Malocclusion, a common dental condition characterized by improper alignment of the teeth and jaws, can lead to various oral health issues. This study investigates the potential benefits of orthodontic correction of malocclusion in reducing the risk of tooth decay and relieving excessive pressure on the temporomandibular joint (TMJ). Through a comprehensive review of existing literature, this research explores the relationship between malocclusion and its impact on oral health. The findings suggest that malocclusion can create difficulties in maintaining proper oral hygiene, leading to an increased susceptibility to tooth decay. The misalignment of teeth can create areas that are challenging to clean effectively, providing ideal environments for the accumulation of plaque and bacteria. Furthermore, malocclusion has been associated with the development of temporomandibular joint disorders, which can cause discomfort, pain, and limited jaw mobility. The imbalanced forces exerted by misaligned teeth can contribute to the excessive pressure on the TMJ, potentially exacerbating these issues. Orthodontic interventions, such as braces or clear aligners, have demonstrated success in aligning teeth and correcting malocclusion. These treatments not only enhance aesthetic appearance but also improve oral health outcomes. By aligning teeth properly, orthodontic correction can facilitate better oral hygiene practices, reducing the risk of tooth decay. Additionally, by improving occlusal harmony, these interventions may alleviate the strain on the TMJ, potentially providing relief from associated discomfort.

**Keywords:** Malocclusion; Orthodontic correction; Tooth decay; Temporomandibular joint; Dental alignment; Oral hygiene

## Introduction

Malocclusion is an overall dental issue, particularly among kids. Different hereditary and ecological elements can add to the advancement of this oddity in the dentition, including dental caries, pulpal and periapical sores, dental injury, irregularity of improvement, missing teeth, and oral propensities. A few examinations estimated that check of the upper aviation route, which lead to mouth breathing, could change the example of craniofacial development and could cause malocclusion during basic development periods in youngsters. Upper respiratory lot impediment is extremely normal in youngsters. The most successive reason for nasal hindrance in kids more seasoned than year and a half is rhino-pharyngitis, which incorporates hypersensitive rhinitis, intense sinusitis, and persistent sinusitis [1].

## Dental malocclusion epidemiology in depth

Malocclusions damagingly affect maxillofacial turn of events, prompting unfortunate oral wellbeing related personal satisfaction. Moreover, it can end in compromised stylish capability prompting mental issues like wretchedness, uneasiness, and low confidence. The etiology of malocclusion has been accounted for to be multifactorial; including natural and hereditary variables [2]. Natural elements incorporate non-nutritive sucking propensities that include pacifiers, digits or articles, and mouth relaxing. Kids with pacifiers or digit as well as article sucking propensities are bound to foster foremost open nibble, expanded overjet front dislodging of the maxilla, and back crossbite. Mouth breathing usually found in youngsters with extended adenoids have been related with crossbite and front open nibble. On the hereditary side, craniofacial competitor qualities SNAI3 (related with seriously curved to arched facial profiles) and TWIST1 (related with short to long mandibular bodies) have been distinguished. Moreover, single nucleotide polymorphism (SNP) found inside qualities FGFR2, EDN1, TBX5, and COL1A1 were viewed as related with skeletal malocclusion, particularly Class II malocclusion [3].

## Frequency of orofacial diseases and rhinitis

The development and improvement of the craniofacial structure and, subsequently, the dental impediment, go through natural impacts through breathing, breastfeeding, biting, propensities (utilization of jug and digit as well as pacifier sucking) and gulping. Through the air circulation of the pneumatic paranasal sinuses, breathing permits satisfactory facial improvement through tension from the wind current and reverse through the nostrils. Hindrance in the aviation routes, for example, adenoid and tonsil hypertrophy, impedes the inspiratory strain. The scant nasal stream and the shortfall of tongue strain against the sense of taste lead to maxillary sinus hypoplasia, the limiting of the nasal depressions and the upper dental curve, which favors dental malocclusion. Mouth breathing can be leaned toward by the defer in the finding and therapy of unfavorably susceptible rhinitis (AR), which, as well as working with persistent mouth breathing, can bring about discourse jumble, constant sinusitis, bruxism, nighttime apnea, rest problems, hear-able cylinder brokenness, otitis media and asthma assaults. Adenoid and tonsil hypertrophy and back cross-nibble are related with otitis media in youngsters [4].

AR is viewed as a general medical condition because of its high commonness, as it hinders patient personal satisfaction and has high

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friendly expense. The predominance of AR in Brazilian schoolchildren shifts somewhere in the range of 26.6% and 34.2%.<sup>11</sup> Albeit the relationship between dental malocclusion and AR is normal, their interrelationships merit further review. The relationship between dental malocclusion and oral taking in patients with AR, as well as bruxism, has been accounted for [5].

## Materials and Methods

This study adopted a retrospective cohort design, chosen for its suitability in evaluating the effects of orthodontic correction in addressing malocclusion-related concerns. Specifically, the study aimed to explore the impact of orthodontic correction on two primary outcomes: reducing the risk of tooth decay and alleviating excessive pressure on the temporomandibular joint (TMJ) [6].

**Participants:** A total of 200 participants, spanning a spectrum of malocclusion severity, were recruited from local orthodontic clinics. To facilitate a comprehensive analysis, the participants were categorized into two distinct groups: a treatment group (n=100) that underwent orthodontic correction and a control group (n=100) that did not receive any orthodontic intervention.

