ORIGINAL ARTICLE

A COMPARATIVE STUDY BETWEEN TEMPOROMAN-DIBULAR JOINT DISORDERS (TMDS) ALONE AND TMDS ASSOCIATED WITH BRUXISM

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ABSTRACT

The objective of the present study was to compare signs and symptoms in temporoman-dibular joint disorder (TMD) patients and TMD associated with bruxism patients. This cross-sectional study was conducted on patients attending dental clinics in King Saud Medical City with TMD. The patients were divided into two groups; the experimental group consisted of TMD patients associated with bruxism habits while the control group was the TMDs patients without bruxism. To standardize the clinical examination; four examiners were trained to examine the temporomandibular joint (TMJ) and the muscles of mastication according to Research Diagnostic Criteria for Temporomandibular Disorder (RDC/TMD). This study measured pain in muscles of mastication and TMJ. Total of 80 patients participated in this study; (45% male & 55 % female). The age range was between 13 to 72 years with the mean age of 31 (SD 11.5) years. The present study has revealed that TMD patients felt more pain during palpation than TMD patients associated with bruxism in lateral and posterior discs (p=.026 and p=.000 respectively). Similarly, the pain during mouth opening (p=.001), chewing (p=001), yawning (p=.000) and talking (p=048) was more in TMD patients than TMD associated with bruxism. On the other hand, during palpation on temporalis muscles (P=0.235), TMD associated with bruxism group felt more pain than the TMD group. Therefore, it can be concluded that TMD showed much lower correlation with bruxism and, bruxism is more associated with myofascial pain.

Key Words: *Pain, Temporomandibular disorders, Bruxism, muscles of mastication*

INTRODUCTION

Temporomandibular disorders (TMD) are a collection of symptoms that encompasses a number of clinical conditions that involve temporomandibular joint and its associated musculature.[1,2] TMD is characterized by pain in the pre-auricular area, TMJ, limitation or deviation during mouth opening/closing, and TMJ sounds (clicking, popping, crepitus). The most common symptoms that patients complain are headache, neck-ache, earache, and facial pain.[1]

Bruxism is an excessive jaw-muscle activity identified by clenching or grinding of the teeth.[2] Bruxism can occur during sleep "Sleep Bruxism" (SB) or while awake "Awake Bruxism » (AB) or Diurnal Bruxism (DB).[3,4] Many theories have suggested that bruxism have multifactorial etiology. SB have a mutual relationship or connection with peripheral factors such as tooth interference in dental occlusion, psychosocial factors, stress or anxiety and central or patho-physiological causes involving brain neurotransmitters.[4,5] Bruxism is not a threatening condition, but it affects the quality of human life, especially in cases of those problems which affect the oral and dental health such as tooth wear, fractures of dental restorations, prosthesis and pain in the orofacial area.[4]

A study by Casanova-Rosado et al[6] using RDC/TMD and questionnaires to assess parafunctional habits found that one of the most significant variables related with the symptoms of TMD was bruxism. In addition, a study conducted by Shetty et al[4] found that tooth grinding causes temporal headache and temporomandibular disorders. Previous studies have also reported positive association between self-reported bruxism and TMD.[7,8,9] However, Marbach et al & Pullinger et al studied the association between bruxism and TMD, and both reported no significant association of bruxism with severity of muscle pain and the TMJ pain symptoms.[10,11] Rossetti et al also reported no statistically significant correlation between bruxism and TMD.[12] The objective of the present study was to compare signs and symptoms in temporomandibular

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Received for Publication: November 18, 2017
First Revision: March 21, 2018
Second Revision: May 04, 2018
Approved: May 15, 2018

joint disorder (TMD) patients with TMD associated with bruxism patients.

