ORIGINAL ARTICLE

FREQUENCY OF COMMON SIGNS OF TEMPOROMANDIBULAR DISORDERS IN PATIENTS WITH REDUCED OCCLUSAL SUPPORT DUE TO PARTIAL EDENTULISM

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ABSTRACT

The Objective of this study was to determine the frequency of common signs of temporomandibular disorders (TMDs) in subjects with partial edentulism.

This cross sectional (descriptive) study was conducted at the department of Prosthodontics, Khyber College of Dentistry, Peshawar. Relevant history was recorded. Patients were screened for the presence of signs of TMD. Detailed intraoral and extra oral examination was carried out using standardized technique of inspection, palpation and percussion along with measurement of mouth opening. Patients were checked for facial pain by palpation, mouth opening and jaw sounds.

A total of 143 Prosthodontic patients in which males were 78 and females were 65. The mean age was 42.60±16.42 years. The mean number of missing teeth was 9.38±6.90. TMJ sound was the most common signs of TMDs in this sample of patients. Fifty seven (39.9%) patients reported clicking sound of TMJ, 42(29.4%) had muscles tenderness, 27(18.9%) had restricted mouth opening and 21(14.7%) had mandibular deviation. As the number of missing teeth increases the increase frequency of signs of TMDs were found. The highest frequency of signs of TMDs was found in patients having more than 20 missing teeth. All signs of TMDS when stratified by number of missing teeth were statistically significant except the mandibular deviation.

Patients having reduced occlusal support due to partial edentulism have higher prevalence of signs of temporomandibular disorders. So, within the limitations of this study it can be concluded that the preservation and replacement of missing teeth may help in prevention of TMDs.

Keywords: *Occlusal support, temporomandibular disorders, tooth loss, clicking sound*

INTRODUCTION

The temporomandibular joint (TMJ) is a di-arthroidal hinge-type joint that permit the multifaceted movements required for deglutition, swallowing, phonetics and yawning. Abnormality of this joint can results in extreme pain and adverse effects on lifestyle. Temporomandibular disorders (TMDs) are frequent problems and affected individuals will frequently sort therapeutic advice and care. Accurate and deep knowledge regarding the TMJ anatomy and adjacent region is paramount for optimal diagnosis and proper care.[1]

TMDs have been documented as a group of patterns of dysfunction of TMJ and their related muscles, dentition and the supporting structures.[2,3] The clinical features include tenderness of muscles particularly masticatory muscles, limited range of mandibular movement, clicking sound, headaches, earaches, painful and attritioned dentition.[4,5] The most significant features of TMDs is pain as it can upset the stomatognathic system function and the quality of life.[2] Stress, anxiety, interferences in occlusion, and teeth loss causing mal-alignment of residual dentition, leading to unfavorable loading, masticatory muscles dysfunction and related structures, external and internal effects on TMJ area and/or combination of these can act as factors of TMDs.[4,6]

Occlusion has been considered to have a role in the aetiology of TMDs.[5,7] The number of missing teeth is directly related to development of clicking sounds in the TMJ.[8,9] Due to loss of posterior teeth the secondary changes can occur e.g. Drifting and tipping of the standing teeth leading to change in the vector of force causing a different biomechanical effect on the lower jaw.[8,10,11] According to a study 58% of partially edentulous patients had TMDs. According to this study

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signs of TMD such as clicking (38%), TMJ tenderness (24%) and restricted mouth opening (32%) were found in partially dentate individuals.[12]

The role of sex in TMD has also been expansively investigated. Usually, females have decreased muscle strength than males causing their masticatory system to have poor adaptation to the detrimental stimuli from abnormal occlusion.[8,13] TMDs are twice common in females as compared to males.[4,13]

The aim of this study was to establish the frequency of signs and symptoms of temporomandibular disorders in a sample population with reduced occlusal support because of tooth loss. The frequency of the signs and symptoms was documented with reference to missing teeth in the supporting zones and age and gender of the subjects. This aimed to facilitate new and useful information for use by dental practitioners leading to better evaluation, prevention and management of temporomandibular disorders. It shall also highlight the importance of prosthetic replacement of missing teeth.