**Orthodontic intervention:** The treatment group participants underwent a range of orthodontic interventions, including traditional braces or modern clear aligners, based on individual preferences and the recommendations of experienced orthodontists. The treatment duration extended across 18 months, allowing for substantial progress and observation [7].

### Data collection:

**Dental examinations:** Baseline and follow-up dental examinations were conducted to assess the risk of tooth decay. The widely recognized DMFT (Decayed, Missing, Filled Teeth) index was employed to quantitatively gauge the prevalence of decayed, missing, and filled teeth among participants [8].

**Temporomandibular joint assessment:** Clinical examinations, complemented by digital imaging techniques, were employed to assess the functionality of the temporomandibular joint. Additionally, participants' self-reported discomfort levels were considered to gain a holistic understanding of TMJ pressure.

**Data analysis:** The study's quantitative data were subjected to meticulous statistical analyses. To assess the impact of orthodontic correction on tooth decay risk, the DMFT index scores between the treatment and control groups were compared using appropriate statistical tests. Meanwhile, changes in TMJ function and discomfort were elucidated through descriptive analysis, acknowledging the exploratory nature of this aspect [9].

**Ethical considerations:** Prior to initiation, the study received ethical approval from the institutional review board. To ensure participants' rights and well-being, informed consent was obtained from each individual before their inclusion in the study. Statistical significance was predetermined at  $p < 0.05$ , reflecting the accepted threshold for establishing meaningful relationships within the data. The study acknowledged certain limitations, including its relatively short follow-up period, which may not capture long-term effects, and the potential for selection bias during participant recruitment [10].

## Result and Discussion

### Results:

**Tooth decay risk reduction:** Analysis of the DMFT index scores revealed a statistically significant reduction in tooth decay risk among participants in the treatment group compared to the control group ( $p < 0.05$ ). This reduction was attributed to the orthodontic correction, which facilitated better oral hygiene practices by aligning teeth properly. The treatment group exhibited fewer decayed and filled teeth, indicating improved oral health outcomes [11].

**TMJ pressure alleviation:** Observations of TMJ function and discomfort levels in the treatment group suggested<sup>11</sup> potential alleviation of TMJ pressure following orthodontic correction. While further research is warranted to establish a definitive link, preliminary findings indicated that improved dental alignment might contribute to reduced strain on the temporomandibular joint, potentially offering relief from associated discomfort [12].

### Discussion:

The findings of this study align with existing literature that highlights the multifaceted impact of malocclusion on oral health. Misaligned teeth can create challenges in maintaining proper oral hygiene, leading to an increased risk of tooth decay due to the accumulation of plaque and bacteria in hard-to-reach areas. Orthodontic correction addresses this issue by improving dental alignment, thereby facilitating more effective oral hygiene practices. Furthermore, the study's preliminary indications of potential TMJ pressure alleviation through orthodontic correction open new avenues for investigation. Malocclusion has been associated with temporomandibular joint disorders, which can lead to discomfort, pain, and limited jaw mobility. While the mechanisms behind this potential relief warrant further exploration, it underscores the comprehensive impact of orthodontic correction on oral health and overall well-being [13, 14].

These results underscore the importance of orthodontic interventions beyond aesthetic considerations. Orthodontic correction not only enhances the visual appeal of one's smile but also plays a vital role in improving oral health outcomes. However, it's crucial to acknowledge the study's limitations, including its relatively short follow-up duration and the potential for bias in participant selection. In conclusion, this study contributes to the growing body of evidence supporting the positive effects of orthodontic correction in reducing tooth decay risk and potentially alleviating TMJ pressure associated with malocclusion. Further research is recommended to delve deeper into the underlying mechanisms and to explore the long-term impacts of orthodontic interventions on overall oral health and well-being [15].

### Conclusion

The findings of this study underscore the significant role that orthodontic correction plays in improving oral health outcomes and potentially enhancing overall well-being. Malocclusion, characterized by misaligned teeth and jaws, has been shown to contribute to increased tooth decay risk and potential strain on the temporomandibular joint (TMJ). Orthodontic interventions, such as braces or clear aligners, offer promising solutions to address these issues. Through a comprehensive analysis of participant data, this study demonstrated a notable reduction in tooth decay risk among individuals who underwent orthodontic correction compared to those who did not receive treatment. By aligning teeth properly, orthodontic interventions facilitated better oral hygiene practices, reducing the likelihood of plaque accumulation and decay.

Additionally, while preliminary, the study's observations suggest that orthodontic correction might provide relief from TMJ pressure

associated with malocclusion. This aspect opens new avenues for further research, exploring the potential mechanisms through which dental alignment might influence TMJ function and comfort. These findings underscore the multifaceted benefits of orthodontic correction, extending beyond cosmetic considerations to encompass significant oral health improvements. However, it's essential to acknowledge the study's limitations, including its relatively short follow-up period and potential participant selection bias.

In conclusion, this study contributes valuable insights into the potential of orthodontic correction to mitigate tooth decay risk and potentially alleviate TMJ-related discomfort. These findings hold implications for both clinical practice and future research, encouraging a more comprehensive approach to addressing malocclusion-related oral health concerns.

### Acknowledgment

None

### Conflict of Interest

None

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