METHODOLOGY

Study Population

The population of this research project comprised of all patients attending dental clinics of three hospitals of King Saud Medical City (King Khalid University Hospital, King Abdulaziz University Hospital, and Dental University Hospital) in Riyadh, Kingdom of Saudi Arabia during the year 2016. The study was registered (IR 0172) with the College of Dentistry Research Center (CDRC), at King Saud University.

Patients were categorized into two groups, the first group consisted of TMD associated with bruxism patients (experimental), and the second group was TMD only patients (control). Methods of examination and the designing of clinical examination form were based on RDC/TMD[13] and DC/TMD[14].

Development of Questionnaire

The study questionnaire and clinical examination form were based on RDC/TMD[13] and DC/TMD[14] respectively (See Appendix I). The questionnaire comprised of 13 questions, the first five questions (Q1-Q5) were about the feeling of pain during mouth opening, chewing, yawning, talking and jaw lock during mouth opening/closing. Whereas the remaining eight questions (Q6-Q13) were about the pain during palpation on specific anatomic locations with "Yes" or "No" options.

The amount of pressure during digital palpation was standardized (6-8kg) in calibrated weighing scale (Detecto Weighing Scale 1250-LPAN Cardinal Webb City, MO, USA) provided by the physical laboratory in the College of Dentistry at King Saud University.

The exclusion criteria in this study were:

1. Patients with missing or tilted tooth/teeth.
2. Patients with third-molar problems such as pericoronitis or supra-erupted tooth.
3. Patients with occlusal splint at the time of evaluation.
4. Patients with major psychiatric disorders.

Statistical Analyses

The data obtained were analyzed using IBM SPSS software version #20. Chi square test was performed to determine any significant difference between the groups. All calculations were performed at $p<0.05$ level of probability. Descriptive analyses were also conducted to summarize the individual responses to each question.

RESULTS

A total of 80 participants (45% males and 55 % females) were involved in this study. 36 participants were in TMD group and 44 participants were in TMD associated with bruxism group. The age ranged from 18 to 72 years with a mean age of 31 (SD 11.5) years. The sample power was 86 % at the level of significance 0.05.

The result of the clinical examination showed highly significant differences ($p<.05$) for all clinical items between TMD patients associated with bruxism and those with TMD only except the two items related to pain during palpation of masseter and temporalis muscles. The bruxism was diagnosed by taking history of the patients and clinical examination. According to the history of patients, all of them were suffering from sleep bruxism.

Pain during mouth opening, chewing, yawning and talking:

In this study, highly significant differences were observed between pain in the TMD group and the TMD associated with bruxism group. Pain in the TMD patients was higher than the TMD associated with bruxism patients. In TMD group, 52%, 50%, 61% and 22% of patients and in the TMD associated with bruxism group, 15%, 15%, 13% and 6% of patients felt pain during mouth opening, chewing, yawning and talking respectively (P=0.001 for mouth opening and chewing, P=0.048 for talking) [Table 1, Fig 1].

Jaw locks during mouth opening or closing:

In the TMD group, 33% of patients experienced lock jaw during mouth opening or closing while 13% of patients experienced those in the TMD associated with bruxism group (P=0.034) [Table 1, Fig 1].

Pain on palpation:

During palpation on temporalis muscles, significant difference was observed between pain in the TMD group and the TMD associated with bruxism group. Pain was higher in the TMD associated with bruxism patients than the TMD patients during palpation on temporalis muscles (P=0.235). On the other hand, pain is higher in the TMD patients than the TMD associated with bruxism patients during palpation on masseter muscles (P=0.113) [Table 1, Fig 1]. Pain during palpation on temporalis and masseter muscles, the p value was shown higher than 5% level of significant.

While examining the lateral and posterior capsule during palpation, pain in the TMD group was higher than the TMD associated with bruxism group. 58% and 89% of patients in the TMD group and 34% and 43% of patients in the TMD associated with bruxism group felt pain in the TMJ during palpation on lateral and posterior discs respectively (P=0.026) [Table 1, Fig 1].

