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REVIEW ARTICLE

Sleep bruxism and temporomandibular disorders: systematic review*

Bruxismo do sono e disfunções temporomandibulares: revisão sistemática

Rafael Schlogel Cunali[1], Danielle Medeiros Veiga Bonotto[1], Eduardo Machado[1], Priscila Brenner Hilgenberg[2], Daniel Bonotto[3], Aguinaldo Coelho de Farias[4], Paulo Afonso Cunali[5]

** Received from the Specialization Course, Temporomandibular Disorders and Orofacial Pain, Federal University of Paraná (UFPr). Curitiba, PR.*

SUMMARY

BACKGROUND AND OBJECTIVES: Epidemiologic studies of temporomandibular disorders (TMD) bring general understanding of the role of sleep bruxism (SP) as TMD triggering and/or perpetuating factor. To date, studies on this association have not shown conclusive results. A reason for the low specificity level of this association is the different diagnostic methodology, both for TMD and SB. This study aimed at evaluating the possible cause and effect ratio between SB and TMD.

CONTENTS: Systematic literature review of research databases Medline, Cochrane, EMBASE, Pubmed, LILACS and BBO. Eligible criteria were papers published between January 2000 and August 2012, using the Research Diagnostic Criteria (RDC/TMD) for TMD diagnosis and polysomnography (PSG) for SB evaluation. Nine studies were selected by crossing chosen keywords. After applying inclusion criteria, four studies were selected. From five discarded studies, two were pilot studies, one was a review article, one case report and one comparative study not using RDC/TMD.

CONCLUSION: Evaluated studies were unable to establish a positive relationship between SB and TMD when keywords sleep bruxism, temporomandibular disorders and polysomnography were crossed; however they reinforce the need for referring TMD patients with sleep disorders to polysomnographic evaluation.

Keywords: Polysomnography, RDC/TMD, Sleep bruxism, Temporomandibular disorder.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Os estudos epidemiológicos das disfunções temporomandibulares (DTM) trazem compreensão geral a respeito do papel que o bruxismo do sono (BS) tem como fator do desencadeamento e/ou da sua perpetuação. Até o momento, estudos a respeito dessa associação, não mostraram resultados conclusivos. Uma das causas responsáveis pelo baixo grau de especificidade dessa associação é a diferente metodologia de diagnóstico, tanto para as DTM como para o BS. O objetivo deste estudo foi avaliar a possível relação de causa e efeito entre o BS e a DTM.

CONTEÚDO: Revisão sistemática da literatura nas bases de pesquisas Medline, Cochrane, EMBASE, Pubmed, LILACS e BBO. Foram considerados trabalhos publicados entre janeiro de 2000 e agosto de 2012, que utilizaram o *Reseach Diagnostic Criteria* (RDC/TMD) para diagnóstico de DTM, e a polissonografia (PSG) para avaliação do BS. Nove estudos foram selecionados pelo cruzamento dos descritores eleitos. Após a aplicação dos critérios de inclusão quatro estudos foram incluídos.

1. Specialists in Temporomandibular Disorders and Orofacial Pain, Federal University of Paraná (UFPr). Curitiba, PR, Brazil.
2. Master in Oral Rehabilitation, Dentistry School of Bauru, University of São Paulo (FOB/USP); Specialist in Dental Prosthesis, FOB/USP. Curitiba, PR, Brazil.
3. Professor of the Positivo University; Master in Sciences, Catholic University of Paraná (PUCPr); Specialist in Temporomandibular Disorders and Orofacial Pain, Federal University of Paraná (UFPr). Curitiba, PR, Brazil.
4. Professor, Federal University of Paraná; Doctor in Orthodontics, Paulista State University (UNESP); Specialist in Temporomandibular Disorders and Orofacial Pain, Federal University of Paraná (UFPr). Curitiba, PR, Brazil.
5. Professor, Federal University of Paraná; Coordinator of the Specialization Course, Temporomandibular Disorders and Pain, UFPr; Doctor in Sciences, Federal University of São Paulo (UNIFESP); Specialist in Temporomandibular Disorders and Orofacial Pain. Curitiba, PR, Brazil.

Correspondence to:
Rafael Schlogel Cunali, M.D.
Rua Padre Agostinho, 805
80430-050 Curitiba, PR.
Phone: +55 (41) 3322-12134
E-mail: rscunali@gmail.com

Dos cinco estudos descartados, dois eram estudos piloto, um era artigo de revisão, um relato de caso, e outro um estudo comparativo que não utilizou o RDC/TMD.
CONCLUSÃO: Os trabalhos avaliados não permitem estabelecer relação positiva entre o BS e a DTM, quando se cruzam os descritores bruxismo do sono, disfunção temporomandibular e PSG, porém reforçam a necessidade de encaminhar pacientes de DTM com queixas de distúrbios do sono para avaliação polissonográfica.
Descritores: Bruxismo do sono, Disfunção temporomandibular, Polissonografia, RDC/TMD.

