TEMPOROMANDIBULAR DISORDER FEATURES IN COMPLETE DENTURE PATIENTS VERSUS PATIENTS WITH NATURAL TEETH; A COMPARATIVE STUDY

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ABSTRACT

The aim of this study was to determine the prevalence of temporomandibular disorder features in completely edentulous patients wearing upper and lower complete dentures, and to compare this to the prevalence of features in dentate patients with complete set of natural teeth.

A questionnaire and clinical examination were used to assess 473 patients. 182 of these were complete denture wearers while 291 were dentate patients who had attended the Conservative clinic for routine restorative dental treatments.

The results of this study showed that there was a difference between the two groups regarding the prevalence of temporomandibular features. Dentate patients had more temporomandibular disorder signs (with the exception of crepitus sound of the joint) compared to patients wearing dentures (29.2% and 14.3%, respectively). They significantly (P<0.05) exhibited more signs of temporomandibular joint tenderness (12.4%) and clicking sound (10.7%) on clinical examination compared to (4.4%) and (3.3%) only in the denture-wearing patients, respectively. However, denture wearers, significantly (P<0.05) had more signs of crepitus sound of temporomandibular joint compared to dentate patients (9.3% and 2.1%, respectively). The lateral pterygoid muscle most commonly demonstrated tenderness among dentate patients however, the tenderness in masseter and temporalis muscles was more prevalent among denture wearers, but, the differences were not statistically significant. Tenderness on palpation in the temporomandibular region was the most common sign reported in both groups.

Key words: *Temporomandibular disorders, temporomandibular joint, signs, complete dentures, dentate, prevalence*

INTRODUCTION

Temporomandibular disorders (TMD) is a collective term used for structural and functional disorders associated with the temporomandibular joints, muscles of mastication, or both.[1,2] These are also known as temporomandibular pain dysfunction disorders. Using various definitions of TMD, epidemiological prevalence studies have shown that up to 50% of the general population may experience symptoms or signs of TMD[3,5] although only 3% to 7% of the general population reported to seek treatment.[6] Additionally, it has been reported that the majority of those who sought treatment were women between the ages of 25 and 35.[7]

The reasons for the apparent discrepancy between the number of people perceiving subjective symptoms or signs and the number of people seeking treatment are still not clear. Additionally, longitudinal studies have indicated that TMD fluctuate over time[8,9] and no clear conclusion has been reached yet about their natural progression or about exactly what variables contribute to the development of TMD.

There would be varying opinions on the prevalence of TMD signs in dentate population. TMD appear to be almost as prevalent in complete dentures (CD) wearers as in dentate individuals, varying from 15 to 25%[10,11] others reported that CD wearers were found to have a higher prevalence of TMD symptoms than the normal population with natural dentition.[12]

A higher figure of TMD signs in dentate individuals when compared with completely edentulous patients was, however, reported.[13] Signs and symptoms of TMD seem to decrease with increasing age.[11,15,18]

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METHODOLOGY

A total of 4503 patients who received treatment m two dental clinics; Prosthodontic and Conservative clinics at Prince Rashid Bin AI-Hassan Military Hospital in Irbid, Jordan; over six-month period (January to July 2005) formed the part of this study. In the prosthodontics clinic; there were 3075 patients (1466 male; 1609 female). Of these; 1834 (59.6%) were partially edentulous patients who were provided removable partial dentures and they were excluded from the study. The remaining 1241 (40.4%) were completely edentulous patients; 495 (39.9%) of these were under treatment for the construction of their first complete dentures, 288(23.2%) were new patients who were referred to the clinic for the providing complete dentures, 133 (10.7%) patients with single CD opposing either natural dentition or partially edentulous arches 53 (4.3%) patients who had been previously diagnosed and treated as symptomatic TMD patients, were excluded from this study. The remaining 272 (21.9%) completely edentulous, CD wearers were included in this study. In the conservative clinic, there were 1428 (586 male: 842 female) patients. Of these; 856(59.9%) dentate patients who had one or more missing tooth/ teeth and 71(5.0%) patients who had been previously diagnosed and treated as symptomatic TMD patients were excluded from this study. The remaining 501 (35.1%) dentate patients with complete set of natural dentition (third molars were excluded from the inclusion criteria) were included in this study.

A total of 182 complete denture wearers and 291 dentate patients were willing to participate and complete the questionnaire and undergo the clinical examination giving a response rate of 67% and 58%, respectively.

The completely edentulous patients who were being treated to provide replacement complete dentures for the reasons that they had poor denture retention, poor stability, overclosure, excessive wear of artificial teeth and repeated fractures. The dentate patients with complete set of natural dentition attended the conservative clinic for routine restorative dental treatments.