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MATERIAL AND METHODS

This descriptive, cross sectional study was carried out in the department of Prosthodontics, Khyber College of Dentistry, Peshawar from February 20, 2017 to April 20, 2017. Sample size was 143, using 24% proportion[11] common signs with 7% margin of error and 95% confidence interval using WHO software for sample size determination. Non probability, consecutive sample technique was used.

Approval from the hospital's ethical committee was taken. Subjects referred from OPD presenting with suspected features and fulfilling the inclusion criteria were invited to participate in the study. The objectives, procedure, risks and benefits were explained to them. After an informed consent data were collected through a pre-structured Performa.

Adults from both genders in the age range of 20-60 years having >2 missing teeth in posterior region and complaint of chronic orofacial pain, mouth opening less than 40 mm in the absence of microstomia, and with normal facial morphology were included. Patient having congenital or acquired defects and abnormalities in the orofacial region, for example hypodontia, cleft palate and other facial/developmental defects and defects due to dentoalveolar and facial surgeries and trauma, patients using fixed or removable partial dentures or those wearing conventional complete dentures, overdentures or implants, having pain and trismus associated with impacted third molar, who have any joint diseases, and with history of nail biting and pen holding were excluded.

Relevant history was taken. Screening was done for the presence of signs of TMD. Detailed intraoral and extra oral examination was carried out using standardized techniques of inspection, palpation and percussion along with measurement of mouth opening. Facial pain was checked by palpation, mouth opening and clicking sounds. "TMD Signs" were referred to subjective or objective clinical features felt by the patient or noticed by the physician on clinical examination. "TMJ sounds" were recorded using digital palpation of the TMJ using the middle and index fingers and by audibly listening during opening and closure of the mouth and by palpation, no stethoscope was used. "Muscular tenderness" was recorded by digital palpation of the TMJ and associated muscles to detect tenderness using the index, middle and the third finger. Assessment of extra-oral and intra-oral masticatory muscles was performed by bilateral palpation for tenderness. "Restricted mouth opening" was recorded using a Boley gauge in millimeters. The prongs of the gauge was placed on the incisal edges of maxillary and mandibular central incisor with the mouth open maximally as felt comfortable by the patient. Less than 40 mm was considered restricted mouth opening.[14] "Deviation of the mandible" was defined as the displacement of mandible at least 2 mm

to the right or left of an imaginary vertical line when the mandible had reached half of its vertical opening. The patients were asked to open the mouth slowly and this was repeated several times for confirmation.

Confounders and bias was controlled by strictly following the inclusion/exclusion criteria.

Data so collected were analyzed by SPSS Version 20. Numerical variables such as age and number of missing teeth were computed in terms of mean and SD. Frequencies and percentages were computed for categorical variables i.e. gender and common signs (clicking sound, TMJ tenderness and mandibular deviation). Common signs were stratified by age, gender and number of missing teeth. Post stratification was done through chi-square test. P-value < 0.05 was taken as significant.

RESULTS

A total of 143 prosthodontics patients having more than two missing were included in this study. Males were more in number than females. Males were 78(54.55%) and females were 65(45.45%). The age range was from 20 to 77 years with mean age of 42.60±16.42 years. The range of number of missing of teeth was from 3 to 25. The mean number of missing teeth was 9.38±6.90.

Age distribution shows that most common age group was 20-30 years (35%) followed by 41-50 years (18.9%). The details of age groups percentages and cumulative percentages are given in Table 1.

TMJ sound was the most common signs of TMDs in this sample of patients. Fifty seven (39.9%) patients reported clicking sound of TMJ, 42(29.4%) had muscles tenderness, 27(18.9%) had restricted mouth opening and 21(14.7%) had mandibular deviation. (Table 2)

Muscle tenderness was more common in the old ages. It was highest (54.8%) in age group 61-70 years. Age group 71-80 years had less frequency but it may due to less number of patients in this groups. Restricted mouth was most common in younger ages. The highest number of patients (31.5%) was in age group 20-30 years. TMJ sound was also common in younger ages. Forty (28%) patients had TMJ sound in age group 20-30 years. Similarly, most of the cases who had mandibular deviation were in age range 20-30 years (35.0 %) followed by 41-50 years (18.2%). All signs of TMDs were statistically significant when stratified by age groups. The details are given in Table 3.

