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The triangle bruxism, pain, and psychosocial factors

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Publication date
2011

[Link to publication](#)

Citation for published version (APA):

Manfredini, D. (2011). *The triangle bruxism, pain, and psychosocial factors*.

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Chapter 1

INTRODUCTION

Temporomandibular disorders (TMD) are a heterogeneous group of pathologies affecting the jaw muscles, the temporomandibular joints (TMJ), or both ¹. The main signs and symptoms characterizing the clinical manifestation of TMD are represented by joint sounds, functional limitation, and pain ². Of these, pain is by far the main reason for patients to ask for advice and treatment, thus being the main target for diagnosis and treatment ³.

Over the years, a number of etiological theories were proposed to explain the pathophysiology of TMD, and the paradigm concept characterizing TMD practice initially focused on dental occlusion. For decades, the search for supposed abnormalities in teeth alignment and interarch relationship has been the main, not to say the unique, approach to the study of TMD etiology, and their correction was advocated as a necessary causal treatment for TMD symptoms ⁴.

More recently, evidence-based literature dismantled the validity of the occlusal paradigm ⁵. The search for alternative hypotheses for the pathophysiology of TMD and for customized treatment algorithms, which began already in the '50s of the past century, received a strong input from investigations performed over the past two decades ⁶. Amongst others, it became clear that psychosocial aspects of the disease, viz., concurrent depression, anxiety, stress, and pain-related disability, have a strong influence on an individual's quality of life and on treatment outcome ⁷⁻⁹. This led to current views on TMD as a group of multifactorial disorders to be assessed within a biopsychosocial context.

Bruxism is a motor muscle activity characterized by teeth grinding and/or jaw clenching during sleep and/or wake time ¹⁰. It is considered a risk factor for damage to the stomatognathic structures, and it was called into cause as a potential cause for both muscle and joint overload ^{11,12}. Pain in the jaw muscles and in the TMJ has thus been indicated as a consequence of bruxism, and sometimes pain has been proposed to be assessed as a bruxism symptom as well. However, the literature is not conclusive on the actual cause-and-effect relationship between bruxism and pain ^{13,14}. Actually, uncertainties on this issue may be explained by the very definition of bruxism itself, which suggests that it is a complex clinical entity including different jaw muscles motor activities, viz., clenching and grinding, performed at different stages of the circadian rhythm, viz., sleeping and

wakefulness¹⁵⁻¹⁷. In view of these considerations, it is plausible that getting deeper into the knowledge of the etiology and pathophysiology of the different bruxism activities will help comprehending better its complex relationship with TMD pain.

As in the case of the TMD literature, works on the etiology of bruxism suggested that peripheral sensory influences play only a minor role in the pathogenesis¹⁸, while factors related to the central nervous system (CNS) seem to have much more importance^{19,20}. From an etiological viewpoint, there are some suggestions that psychosocial factors may play a role in the etiology of bruxism, thus constituting a possible common denominator with pain referred by TMD patients^{21,22}.

Briefly, bruxism has been associated with emotional tension, psychosomatic disorders, hostility, aggressiveness, apprehension and a tendency to worrying, and also to psychiatric disorders such as schizophrenia²³⁻²⁵. TMD pain is also associated with a number of psychiatric and psychosocial disorders^{26,27}, mainly relating to anxiety disorders in the acute stage of pain and depression disorders in the chronic phase²⁸. In addition, the association between pain and psychosocial factors depends only in part on the pain location²⁹.

TMD pain may be associated with bruxism as well, so the study of bruxism in this context is complicated by the relationships that both bruxism and pain have with psychosocial factors, to the point that there are some preliminary suggestions for a different psychosocial profile of bruxers with and without chronic facial pain³⁰.

From the above, it is clear that bruxism, TMD pain, and psychosocial factors form a “triangle” of interconnected disorders, and their mutual relationships are likely to reciprocally influence each other and have a strong impact on the TMD clinics. Getting deeper into the study of such triangle may provide some basis to construct evidence in support of new paradigmatic concepts on which TMD practice should be based.

The general aim of the present thesis was to obtain a deeper insight into the mutual interactions between the three components of the triangle. Specific research questions and aims will be formulated for each chapter of this thesis.

The starting point of the project was a systematic literature review performed to assess the relationship between bruxism and temporomandibular disorders. The review,

described in **Chapter 2** of this thesis, aimed to summarize and update all the available information with respect to the last comprehensive review on the argument, which dated back to more than a decade ago¹³. For that reason, the literature published later than 1998 was selected, and findings were interpreted as the basis to discuss data from a series of multicenter investigations involving four highly specialized university centers for TMD treatment (Amsterdam, Padova, Tel Aviv, and Helsinki).

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD)³¹ are a standardized diagnostic system adopted to favour multicenter data gathering and comparison, and they were widely used over the years to collect data on patient and non-patient populations in several countries. In **Chapter 3** of this thesis, the association between self-reported bruxism, as diagnosed with the RDC/TMD history taking questionnaire, and the different TMD diagnostic groups, as diagnosed with the RDC/TMD axis I examination guidelines, was assessed. The discussion was focused on a comparison with findings from the literature and on the attempt to suggest a rationale to explain the peculiarities of the bruxism-TMD association in the clinical setting.

As a next step in further elucidating the triangle bruxism, pain, and psychosocial factors, a systematic review of the literature on the association between bruxism and psychosocial factors was performed. Findings of this review, described in **Chapter 4** of this thesis, allowed hypothesizing on the existence of a common psychosocial denominator for some TMD-related painful disorders and some bruxism activities. As a consequence, with the aim to further improve knowledge on the role of psychosocial factors in the etiology of bruxism, sleep-time masticatory muscles activities were recorded in a home environment in a group of healthy volunteers completing a set of questionnaires to rate their anxiety and depression symptoms. The study protocol and the results of this study are described in **Chapter 5** of this thesis.

Finally, the studies described in **Chapters 6 and 7** of this thesis examined the remaining side of the triangle, i.e., the associations between TMD pain and psychosocial factors, by investigating the prevalence of depression and somatization and the rate of chronic pain-related disability in patients with TMD pain. Multicenter designs were adopted in both chapters, the former describing findings gathered with the RDC/TMD axis

II for psychosocial assessment in TMD patients and the latter correlating such findings with those gathered with the RDC/TMD axis I for physical diagnosis in both patient and non-patient populations.

Synopsis

The topic of this thesis is the relationship between bruxism, pain, and psychosocial factors. Several aspects of the mutual interactions between the three components of the triangle will be studied. The aims of the thesis are the following: (1) to systematically review the literature on bruxism, with focus on its relationship with temporomandibular disorders and on the role of psychosocial factors in bruxism's etiology (**Chapters 2 and 4**); (2) to investigate for the relationship between self-reported bruxism and temporomandibular disorders (**Chapter 3**); (3) to study the influence of psychological symptoms on sleep-time masticatory muscles activity (**Chapter 5**); and (4) to assess the psychosocial impairment of TMD patients and its relationship with the physical diagnoses (**Chapters 6 and 7**).

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