Pain in protruding the mandible against intrusion:

36% of participants in TMD group and 11% of participants in TMD associated with bruxism group felt pain in protruding the mandible against intrusion (P=0.009) [Table 1, Fig 1].

During protruding the mandible against intrusion, more number of TMD patients felt pain compared to TMD with bruxism patients. (Table 1, Fig 1)

Anterior disc displacement:

In this study, there was a significant difference between TMD group (91%) and TMD associated with

bruxism group (38%) who had anterior disc displacement with reduction (P=0.000) [Table 1, Fig 1].

Deviation on mouth opening:

A significant difference was found between TMD group (80%) and TMD associated with bruxism group (57%) with deviation of the mandible during mouth opening (P=0.021) [Table 1, Fig 1].

APPENDIX I: THE CLINICAL EXAMINATION FORM USED IN THE STUDY.

Clinical form Items	TMD Patients	TMD Associated with Bruxism
1- Pain during mouth opening		
2- Pain during chewing		
3- Pain during yawning		
4- Pain during talking		
5- Jaw locks during mouth opening or closing		
6- Pain in temporalis muscle on palpation		
7- Pain in masseter muscle on palpation		
8- Pain in TMJ on lateral palpation		
9- Pain in TMJ on posterior palpation		
10- Pain in protruding the mandible against intrusion		
11- Anterior disc displacement with reduction		
12- Anterior disc displacement without reduction		
13- Deviation on opening		

DISCUSSION

Myofascial pain is a common subset of TMD, and it is well known that jaw muscle pain and motor function are interrelated. This study was specifically designed to measure the correlation between the bruxism and TMD based on a clinician's interview/oral history taking besides clinical assessment. Palpation was carried out on specific anatomic locations, which included symmetric points simultaneously. In this study, there was a significant differences between a TMD associated with bruxism group and TMD only group who had anterior disc displacement with reduction. Mitchel et al[15] mentioned in their study that pain with anterior disc displacement is expected to be happened in the TMD due to distortion of capsular nociceptive fibers.

TABLE 1: SUMMARY OF FINDINGS FROM STUDIES WITH A QUESTIONNAIRE.

Number of questions	Number answered yes TMJ (%)	Number answered yes bruxism (%)	P value
Q1. Pain during mouth opening	52.77	15.50	.001*
Q2. Pain during chewing	50	15.50	.001*
Q3. Pain during yawning	61.11	13.63	.000*
Q4. Pain during talking	22.22	6.51	.048*
Q5. Jaw locks during mouth opening or closing	33.33	13.63	.034*
Q6. Pain in temporalis muscle on palpation	30.55	40.90	.235
Q7. Pain in masseter muscle on palpation	80.55	65.90	.113
Q8. Pain in TMJ on lateral palpation	58.33	34.09	.026*
Q9. Pain in TMJ on posterior palpation	88.88	43.18	.000*
Q10. Pain in protruding the mandible against intrusion	36.11	11.36	.009*
Q11. Anterior disc displacement with reduction	91.66	38.63	.000*
Q12. Anterior disc displacement without reduction	0	0	-
Q13. Deviation on opening	80.55	56.81	.021*

*Significant

While examining the lateral and posterior capsule during palpation, pain in the TMD patients was higher than the TMD associated with bruxism group. In adult population, the disc lacks nerve endings. Therefore, it is not the pain source. Pain is derived from the pressure applied over the retro discal tissue.[13] Our results showed highly significant difference between pain in the TMD group and the TMD associated with bruxism group during opening and chewing, which is consistent with