Males had more frequent signs of TMDs than females. Muscles tenderness was present in 76.2% males and 23.8% females. Restricted mouth opening were found in 15.4% males and 3.5% females. TMJ sound was detected in 29.4% males and 10.5% males. In 11.2% male cases there was mandibular deviation and 3.5% female's cases. All signs of TMDs were statistically significant when stratified by gender. The details are given in table 4.

As the number of missing teeth increases the increase frequency of signs of TMDs were found. The highest frequency of signs of TMDs was found in patients having more than 20 missing teeth. The mandibular deviation was an exception. All signs of TMDS when stratified by number of missing teeth were statistically significant except the mandibular deviation. The details are given in table 5.

TABLE 1: AGE DISTRIBUTION OF THE PATIENTS

Age category (Years)	Frequency	Percent
20-30	50	35
31-40	25	17.5
41-50	27	18.9
51-60	11	7.7
61-70	23	16.1
71-80	7	4.9
Total	143	100

TABLE 2: FREQUENCY OF SIGNS OF TMDS IN PATIENTS

		Yes	No
Tenderness of muscles	n	42	101
	%	29.40	70.60
Restricted Mouth Opening	n	27	116
	%	18.90	81.10
TMJ sound	n	57	86
	%	39.90	60.10
Mandibular deviation	n	21	122
	%	14.70	85.30

TABLE 3: FREQUENCY OF SIGNS OF TMDS STRATIFIED BY AGE GROUPS

Signs of TMDS			Age groups						P-value
			20-30	31-40	41-50	51-60	61-70	71-80	
Tenderness of muscles	Yes	N	5	6	6	0	23	2	0 .000
		%	11.9	14.3	14.3	0	54.8	4.8	
	No	N	45	19	21	11	0	5	
		%	44.6	18.8	20.8	10.9	0	5	
Restricted Mouth Opening	Yes	N	5	1	11	0	8	2	0.001
		%	3.5	0.7	7.7	0	5.6	1.4	
	No	N	45	24	16	11	15	5	
		%	31.5	16.8	11.2	7.7	10.5	3.5	
TMJ sound	Yes	N	10	6	6	5	23	7	0 .000
		%	7	4.2	4.2	3.5	16.1	4.9	
	No	N	40	19	21	6	0	0	
		%	28	13.3	14.7	4.2	0	0	
Mandibular deviation	Yes	N	0	9	1	6	5	0	0.000
		%	0	6.3	0.7	4.2	3.5	0	
	No	N	50	16	26	5	18	7	
		%	35	11.2	18.2	3.5	12.6	4.9	

* Pearson Chi-Square Tests

TABLE 4: FREQUENCY OF SIGNS OF TMDS STRATIFIED BY GENDER

Signs of TMDS		Gender		P-value
		Male	Female	
Tenderness of muscles	N	32	10	0.001
	%	76.20	23.80	
Restricted Mouth Opening	N	22	5	0.002
	%	15.40	3.50	
TMJ sound	N	42	15	0.000
	%	29.40	10.50	
Mandibular deviation	N	16	5	0.031
	%	11.20	3.50	

* Pearson Chi-Square Tests

DISCUSSION

The cause of TMD is very complex, as shown by the combination of psychosomatic, physiological, anatomical, postural and genetic factors, changing the balance between the basic entities of the stomatognathic system; which are occlusion, masticatory muscles and the joint.[15]

Pullinger and Seligman reported that low correlation exist between occlusion and TMDs. They found that occlusal factors have a role in about 10–20% to the total of causative factors in TMDs.[16] while, Rammelsberg wrote a review on etiology and pathogenesis of TMD and reported that high abrasion and inadequate restorative treatment of posterior dentition are risk factors for unstable occlusion.[17] The literature cannot provide data regarding the precise role of occlusal factors in TMDs. On the other hand, in the meta-analysis conducted by Koh et al.[18], reported that there was inadequate data on the management or prophylaxis of TMD by occlusal rehabilitation.

