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Original Article

Frequency of Parafunctional Habits and Malocclusion in Patients with Temporomandibular Disorders in Public Dental Hospital

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ABSTRACT

Objective: To correlate the frequency of parafunctional habits and dental malocclusion in patients presenting with and without temporomandibular joint disorders.

Study Design: Correlational study.

Place and Duration of Study: Department of Oral and Maxillofacial Surgery, Armed Forces Institute of Dentistry, Rawalpindi, Pakistan, from Feb to Jul 2024.

Methodology: A total of 150 patients with parafunctional habits and dental malocclusion issues were assessed for presence or absence of temporomandibular joint (TMJ) disorders. The assessment for presence or absence of TMJ disorders was done according to standard guidelines furnished by the American Academy of Orofacial Pain, which included TMJ pain, muscle stiffness, and joint noises. Primary variables studied were the frequency of parafunctional habits and malocclusion between patients with and without TMJ disorders.

Results: Bruxism was reported in 47(51.1%) versus 12(20.7%) patients (p<0.001), nail biting was reported in 23(25.0%) versus 07(12.1%) patients, (p=0.054), lip biting was reported in 09(9.8%) versus 04(6.9%) patients (p=0.541) holding objects in the mouth was reported in 18(19.6%) versus 05(8.6%) patients (p=0.070) and leaning the face on both arms was seen in 20(21.7%) versus 06(10.3%) patients (p=0.073). Class-I Occlusion was seen in 06(6.5%) versus 36(62.1%) patients, Class-II malocclusion in 55(59.8%) versus 22(37.9%) patients and Class-III malocclusion was seen in 31(33.7%) versus 00(0%) between both groups (p<0.001)

Conclusion: We conclude that parafunctional habits and malocclusion are major and important risk factors leading to TMJ disorders in patients.

Keywords: Dental, Malocclusion, Parafunctional, Temporomandibular.

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INTRODUCTION

Temporomandibular joint (TMJ) disorders present with diverse clinical pictures in both genders and all age groups globally.[1] Recent reported global prevalence of TMJ disorders is reported to be around 34%.[2] The most common affected age group is reported between ages 18-60, but younger patients have been reported more in poor resource countries.[3] With such a staggering number of patients affected by the issue, risk factors and causative practices need to be identified and addressed promptly to prevent complications. Studies have reported considerable deterioration in the quality of life of patients suffering from TMJ disorders with pain and muscle stiffness in the affected area associated with mastication and feeding issues.[4]

The two most common factors associated strongly with TMJ disorders are parafunctional habits and malocclusion.[5] Parafunctional habits are defined as non-functional oromandibular activities apart from deglutition and mastication. They signify psychological, social, and organic issues that adversely affect the integrity of the TMJ resulting in considerable disability.[6] Malocclusion is the misalignment or incorrect relationship between the teeth of the upper and lower dental arches causing abnormal apposition when the jaw closes. They are defined as Class I-III depending upon the severity of misalignment and require corrective procedures in most cases.[7]

While international literature is adequate in identifying risk factors for the specific demographic area, there has been a lack of recent studies in Pakistan assessing the prevalence of TMJ disorders. This study aims to identify major parafunctional causes and level of malalignment prevalent in the population since specific causes require specific treatment strategies ranging from simple observation to interventional

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procedures. The study would help us tailor treatment guidelines and provide facilities to assess and monitor the major risk factors for TMJ disorders and analyze the frequency of variables affecting TMJ versus those without TMJ issues.

METHODOLOGY

This analytical cross-sectional study was conducted at the Department of Oral and Maxillofacial Surgery, Armed Forces Institute of Dentistry, Rawalpindi, Pakistan from Feb-July 2024 after approval from the ethical review board vide letter no. 918/Trg dated 13 May 2020. Minimum sample size was calculated using the WHO calculator, keeping the confidence interval at 95%, margin of error at 5%, with anticipated population frequencies of parafunctional habits and malocclusion between those with TMJ disorders versus those without at 59.6% versus 40.4%, respectively.[8] Minimum sample size came out to be 103 patients. With a margin for lost to follow-up in the study, 150 patients were included finally protocol according to the inclusion criteria furnished.

Inclusion Criteria: All patients aged 18-50 years of age presenting to the outpatient department with positive history and clinical findings of parafunctional habits and malocclusion with or without TMJ disorders were included.

Exclusion Criteria: Patients with an orthodontic dental procedure in the last 6 months, patients with infection of the gums and/or teeth, patients with acute or chronic toothache, patients with facial trauma, patients with previous history of TMJ surgery or pathology, patients with history of mental disorders, patients lost to follow-up and unwillingness of patients, parents or next of kin in case of minors to be included in the study.

