A COMPARATIVE STUDY BETWEEN TEMPOROMANDIBULAR 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 temporomandibular 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), 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. 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. Bruxism is an excessive jaw-muscle activity identified by clenching or grinding of the teeth. Bruxism can occur during sleep “Sleep Bruxism” (SB) or while awake “Awake Bruxism » (AB) or Diurnal Bruxism (DB). 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. 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.

A study by Casanova-Rosado et al 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 found that tooth grinding causes temporal headache and temporomandibular disorders. Previous studies have also reported positive association between self-reported bruxism and TMD. 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. Rosetti et al also reported no statistically significant correlation between bruxism and TMD.
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 (IR0172) 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 and DC/TMD.

**Development of Questionnaire**

The study questionnaire and clinical examination form were based on RDC/TMD and DC/TMD 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 massester muscles (P=0.113) [Table 1, Fig 1]. Pain during palpation on temporalis and massester 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.**

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

**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 al15 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. 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

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

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

*Significant
mechanisms such as hypertrophy, thickening or repair as capability of adaptation.  
It is important to increase the awareness level about the 
bruism habit among the population. Bruism 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 bruism 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 
bruism. Further, the pain was more during mouth 
opening, chewing, yawning and talking in TMD patients 
than TMD associated with bruism. On the other hand, 
pain during palpation on temporalis muscles was more 
in the TMD associated with bruism patients than the 
TMD patients only. Therefore, our study suggests that 
TMD showed much lower correlation with bruism 
and, bruism is more associated with myofascial pain.

DISCLOSURE

All authors declare no conflict of interest.

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

finding by Ciancaglini.  
Carlsson et al 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 bruism 
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 demonstrate trigger 
points or hypertonicity of the closing muscles. Velly 
et al noted that self-reported tooth clenching/grinding 
was associated with the prevalence of chronic masticatory 
myofascial pain. Huang et al 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 bruism was 
not observed. The studies that used other methods 
to diagnose bruism, such as polysomnography and 
electromyography did not find a significant association 
between bruism and the painful symptoms of TMD. 
Although bruism may cause pain, there are many 
people who have bruism, 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 dam-
age-resistant. 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 bruism 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 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

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