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# Correlations between mandibular asymmetries and temporo-mandibular disorders (TMD): literature review.

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# Correlations between mandibular asymmetries and temporo-mandibular disorders (TMD): literature review.

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## Introduction

Cranio-facial asymmetries, and in particular those with mandibular involvement, are a topic of great interest in modern literature, both for the different diagnostic frameworks of reference, and for the possible therapeutic approaches that can provide only orthodontics or in combination with maxillofacial surgery. One interesting aspect centered in international literature, as the topic of this work is to analyze the correlation between this characteristic and the appearance of temporo-mandibular disorders.

In fact, the purpose of this work is to study how mandibular asymmetries are factors that are etiological or predisposing to the development of temporomandibular disorders (TMD). To obtain this, it was analyzed articles related to the association between mandibular asymmetries and temporomandibular disorders.

## Methods

A manual and electronic research was carried out in the main journals to select studies that evaluated the correlation between mandibular asymmetry and temporo-mandibular disorders. It was included in the research: randomized clinical trials, controlled clinical trials, cohort studies, retrospective studies and case series were, with the exclusion of animal studies, in vitro studies, case reports, letters to publishers and narrative or systematic reviews. In the end we selected 6 articles.

## Review

Through the review of the literature a series of observations emerged concerning the topic under investigation. According to one of the articles analyzed it can be argued that mandibular asymmetries can be considered as an etiological or predisposing factor for the development of temporo-mandibular disorders. In fact, a sample of 16 subjects aged from 14 to 36 years (11 females and 5 males) with mandibular

asymmetries (structural asymmetry of 81%, functional asymmetry of 19%) with skeletal and dental malocclusion combined with different temporo-mandibular disorders. In 100% of these patients received orthodontic treatment. At the end of the treatment, a comparison was made between the postero-anterior cephalometric analysis (PA) pre- and post-treatment in order to evaluate the resolution of the asymmetry. This comparison showed the resolution of mandibular asymmetries and temporomandibular symptoms after treatment. Another article assesses whether the genes ACTN3, ENPP1, ESR1, PITX1 and PITX2 (genes contributing to sagittal and vertical malocclusions) also contributed to the determination of facial asymmetries and temporo-mandibular disorders (TMD) before and after treatment of orthodontics and orthognathic surgery. In this, 174 patients with a dentofacial deformity were subdivided, through the postero-anterior cephalometric measurements, into symmetric patient groups and into 4 subgroups of asymmetric patients; in addition, these patients were given questionnaires on the diagnosis of the TMD examination and on the pain and function of the jaw (JPF) with the aim of assessing the presence and severity of TMD. The classification of asymmetries showed significant cephalometric differences between symmetric and asymmetric groups and between 4 asymmetric subtypes: group 1: asymmetry of the mandibular body; group 2: asymmetry of the branch; group 3: atypical asymmetry; group 4: C-shaped asymmetry. Through genetic analysis it was possible to observe that ENPP1 SNP-rs6569759 was associated with group 1 ( $P = 0.004$ ) and rs858339 was associated with group 3 ( $P = 0.002$ ); ESR1 SNP-rs164321 was associated with group 4 ( $P = 0.019$ ). These results were confirmed by the analysis of the main component that showed 3 main components that accounted for almost 80% of the variations in the studied groups. The main components 1 and 2 have been associated with ESR1 SNP-rs3020318. Average JPF scores for asymmetric subjects prior to surgery (JPF, 7) were significantly higher than symmetric subjects (JPF, 2). Patients in group 3 had the highest preoperative JPF scores and groups 2 and 3 were more likely to be cured of TMD 1 year after treatment. ( $< 0.05$ ).

## Discussion

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The analysis of the 6 articles evidenced that the diagnoses of disk dislocation with reduction, myalgia of masticatory muscles and arthralgia were highly prevalent in the asymmetry groups, and all had strong statistical associations. Through this study it was observed that orthodontic and orthognathic facial asymmetry treatments are effective in eliminating temporomandibular dysfunction in most patients and that postero-anterior cephalometry can classify asymmetry into distinct groups and identify the probability of associations of the temporomandibular disorders and of the genotype. Another article centered the interest on the topic by evaluating the correlation of the morphological discrepancy between the mandibular condyle and the temporomandibular joint (TMJ) and the displacement of the disk on the magnetic resonance (MRI). This study included 61 patients with unilateral internal imbalance based on both magnetic resonance and clinical examination. The coronal morphologies of the condyle and the fossa were divided into four groups. According to the coronal morphology of the condyle and the fossa, all the joints were dichotomized into harmonized groups or in a group of discrepancies (eg condilo angled and concave fossa). The incidence of discrepancy and the discrepancy relationship with other findings on magnetic resonance imaging were statistically evaluated. Through this analysis it was possible to observe that the discrepancy was correlated to the incidence of the deformity of the disk on the interested side.

## Conclusion(s)

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In conclusion, from the following revision of the literature a correlation between mandibular asymmetry and temporo-mandibular disorders has been refuted since, in most of the articles, there is a link between the asymmetries and the reduction/resolution of the temporo-mandibular disorder of the patients on which it is performed.

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