The study method included all patients as per the inclusion criteria. The study method then consisted of two steps. The first step involved segregation of patients presenting with parafunctional habits and class of malocclusion at presentation. Parafunctional habits included findings consistent with bruxism, nail biting, lip biting, leaning on both arms, and holding objects in the mouth. The history included yes or no questions inquiring about the presence or absence of these issues in all patients. The next step involved complete history taking, including demographic variables and parafunctional habits endorsed on a proforma by a resident oral and maxillofacial surgery unaware of the study protocol or the study outcome to ensure blinding and prevent bias. The measurement of parafunctional habits, including teeth clenching, fingernail biting, object holding in mouth, lip biting, and leaning on arm, involved a multifaceted approach. All participants were asked whether they do these habits or not. As part of the clinical measurement process, methods were employed to assess the impact of these habits on the stomatognathic system, including conducting visual examinations, looking for telltale signs such as tooth wear, enamel damage, and the presence of bite marks on non-food items like pencils, taken on history. Moreover, history included observations to identify patterns associated with these habits, considering factors like jaw pain, headaches, and facial muscle tension reported by the individuals. The subjective experiences reported by patients were complemented by objective clinical assessments, allowing for a comprehensive understanding of the nature and consequences of these parafunctional habits.

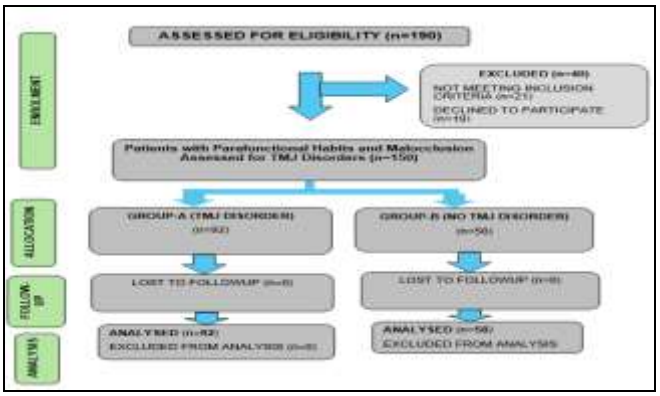

Figure-1: Patient Flow Diagram Representing Phases of The Study

Complete examination of the oral and masticatory system and presence and/or absence of malocclusion was also documented according to the Angle classification,[9] which involved Class I-III signifying level of upper and lower teeth malalignment once the mouth was closed on clinical exam and assessment (Figure-II). Once the variables were documented, the patients were then assessed for presence or absence of TMJ disorders. Those with TMJ disorders after final assessment were placed in Group-A, while those not exhibiting TMJ disorders were placed in Group-B.

The assessment for the presence or absence of TMJ disorders was conducted according to the standard guidelines provided by the American Academy of Orofacial Pain.[10] It consisted of history

and clinical assessment, which included facial pain, headache, restriction in jaw movements, problems in mouth opening, issues with normal mastication, muscle tenderness, and muscle fatigue. The examination was done by a consultant oral and maxillofacial surgeon, unaware of the study protocol or study variables. Examination included assessment of TMJ joint sounds assessed by closing, along with lateral mandibular movements and presence or absence of joint crepitations and/or clicking. TMJ pain was assessed by the palpatory method on both the lateral and posterior aspects, and pain scores reported in both groups were evaluated using a standard 10-point Visual Analog Scale (VAS), with higher scores indicating greater pain and discomfort. The same method was used to assess muscle tenderness and range of mandibular movement with assisted and unassisted mouth opening and pain scores endorsed on the VAS accordingly. After the initial evaluation, patients presenting with joint sound and pain during mandibular movement, mouth opening < 35 mm, and pain scores on the VAS between 1-10 for more than one month were included as patients having TMJ disorders.

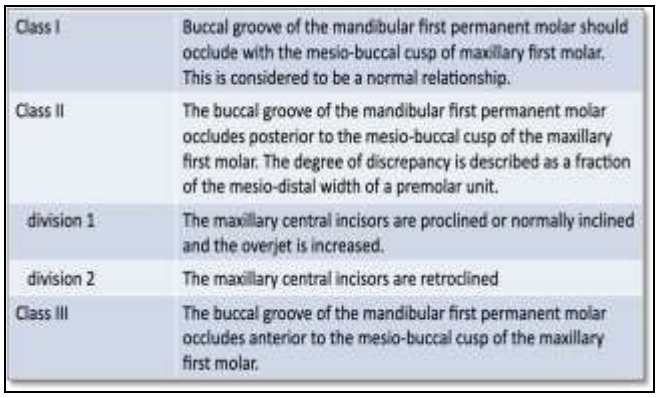

Figure-2: Angle Classification Grades of Malocclusion

Primary variables studied were the frequency of parafunctional habits and malocclusion between patients with and without TMJ disorders. Secondary variables were median pain scores on clinical examination of the TMJ joint between patients with and without TMJ disorders.