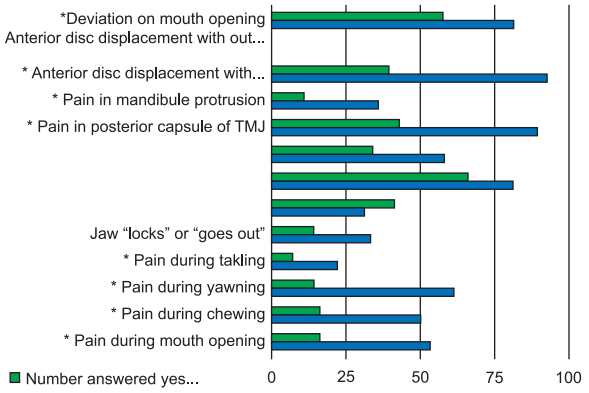

Fig 1: Comparison between TMD associated with bruxism and TMD only groups.

finding by Ciancaglini.[16] Carlsson et al[17] also reported that pain occurred in the TMJ region during opening and chewing and, is associated with the difficulty to open the mouth wide.

Significant finding was noticed from the result of palpating the temporalis muscles in both the study groups. The present study showed that during palpation of temporalis muscles, TMD associated with bruxism group felt more pain than the TMD group only. Mitchel et al stated that pain in the joint demonstrates joint or capsule inflammation or adhesions while pain in the masseter or temporalis may demonstrates trigger points or hypertonicity of the closing muscles.[15] Velly et al[18] noted that self-reported tooth clenching/grinding was associated with the prevalence of chronic masticatory myofascial pain. Huang et al[19] also stated that self-reported clenching was identified as a risk factor for subjects with myofascial pain. As shown above, strong correlation between TMD and bruxism was not observed. The studies that used other methods to diagnose bruxism, such as polysomnography and electromyography did not find a significant association between bruxism and the painful symptoms of TMD.[12] Although bruxism may cause pain, there are many people who have bruxism, hypertrophy of jaw muscles and attrition, but do not suffer from pain. The reason behind could be that they have been trained their muscles for years and the muscles have become damage-resistant.[20] Therefore, our result suggests that pain during palpation on temporalis may be more associated with myofascial pain than the TMD.

Furthermore, a noticeable difference was found between TMD associated with bruxism group and TMD group in which deviation of the mandible during mouth opening occurred more in the TMD group. To evaluate the mandibular deviation, the mandibular opening (active range of motion) must be observed carefully. In this manner, if a spasm or a displaced disc occurred, the mandible will deviate toward the affected side. Chaurasia[21] also found higher deviation of mandibular opening in muscle disorders. The disc is considered the structure least adaptable to stresses placed upon it, comparing with the other structures (muscles, ligaments and capsules) which have some mechanisms such as hypertrophy, thickening or repair as capability of adaptation.[16]

It is important to increase the awareness level about the bruxism habit among the population. Bruxism can cause severe damage to periodontal and oral health such as tooth wear (which is irreversible process) and broken dental restorations. The dentists should notice any signs or symptoms related to bruxism during dental examination and inform the patient about it.

CONCLUSION

Our present study demonstrates that TMD patients experienced more pain during palpation in the lateral and posterior discs than TMD patients associated with bruxism. Further, the pain was more during mouth opening, chewing, yawning and talking in TMD patients than TMD associated with bruxism. On the other hand, pain during palpation on temporalis muscles was more in the TMD associated with bruxism patients than the TMD patients only. Therefore, our study suggests that TMD showed much lower correlation with bruxism and, bruxism is more associated with myofascial pain.

DISCLOSURE

All authors declare no conflict of interest.

ACKNOWLEDGMENTS

Thank to Research Centre at College of Dentistry in King Saud University, Riyadh, Saudi Arabia for supporting this study (IR0172).

REFERENCES

1 Pergamalian A, Rudy TE, Zaki HS, Greco CM. The association between wear facets, bruxism, and severity of facial pain in patients with temporomandibular disorders. J Prosthet Dent. 2003;90(2):194–200.

2 Tao J, Liu W, Wu J, Zhang X, Zhang Y. The study of grinding patterns and factors influencing the grinding areas during sleep bruxism. Arch Oral Biol. 2015;60(10):1595–600.