Joint tenderness was determined by bilateral digital palpation posteriorly via the external auditory meatus and laterally over the condyle in the immediate pre-auricular region. Joint sounds were determined with the aid of a stethoscope placed in front of the external auditory meatus. Clicking and crepitus of the TMJ, either unilateral or bilateral, was recorded.

The maximum mouth opening was measured using a millimeter ruler after asking the patient to open as wide as possible while remaining comfortable. The maximum opening was recorded between the incisal edge of the maxillary central incisor that is the most vertically oriented and measured vertically to the incisal edge of the opposing mandibular incisor (at the midline). The amount of vertical incisor overlap (the distance between the incisal edges of the upper and lower central incisors) was added to each of these measurements to determine the actual amount of opening.[19]

The pathway of mandibular opening for each patient was recorded as follows: straight opening with no deviation, deviation to the right side, or deviation to the left side. Any mandibular deviation on opening and closing was recorded. A patient's tendency to deviate towards the affected side was regarded as a positive diagnostic sign.[20]

The masseter and temporalis muscles were palpated bi-manually for any signs and tenderness. The lateral pterygoid muscle was examined by recording its response to resisted movements since this muscle is not readily accessible to manual palpation.[21]

The existing complete dentures were examined carefully for support, retention, stability, occlusion, vertical dimension of occlusion, freeway space and extension of the base. The method of dentures evaluation was the same as that performed by MacEntee and Wyatt.[22] Clinical examination of the patients and prostheses was performed by two "specialist" dentists' examiners who applied a standardised procedure before the collection of the data.

The results obtained from the patient's questionnaire, clinical examination and denture examination were analysed using the Statistical Package for Social Sciences (SPSS software, Release 11.0). Statistical analyses were performed with the chi-square test. Statistical significance was set at $P<0.05$.

RESULTS

Of the 182 completely edentulous patients studied, 79(43.4%) were male and 103(56.6%) were female. The age range was from 47 to 82 years with a mean of 65.3 (SD±8.53) years. They had been wearing their present dentures for periods varying between 3 and 25 years with the mean denture age of7 (SD±5.4) years. Of the 291 dentate patients studied, 110(37.8%) were male and 181 (62.2%) were female. The age range was from 17 to 46 years with a mean of 28.1 (SD± 7 .16) years. The mean age of the whole sample was 42.4 years.

The frequency and distribution of the TMD features were also recorded (Table 1). It was shown that fewer CD-wearing patients exhibited TMD signs when compared with the dentate patients (with the exception of crepitus sound of the joint), however, statistically significant findings were only present in two signs; the prevalence of TMJ tenderness and the prevalence of joint sounds (Table 2).

Clicking was more prevalent among dentate group, however, crepitus was more prevalent among the CD wearers. The other TMD features in both groups showed the similar pattern of frequency and distribution (with the exception of crepitus sound of the TMJ), although the signs were more frequently recorded in dentate group but found to be statistically insignificant. However, the most common sign in both groups was muscle tenderness.

Tenderness in masseter and temporalis muscle in CD wearers was more prevalent than that in dentate patients, however, the tenderness in lateral pterygoid muscles was more common among those with natural dentition than the completely edentulous patients (Fig 1).

Tenderness upon palpation followed a similar pattern between the two groups. TMJ region was the most common site, followed by the maxillae, the mandibular region; and neck were less frequently involved (Fig 2).

The pathway of mandibular opening for each patient was recorded as follows: straight opening with no deviation, deviation to the right side or deviation to the left side. The vast majority of patients (98%) had straight opening with no deviation. The mean value of maximum opening for dentate group was 45.6 (SD±1.8) mm. CD-wearing patients had decreased reading with a mean value of 39.7 (SD±2.3) mm.

For denture wearing patients, evaluation of the CD are shown in Table 3.

TABLE 1: NUMBER AND PERCENTAGES OF TMD FEATURES IN COMPLETE DENTURE AND DENTATE PATIENTS

	Prevalence of features	**Tenderness**		**Joint sounds**		**Deviation**		
		TMD TMJ	**Muscle**	**Clicking**	**Crepitus**	**Rt-side deviation**	**Lt-side deviation**	**Total**
CD	26	8	21	6	17	2	1	3
n=182	(14.3%)	(4.4%)	(11.5%)	(3.3%)	(9.3%)	(1.1 %)	(0.6%)	(1.7%)
Dentate	85	36	38	31	6	3	4	7
n=291	(29.2%)	(12.4%)	(13.1%)	(10.7%)	(2.1%)	(1.0%)	(1.4%)	(2.4%)
		S	NS	S	S			NS

Rt: right, Lt: left, S: significant, NS: not significant.