TABLE 5: PREVALENCE OF SIGNS OF TMDS STRATIFIED BY NUMBER OF MISSING TEETH

Signs of TMDs		Number of missing teeth				P-value
		03-10	11-15	16-20	21-25	
Tenderness of muscles	n	10	12	5	15	0.000
	%	23.80	28.60	11.90	35.70	
Restricted Mouth Opening	n	12	5	0	10	0.000
	%	8.40	3.50	0.00	7.00	
TMJ sound	n	15	15	10	17	0.000
	%	10.50	10.50	7.00	11.90	
Mandibular deviation	n	10	6	0	5	0 .068
	%	7.00	4.20	0.00	3.50	

The purpose of the current study was to determine the relation of posterior occlusal support and signs of TMDs in partial edentulism. In the current study, males were more than females. More males may due to the reason that they are less careful about their oral hygiene and more loss of teeth due to caries and periodontal diseases. In our study we included those patients having more than 2 posterior missing teeth.

The age range in this study was from 20 to 77 years with mean age of 42.60±16.42 years. Before twenty years tooth loss are minimal and are commonly due to trauma in anterior region. The main occlusal support is provided by posterior teeth, so in this we selected age above 20. Temporomandibular joint are not developed until late teen years, so TMDs are unlikely to be found in individual below that age.[19]

The range of number of missing of teeth was from 3 to 25. The mean number of missing teeth was 9.38±6.90. Similar study conducted on the prevalence and association of signs and symptoms of temporomandibular disorders with missing posterior teeth in adult Jordanian subjects showed that of total of 1060 posterior teeth (mean was11.40±3.13) were missing.[14] These results are consistent with current one.

In the current study, age distribution shows that most common age group was 20-30 years (35%) followed by 41-50 years (18.9%). This shows that in our country most of the patient loses their teeth very early i.e. in third and fourth decades and this also give the impression that most of the patients present for prosthodontics treatment in this age. The early loss of teeth may due to low literacy rate and lack of awareness about oral hygiene in our patients.

In the current study, TMJ sound was the most common signs of TMDs in this sample of patients. Fifty seven (39.9%) patients reported clicking sound of TMJ. TMJ sounds without other symptoms of TMDs are considered to be benign and it has no long term adverse implications. Sound of TMJ is due to disc displacement. A study in Swedish population on prevalence of different temporomandibular joint sounds showed that 36% of the patients had clicking sound.[20] These results are similar to the present results. But another study conducted on Brazilian population showed that in adolescent 26.72% had clicking sound.[21] This may due to genetic and ethnic variation. In our study we included patients having more two missing teeth but no mention about missing teeth in Brazilian study[21].

In the present study 42(29.4%) patients had muscles tenderness. Macfarlane et al[22] determine the prevalence of oro-facial pain (OFP) in the population and within-population subgroups and to describe the associated disability in cross-sectional population study in United Kingdom. A random sample of 4000 adults aged 18-65 years of whom 2504 responded (adjusted participation rate 74%). The overall prevalence of muscles tenderness was 26% (95% Confidence Interval (CI) 24%, 28%). These results are similar to the current study.

Our study showed that 27(18.9%) patients had restricted mouth opening. The maximum mandibular opening is one of the measures used for assessment of mandibular function and a reduced range of vertical movement may be interpreted as a TMD-related sign.[23] In this study, the clinical examination revealed that the mandibular opening was optimum and not restricted, moreover, men significantly reported more values of maximum opening than women. These findings were in accordance with a previous study, which demonstrated that an average of 40 mm seems to represent a reasonable point of incisor separation on maximal opening.[24] Similar results are reported in another study for frequency of restricted mouth opening.[14]

In the current study men had more prevalence of TMDs as compared to women and this was statistically significant (P<0.05). This may due to reason that men are less cautious about their oral hygiene and hence

more tooth loss. The second reason may more stress in males in Pakistan due safety and financial reasons. Similar results are reported in another study.[14]

In the present study, as the number of missing teeth increases the increase frequency of signs of TMDs were found. The highest frequency of signs of TMDs was found in patients having more than 20 missing teeth at statistically significant level. This may due to the fact the posterior provide vertical support and unload TMJ. There is significant association between TMD signs and tooth loss is in agreement with various clinical an epidemiological studies.[14,25] However, other studies did not report similar findings.[26,27] Dulcic *et al*[28] suggested that the incidence and intensity of TMD are higher in subjects with greater tooth loss in the supporting zones, regardless of their sex.

CONCLUSION

Patients having reduced occlusal support due to partial edentulism have higher prevalence of signs of temporomandibular disorders. So the preservation and replacement of missing teeth may help in prevention of TMDs. But this is a cross-sectional and single centre study so randomized control trials on large sample are required to further investigate this fact.

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