INTRODUCTION

Temporomandibular disorders (TMD) are functional changes of temporomandibular joints (TMJ) and/or masticatory muscles. Its etiology is multifactorial. TMD triggering and perpetuation are conditioned to the interaction of factors such as trauma, ligament laxity, parafunctional habits, stress and systemic changes, among others[1].
The American Academy of Orofacial Pain defines bruxism as a parafunctional diurnal or nocturnal activity which includes tooth grinding and clenching[2]. According to the International Classification of Sleep Disorders[3], sleep bruxism (SB) is the oral activity characterized by tooth grinding or clenching during sleep, in general associated to micro arousals. So, there are SB and vigil bruxism. Among undesirable effects of this disorder, there are teeth wear, dental sensitivity to thermal stimulations, orofacial pain and temporal headache.
Currently, SB is considered a movement disorder[3] and no longer parasomnia. When there are no evident systemic or psychiatric medical causes, SB is considered primary SB. When associated to clinical, neurological or psychiatric disorders, or related to drug and/or substance use or withdrawal, it is considered secondary SB[4-6].
SB is being studied as risk and/or perpetuation factor of TMD[7-14]; however, there are few studies with adequate methodological criteria evaluating the association of SB and TMD. The lack of standardization of diagnostic methods, both for TMD and SB, explains why this association has not yet been proven or discarded. Although to date the best tools for SB and TMD research diagnosis are respectively polysomnography (PSG) and the Research Diagnostic Criteria (RDC/TMD), even studies simultaneously applying these two tools have not concluded that SB identified by PSG is a major risk factor for TMD. So, recent studies[13,14] have used, respectively, the collection of self-reports and clinical criteria of the American Academy of Sleep Medicine[3] to diagnose and relate SB to TMD.
O objetivo deste estudo foi avaliar a associação entre o BS e a DTM.
This study aimed at evaluating the association between SB and TMD.

METHOD

A systematic review contemplating studies with the best methodological criteria is interesting to unveil the current level of evidence to associate SB to TMD.
Pubmed, Medline, LILACS and BBO databases were queried. Keywords were "sleep bruxism", "polysomnography", "temporomandibular disorders" and RDC/TMD, which were crossed in search mechanisms. Initial list of articles was reviewed by two evaluators, who applied inclusion criteria to determine the final sample of articles.
Selection criteria were:
a) Studies published from January 2000 to August 2012;
b) Diagnostic criteria: use of PSG or portable and validated electromyography (Bite Strip) to evaluate SB, and RDC/TMD to evaluate the presence or absence of TMD;
c) Articles written in English, Spanish or Portuguese;
d) Pilot studies, case reports and simple literature reviews were excluded.

RESULTS

Nine studies were selected by crossing above-mentioned

Table 1 – Characteristics of included studies.

Authors	Studies outline and follow-up time	Sample Size	Diagnostic criteria for Sleep Bruxism	Diagnostic criteria for TMD	Results
Camparis et al.[9]	Transversal study One night	Group A: Bruxism with TMD (n = 20: 17 F/3M)	Polysomnography and questionnaire	RDC/TMD and interview	Without statistically significant differences between groups with regard to bruxism and evaluated sleep variables
Rossetti e col.[10]	Transversal study Two nights	Group with TMD (n = 30: 24F/6M) Control group (n = 30: 24F/6M)	Polysomnography and questionnaire	RDC/TMD	Sleep RMMA is associated to MP and is a low risk factor for TMD, while diurnal clenching may be a TMD risk factor.

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Table 1 – continuance

Authors	Studies outline and follow-up time	Sample Size	Diagnostic criteria for Sleep Bruxism	Diagnostic criteria for TMD	Results
Smith, Wickwire & Grace11	Transversal study Two nights	53 patients (43F/10M) with TMD	Polysomnography	RDC/TMD	Sleep RMMA is associated to MP and is a low risk factor for TMD, while diurnal clenching may be a TMD risk factor.
Smith, Wickwire & Grace11	Transversal study Two nights	53 patients (43F/10M) with TMD	Polysomnography and structured interview for sleep disorders	RDC/TMD	Findings suggest that insomnia may have a role on TMD pathophysiology
Saueressig et al.12	Longitudinal study 30 days	28 patients (13F/15M) with SB and w/o spontaneous TMD pain have used a MAD	*Bite Strip* and sleep evaluation questionnaire	RDC/TMD	MAD had positive effects on SB and sleep variables, without increasing TMD prevalence

MP = miofascial pain; F = females; M = males; RDC/TMD: Research Diagnostic Criteria for TMD; RMMA = rhythmic muscular masticatory activity; SB = sleep bruxism; TMD = temporomandibular disorder; MAD = mandibular advancement device.

keywords. After applying inclusion criteria, four studies were selected (Table 1), with Kappa agreement index between reviewers of 1.00. From five discarded studies, two were pilot studies, one was simple review article, one was a case report and one was a comparative study, however not using RDC/TMD.