TABLE 2: PATIENTS WITH TMJ TENDERNESS AND JOINT SOUNDS (CLICKING AND CREPITUS) ELICITED UPON CLINICAL EXAMINATION

	Joint tenderness		**Joint sounds**			
			Clicking		**Crepitus**	
	Signs	**No sign**	**Signs**	**No sign**	**Signs**	**No sign**
Completely edentulous	8	174	6	176	17	165
n=182	(4.4%)	(95.6%)	(3.3%)	(96.7%)	(9.3%)	(90.7%)
Dentate	36	255	31	260	6	285
n=291	(12.4%)	(87.6%)	(10.7%)	(89.3%)	(2.1%)	(97.9%)
Total	44	429	37	436	23	450
n=473	(9.3%)	(90.7%)	(7.8%)	(92.2%)	(4.9%)	(95.1%)
Chi-square	18.38		16.79		12.54	
P value	0.023		0.036		0.042	

TABLE 3: EVALUATION OF CHARACTERISTICS OF MAXILLARY AND MANDIBULAR CD. NUMBER AND PERCENTAGE (n=182).

CD characteristic		Maxillary	Mandibular	Total (%)
Retention	Good	25 (14%)	12 (7%)	10.5
	Moderate	53 (29%)	26 (15%)	22.0
	Poor	104 (57%)	144 (78%)	67.5
Stability	Stable	111 (61%)	87 (48%)	54.5
	Unstable	71 (39%)	95 (52%)	45.5
Wear of artificial teeth	Minimum	35 (19%)		19.0
	Moderate	60 (33%)		33.0
	Severe	87 (48%)		48.0
Free-way space	Normal 2-4 mm	13 (7.1%)		7.1
	Increased 5-7 mm	41 (22.6%)		22.6
	Opened > 7 mm	128 (70.3%)		70.3
Denture fracture	No fracture	95 (52%)	129 (71%)	61.3
	Fatique	76 (42%)	33 (18%)	30.0
	Accidental	11 (6%)	20 (11%)	8.5
Deterioration of the base	Minimum	31 (17.1%)		17.1
	Moderate	100 (55.3%)		55.3
	Severe	51 (28.4%)		28.4
Number of sets of dentures owned by the patient	One	142 (78.3%)		78.3
	Two	35 (19.1%)		19.1
	3 or more	5 (3.2%)		3.2

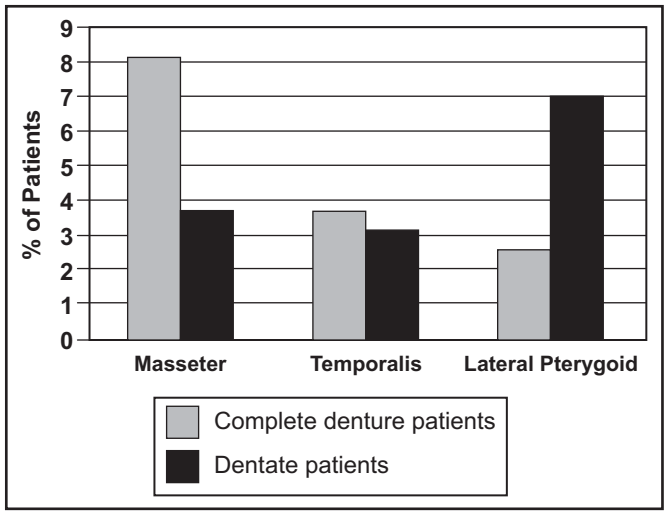

Fig 1: Prevalence of muscle tenderness in the masseter, temporalis and lateral pterygoid

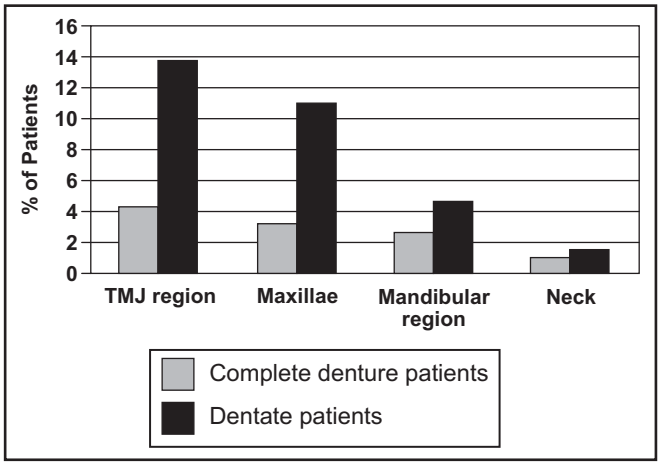

Fig 2: Pain distribution by site in both complete denture and dentate patients

DISCUSSION

The age distribution of the dentate group was younger than that of the completely edentulous group; the mean age was 28 and 65 years, respectively. Similarly more female in both groups attended the two dental clinics, than male.