Demographic data were statistically described in terms of Mean±SD, frequencies, and percentages when appropriate. Normality of the data was checked for checked for age, weight, and gender variables, and they were normally distributed. An independent sample t-test was used to compare statistically significant means for age and weight. Chi-square test was used to compare frequency variables for malocclusion habits. Median values were compared using the Mann-Whitney U test for pain scores. A *p*-value of ≤0.05 was considered statistically significant. All statistical calculations were performed using Statistical Package for Social Sciences (SPSS) 26.0

RESULTS

A total of 190 patients were assessed for inclusion in the study protocol, and 150 patients were finally analyzed. They were divided into Group-A if there was evidence of TMJ disorders and Group-B if there was no evidence of TMJ disorders. Based on the criteria, 92 patients were included in Group-A and 58 patients in Group-B. Mean age of patients in Group-A was 35.42±2.41 years versus 35.41±2.47 years in Group-B (*p*=0.980). Mean weight between both groups was 63.10±6.53 kg versus 62.72±6.26 kg (*p*=0.729). Gender distribution revealed 23(25.0%) males and 69(75.0%) females versus 14(24.1%) males and 44(75.9%) females between both groups (*p*=0.905). Socioeconomic status of patients showed 38(41.3%) versus 26(44.8%) belonging to a very modest background, 34(37.0%) versus 18(31.0%) belonging to a modest while 20(21.7%) versus 14(24.1%) belonging to an affluent background (Table-I).

Table-I: Demographic Characteristics (n=150)

Variables	Group-A (n=92)	Group-B (n=58)	*p*-value
Mean Age (Years)	35.42±2.41	35.41±2.47	0.980
Mean Weight (Kg)	63.10±6.53	62.72±6.26	0.729
Gender			
Male	23(25.0%)	14(24.1%)	0.905
Female	69 (75.0%)	44(75.9%)	
Socioeconomic Status			
Very Modest	38(41.3%)	26(44.8%)	-
Modest	34(37.0%)	18(31.0%)	-
Affluent	20(21.7%)	14(24.1%)	-

**Kg = Kilogram*

When observing for frequency of parafunctional variables, bruxism was reported in 47(51.1%) versus 12(20.7%) patients (*p*<0.001), nail biting was reported in 23(25.0%) versus 07(12.1%) patients, (*p*=0.054), lip biting was reported in 09(9.8%) versus 04(6.9%) patients (*p*=0.541) holding objects in the mouth was reported in 18(19.6%) versus 05(8.6%) patients (*p*=0.070) and leaning the face on both arms was seen in 20(21.7%) versus 06(10.3%) patients (*p*=0.073). When assessing malocclusion in the study group, malocclusion Class-I was seen in 06 (6.5%) versus

36(62.1%) patients, Class-II in 55(59.8%) versus 22(37.9%) patients and Class-III malocclusion was seen in 31(33.7%) versus 00(0%) between both groups (p<0.001) (Table-II).

Table-II: Primary Variables Compared Between Both Groups (n=150)

Variables	Group-A (n=92)	Group-B (n=58)	*p*-value
Frequency Of Parafunctional Variables			
Bruxism	47 (51.1%)	12 (20.7%)	<0.001
Nail Biting	23 (25.0%)	07 (12.1%)	0.054
Lip Biting	09 (9.8%)	04 (6.9%)	0.541
Holding Objects In Mouth	18 (19.6%)	05 (8.6%)	0.070
Leaning Face On Both Arms	20 (21.7%)	06(10.3%)	0.073
Malocclusion Class According To Angle Classification			
Class-I	06 (6.5%)	36 (62.1%)	<0.001
Class-II	55 (59.8%)	22 (37.9%)	
Class-III	31 (33.7%)	00 (0%)	

Median pain scores assessed during TMJ examination between both groups showed pain scores of 4.00(1.00) versus 2.00 (1.00) during temporomandibular joint movement (p<0.001), pain scores of 4.00(1.00) versus 2.00(0.00) reported in patients with masticatory muscle stiffness (p<0.001), pain scores of 4.00(1.00) versus 2.00(1.00) during assisted mandibular motion (p<0.001) and pain scores of 4.00(1.00) versus 2.00(1.00) during unassisted mandibular motion between both groups (p<0.001) (Table-III).