DISCUSSION

It was very difficult to search the scientific literature to study any SB-related subject because there is a huge number of studies. Pubmed has 2389 publications about bruxism. How to select what to study? Determining keywords is critical, altough this limits the study. To scientifically meet such limitation in a study model looking for causal relationship, diagnostic criteria are of major importance. They will be the basis of the sample to be studied and compared. If this was a study aiming at comparing treatments, randomized double blind studies with control groups would be preferred.

SB may be clinically diagnosed when there are typical signs such as abnormal dental wear, tooth grinding sounds during sleep and mandibular muscle discomfort[3]. Since clinical SB diagnosis by history has its limitations, the ideal is that all possible bruxists be submitted to PSG test[15]. This test is important to confirm SB diagnosis, discarding other orofacial movements during sleep, such as swallowing, coughing, grunting or alternating mouth opening and closing, which may be mistaken for SB[16].

Diagnostic criteria for TMD by RDC/TMD[17] are currently being considered more reliable, being validated in several languages in an attempt to standardize research in this area. With RDC/TMD, joint and muscle TMD may be diagnosed in subgroups and their impact on pain may be objectively measured.

All four selected studies of this systematic review have used RDC/TMD to evaluate and diagnose TMD. Even so, the name TMD is still erroneously interpreted.

In the study[11], the title suggests that the objective was to evaluate the association between sleep disorders and sensitivity to laboratory pain in temporomandibular joint disorders, however TMD pain evaluated was miofascial pain, that is, a muscular pain. This problem is again observed when the methodology for dental assessment was evaluated, where the TMJ (Temporomandibular Joint) acronym is used in place of TMD (Temporomandibular Disorder), and this is repeated throughout the article. Since the focus of this study was sensitivity to provoked pain in a group of patients with miofascial pain, a group of patients without TMD pain and without SB should have been comparatively evaluated. Clinical SB diagnosis was done according to ICSD-2[3] and those described in the study[15] were used in PSG. Sample size was not big, but the higher number of females (43 X 10) is in line with other literature finding when TMD and sleep disorders were evaluated[18]. It is interesting the finding that 75% of the sample met the bruxism self-report criteria, but only 17% met PSG criteria for active SB. Other important finding was the relationship of general hyperalgesia in patients with primary insomnia.

It is hypothetically expected that patients with miofascial pain will have more SB than those who are pain free.

A very well designed study using RDC/TMD to define groups with and without masticatory miofascial pain, and PSG to confirm the presence of SB, has proven the opposite. Participated in this study 20 patients with miofascial pain, being 3 males and 17 females, with 20 pain free patients, being 5 males and 15 females, submitted to one PSG night[9], who were evaluated and compared. Results have not shown statistically significant differences in sleep variables and bruxism for both groups. With these observations it is possible to conclude that polysomnographic characteristics of bruxism patients with and without orofacial pain are similar.

In the attempt to associate SB and TMD, the question is: those with SB have higher chances of having TMD pain? This question seems to be answered by a study[10] where authors have evaluated 30 patients with masticatory miofascial pain diagnosed by RDC/TMD, and 30 asymptomatic individuals who made up the control group. All patients were submitted to polysomnography. This study has not shown significant differences between groups with regard to other sleep variables, but SB was significantly associated to miofascial pain. For the authors, SB was a minor risk for masticatory miofascial pain. On the other hand, according to the authors, diurnal clenching is probably a more important risk factor and should always be considered.

PSG is still expensive. It depends on a structured sleep laboratory, on qualified technicians and on patients' displacement. The portable Bite Strip device is an alternative to diagnose SB. The only study selected for this review which has not used PSG[12], has used this portable device to evaluate the effectiveness of a mandibular advancement device (MAD) to improve sleep and SB scores. The authors have used previous studies which have compared this device to PSG, validating it in some studies[20-22].

Twenty-eight individuals with SB complaints were evaluated and treated with MAD. Adaptation period to the device was waived. SB scores were recorded at baseline and 30 days after using MAD. Participants of this study, 13 females and 15 males had clinical SB history, but had no TMD pain according to RDC/TMD. It was possible to confirm clinical SB diagnosis, both moderate and severe, by using Bite Strip in baseline conditions. RDC/TMD was applied before and 30 days after using MAD to check possible side effects. Data have shown statistically significant improvement in sleep and SB scores by Bite Strip and SQA. The use of MAD has significantly decreased joint sounds, as well as sensitivity to masseter and temporal muscles palpation. Confirming data of a different study, MAD had positive effects on sleep and SB scores, measured by Bite Strip and SQA, respectively, and has not worsened TMD signs and symptoms during a 30-day period[22].

There are many publications on SB and TMD, but due to the subjectivity of diagnostic criteria and to methodological limitations of clinical studies, conclusive results still cannot be obtained, however studies with representative samples, long follow up time and adequate methodological criteria are needed to more accurately explain the relationship between SB and TMD using PSG and RDC/TMD.

CONCLUSION

Evaluated studies do not allow a positive relationship between SB and TMD when keywords sleep bruxism, temporomandibular disorders and polysomnography are crossed, however they reinforce the need to refer TMD patients with sleep disorder complaints to polysomnographic evaluation.

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