Recent epidemiologic studies have generally found significantly more frequent and more severe TMD signs and symptoms in women than in men.[23-25] This has been interpreted as a "more women than men appear to seek treatment for TMD symptoms",[26,27] or reflect biological, psychosocial and hormonal differences between the two groups.[28,29,30] It has been documented that patients with natural teeth may have a higher incidence of TMD signs.[31]

One or more TMD signs were present in 29.2% of dentate patients compared to 14.3% found in denture wearers. This indicates that incidence in dentate patients were two times higher. Dentate patients also exhibited significantly ($P<0.05$) more signs of TMJ

tenderness and joint sounds on clinical examination compared to CD- wearing patients. Pain in the TMJ region was the most common site in both groups.

Joint sounds were very common among patients with TMD: They were recorded as clicking or crepitus. Of all the patients in this study with joint sounds, none was actively seeking treatment.[33] A variety of different causes to TMJ sounds have been suggested e.g. arthrotic changes in the TMJ, anatomical variations, muscular incoordination and disc displacement.[34] Recent researchers related clicking "to a sudden acceleration of condylar and internally displaced disc tissues".[35] In this study, dentate patients had significantly higher percentage of clicking (l0.7%) than CD wearer patients (3.3%). However, the denture wearing group had significantly ($P<0.05$) higher incidence of crepitus than the dentate patients, 9.3% and 2.1% respectively. Crepitus was encountered in degenerative disease of the articular surfaces, often associated with aging.[13] The results of this study were in accordance with at least one study which found that osteoarathrosis was present more frequently amongst edentulous patients.[36] A reduced range of vertical movement may be interpreted as TMD features. The mean value of maximum opening for CD wearer group (39.7mm) was lower than that for dentate group (45.6 mm). The reduced value of mean mandibular opening in CD group agreed with at least one clinical study, which demonstrated that an average of 40 mm seems to represent a reasonable point of incisor separation on maximal opening.[17]

It should be mentioned, however, that CD wearers might be expected to have reduced maximum opening levels, as stability of the lower denture during this exercise requires muscular co-ordination to prevent displacement of the denture.[37]

The least common sign in both groups was mandibular deviation during opening. Most of the patients had a straight opening pathway; however, few cases of deviation were recorded in both groups. However, the most common site in both groups was masticatory muscle tenderness. Although the differences between dentate and denture-wearing patients were insignificant, but, it was demonstrated that the tenderness in lateral pterygoid muscle was the most frequently recorded in dentate patients. These findings were in agreement with previous studies.[12,13]

It was also reported by patients that they had to clench their teeth together to ensure denture retention during normal function. This could explain the frequency of masseter and temporal muscle tenderness in patients wearing CD.

It was shown in a study that bite force was 5-6 times greater in dentate subjects than in the denture wearers. In addition, it has been shown that CD wearers avoid foods that are difficult to chew.[24] This, coupled with the reduced forces generated during mastication, indicates that CD wearers seldom exceed their tissue tolerance and adaptability and this could explain why they exhibit fewer signs of TMD. These findings agree with previous studies.[38,39]

In this study, all the denture wearing patients were receiving treatment for the provision of new dentures as their existing prostheses were inadequate for a variety of reasons. This was reinforced by the results which showed that only one-third had acceptable retention, 54.5% had good stability, 52% had minimal or reasonable wear of artificial acrylic denture teeth, 72% had acceptable base status, 38.5% had history of one or more denture fracture(s) and 29.7% had evidence of a satisfactory vertical dimension. However, several studies have found no correlations between certain characteristics of dentures (denture retention, stability, occlusal errors, freeway space, age of present denture, or number of sets of dentures and the presence or severity of TMD signs and symptoms.[40-42] In addition, loss of vertical occlusal height on its own may not be responsible for the TMD occasionally seen in CD wearers with reduced vertical height.[43]

TMD represent a major cause of nondental pain in the orofacial region and are considered to be a subclass of musculoskeletal disorders involving tissue injury may be caused by production of excessive force or pressure. The effects of dysfunction may be presumed to form at the site where the greatest forces are exerted and host resistance is least.[23]

CONCLUSION

From the results of this study, the main conclusions were:

Patients with complete set of natural dentition had more TM disorders (29.2%) compared to those wearing complete dentures (14.3%).

Significantly ($P<O.05$) more dentate patients had TMJ tenderness and clicking sound than CD-wearing patients. However, TMJ crepitus sound was significantly ($P<0.05$) more prevalent among denture wearers compared to dentate patients.

In accordance with several studies, the lateral pterygoid muscle most commonly demonstrated

muscle tenderness in dentate individuals; however, masseter and temporal muscle tenderness was more recorded among CD wearers.

Pain in the temporomandibular region was found to be the most common site reported in both groups.

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