Table-III: Median Pain Scores Between Both Groups On Temporomandibular Joint Assessment (n=150)

Variable	Group-A (n=92)	Group-B (n=58)	*p*-Value
Median Pain Scores On Visual Analog Scale (0-10)			
Temporomandibular Joint Movement	4.00(1.00)	2.00(1.00)	<0.001
Masticatory Muscle Stiffness	4.00(1.00)	2.00(0.00)	<0.001
Mandibular Motion (Assisted)	4.00(1.00)	2.00(1.00)	<0.001
Mandibular Motion (Unassisted)	4.00(1.00)	2.00(1.00)	<0.001

DISCUSSION

The study concluded that increased frequency of parafunctional habits and Class-II and III malocclusion were associated with a greater incidence of temporomandibular joint disorders in this study group. When comparing it with studies done both nationally and internationally and doing a critical analysis, it was found that in a study done nationally by Malik *et al*., it was reported that the incidence of TMJ disorders was closely linked with higher frequencies of parafunctional habits, and the chief presenting issue was lip biting, followed by nail biting and then bruxism.[11] The comparison of study's result with to international literature, the primary etiological factor among our study population was bruxism, followed by nail biting. These findings constitute significant changes in demographic areas that require tailored treatment guidelines since risk factors and causes for TMJ vary from one region to another. A national study done by Khan *et al*., reported that among young individuals, nail biting was reported as the most common presenting parafunctional issue. In our study, the reported frequency was around 30% which is less than the reported, more than 50% in the referenced study. But since we included a wider age demographic than the study referenced, nail biting was reported as the third most common rather than the most common. 12 When talking about parafunctional habits, a study done by Arya *et al*., has reported that psychological and stress factors contribute considerably.[13] In young adults and adolescents, stress factors include a hectic school or college routine, stress associated with educational competitiveness, while in Middle Ages, work stress is implicated as a major causative factors leading to parafunctional habits and TMJ disorders.[14] Studies done by Abe *et al*., and Torul *et al*., both report bruxism followed by tongue bite as the two major causes leading to TMJ disorders. Other major factors in different demographics and age groups include nail and lip biting, especially in the younger demographic.[15, 16]

Another factor contributing significantly to TMJ disorders is the malocclusion issue, as reported by a study done by Simunovic *et al*., 5 Our study reported that TMJ disorders were associated with malocclusion issues, and Class-II was the most reported malocclusion type in our study population. A study done by Angelo *et al*., reported that Class-I occlusion was the most common in their demographic area, and bruxism with Class-II malocclusion was linked to severe TMJ dysfunction, hampering patient comfort with higher pain scores. They reported that Class-III was rarely seen in their study population, but our study reported a 33% frequency in patients with TMJ disorders, but no one was affected in patients without TMJ disorders.[17] A study done by Rathi *et al*., concluded Class-II as the most common type in

patients with TMJ disorders, which is in corroboration with findings of our study.[18] When talking about the pain scores on TMJ examination, it was reported by Sabsoob *et al*., that pain scores were in the mild to moderate category in all types of examinations involving the TMJ, muscles of mastication, and mandibular movement, both assisted and unassisted.[19] Scores were restricted to mild to no pain in patients without TMJ disorders.

A local study conducted by Malik *et al*., in Lahore concluded that bruxism, tongue thrusting, and nail biting were the commonest parafunctional habits reported in adolescents, which is in line with our findings, where bruxism and nail biting were among the top causes for parafunctional habits. The study also reported that long-term follow-up is associated with malocclusion in all directions, with these issues in the study population.[20] Another study done by Butt et al., aimed to find a causal link between emotional stability and parafunctional habits but found that while patients reported anxiety issues, the correlation was not statistically significant. This is an important causal link and requires more studies for more conclusive results.[21]

The study recommends a high level of suspicion in identifying TMJ disorders in patients presenting with parafunctional habits and malocclusion issues and advises patients to seek appropriate therapeutic options to prevent long-term complications. The identification of these disorders shows a diverse presentation in different demographics, and our study would help define local treatment and counseling programs.

LIMITATIONS OF STUDY

The limitations are that the study is single-center only. While parafunctional habits and malocclusion are major factors, the association between underlying social factors and their effect on parafunctional habits needs further studies to conclude a clear causal link.

CONCLUSION

This study concludes that parafunctional habits and malocclusion are major and important risk factors leading to TMJ disorders in patients with higher frequencies than those without TMJ disorders.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SJHB & SUK: Data acquisition, data analysis, critical review, approval of the final version to be published.

AB & SS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AUR & AI: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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