3 Camparis CM, Siqueira JTT. Sleep bruxism: Clinical aspects and characteristics in patients with and without chronic orofacial pain. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;101(2):188–93.

4 Shilpa Shetty, Varun Pitti, Satish Babu CL, Surendra Kumar GP, Deepthi BC. Brux-ism: A literature review. J Indian Prosthodont Soc. 2010;10(3):141–8.

5 Manfredini D1, Lobbezoo F. Role of psychosocial factors in the etiology of bruxism. J Orofac Pain. 2009;23(2):153-66.

6 Casanova-Rosado JF1, Medina-Solís CE, Vallejos-Sánchez AA, Casanova-Rosado AJ, Hernández-Prado B, Avila-Burgos L. Prevalence and associated factors for tem-poromandibular disorders in a group of Mexican adolescents and youth adults. Clin Oral Investig. 2006;10(1):42-9.

7 Blanco Aguilera A, Gonzalez Lopez L, Blanco Aguilera E, De la Hoz Aizpurua JL, Rodriguez Torronteras A, Segura Saint-Gerons R, Blanco Hungría A. Relationship be-tween self-reported sleep bruxism and pain in patients with temporomandibular disor-ders. J Oral Rehabil. 2014;41(8):564–72.

8 Nagamatsu-Sakaguchi C, Minakuchi H, Clark G, Kuboki T. Relationship between the frequency of sleep bruxism and the prevalence of signs and symptoms of temporo-mandibular disorders in an adolescent population. Int J Prosthodont. 2008;21(4) :292-8.

9 van der Meulen MJ, Lobbezoo F, Aartman IH, Naeije M. Self-reported oral parafunc-tions and pain intensity in temporomandibular disorder patients. J Orofac Pain. 2006;20(1):31-5.

10 Marbach JJ. The "temporomandibular pain dysfunction syndrome" personality: Fact or fiction?. J Oral Rehabil. 1992;19(6):545–60.

11 Pullinger AG, Seligman DA. The degree to which attrition characterizes differenti-ated patient groups of temporomandibular disorders. J Orofac Pain. 1993;7:196-08.

12 Rossetti LM, Rossetti PH, Conti PC, de Araujo Cdos R. Association between sleep bruxism and temporomandibular disorders: a polysomnographic pilot study. Cranio. 2008 Jan;26(1):16-24.

13 Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular dis-orders: review, criteria, examinations and specifications, technique. J Craniomandib Disord. 1992;6:301–55.

14 Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, et al. Diag-nostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. J Oral Facial Pain Headache. 2014;28(1):6-27.

15 Mitchel B, Cummins C, LeFebvre R. Temporomandibular joint disorders (TMD): A clinical assessment. University of Western States: 2015.

16 Ciancaglini R, Gherlone EF, Radaelli G. The relationship of bruxism with craniofa-cial pain and symptoms from the masticatory system in the adult population. J Oral Re-habil. 2008;28(9):842–8.

17 Carlsson GE, Ekbäck G, Johansson A, Ordell S, Unell L. Is there a trend of decreas-ing prevalence of TMD-related symptoms with ageing among the elderly?. Acta Odon-tol Scand. 2014;72(8):714–20.

18 Velly AM, Gornitsky M, Philippe P. Contributing factors to chronic myofascial pain: a case-control study. Pain. 2003;104(3):491-9.

19 Huang GJ, Leresche L, Critchlow CW, Martin MD, Drangsholt MT. Risk factors for diagnostic subgroups of painful temporomandibular disorders (TMD). J Dent Res. 2002;81:284–8.

20 Chandwani B, Ceneviz C, Mehta N, Scrivani S. Incidence of Bruxism in TMD Pop-ulation. N Y State Dent J. 2011;77(5):54-7.

21 Chaurasia BD. Human anatomy:Regional and applied dissection and clinical. 5th ed. New Delhi: CBS Publisher and Distributors; 2010.