

Temporomandibular Disorders (TMD) in Edentulous Patients: A Review and Proposed Classification (Dr. Bader's Classification).

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ABSTRACT

Temporomandibular disorders (TMD) are a collective term given to a number of clinical problems that involve the masticatory musculature, the temporomandibular joints and associated structures, or both. Although the aetiology of TMD has not been fully understood, in general it is considered to be multifactorial. The signs and symptoms of TMD which present in patients with natural teeth may also occur in edentulous patients. These symptoms may appear in various combinations and degrees. TMD has attained a prominent role within the context of dental care due to its high prevalence. The present paper is a review of the current literature on TMD in edentulous patients; with an attempt to propose a classification for the same.

Keywords: Occlusion, Temporomandibular dysfunction, Temporomandibular joint

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. TMD's are considered a group of joint and muscle disorders in the orofacial region characterized mainly by facial pain, pain or muscle tenderness on palpation, pain during jaw movement, reduction of mandibular movements, headache and abnormal joint sounds [3,4]. The pain associated with TMD cannot be defined to be of neurogenic, psychogenic, visceral, periodontal, dental or cutaneous origin. Various epidemiological prevalence studies have shown that up to 40-75% of the general population may experience at least one TMD sign, such as TMJ noise, and 33%, at least one symptom, facial or TMJ pain [5]. However, only 3-7% reported to seek treatment, with the majority of those who sought treatment being young adults and middle-aged individuals, ranging from 20 to 45 years old and particularly females [6,7]. The difference for the wide discrepancy among the number of individuals presenting with subjective signs and symptoms and those individuals who report to seek treatment still remain unclear. The aetiology of TMD is considered to be multifactorial and till date, no clear conclusion has been reached upon about their natural progression or about what variables contribute to the development of TMD. There have been different opinions on the prevalence of TMD signs in dentate population. Edentulous subjects generally do not present with TMD symptoms to the extent of those having natural dentition [8]. TMD appears to be prevalent in complete dentures (CD) wearers in almost the same proportion as in dentate individuals, with the prevalence varying from 15-25%. Few others have reported that CD wearers were found to have a higher prevalence of TMD symptoms than the population with natural dentition [9-12]. The lack of complete dentures for long periods promotes a shift in the vertical and horizontal mandibular positions; as a result the position of the condyles in the mandibular fossae may also change. Change of the rest position due to the reduction of vertical dimension of occlusion is also considered to be one of the predisposing factors. Along with this psychological and emotional factors associated with increasing age and loss of natural dentition may lead to increased TMD's in edentulous patients [12-14]. The present paper is a review

of the current literature on TMD in edentulous patients, wherein an attempt has been made by the authors to propose a classification for the same.

DISCUSSION

The temporomandibular joint (TMJ) is a part of the stomatognathic system that comprises of several internal and external structures, capable of performing complex movements, such as chewing, swallowing, phonation and posture. These movements depend heavily on the function, health and stability of the joint to work properly [15]. The temporomandibular dysfunction syndrome as described by Schwartz is a symptom complex commonly observed in young or middle aged adults [16]. It is characterized by the signs such as tenderness of the joint and the muscles, increasing dull pain on mouth opening, reduced mouth opening, referred pain to the angle of mandible and muscles of the neck, deviated mouth opening, head ache and joint sounds, the latter being the most common [2]. Muscle spasm is also triggered by emotional tension and occlusion which play a definite aetiological role to produce these symptoms [3]. Although TMD has a multiple aetiology, faulty vertical dimension is a common cause of muscular pain among complete denture wearers. Edentulous patients generally do not present with as many TMD symptoms as those with natural dentition. This can probably be attributed to the fact that the proprioceptive feedback from teeth no more exists to initiate the symptom complex of TMD. In individuals with natural teeth overclosure of the jaws can predispose to TMD as originally suggested by Costen [17]. Although, this fact is debatable in edentulous individuals with long standing edentulous period and with no dentures, that in spite of the overclosure of edentulous jaws during mastication they do not frequently develop TMDs. Similarly, patients having reduced vertical dimension due to complete dentures generally do not manifest TMJ problems [8]. It is well known that bite force and electromyographic activity are considerably reduced in edentulous patients. More so, in edentulous subjects with TMD syndrome; endurance time and fatigue resistance of the masseter muscles is reduced in such subjects [18]. A hypothesis has been proposed by Monteith et al., that the amount of free-way space present in an individual is an expression of the contractile power of the masseter and medial pterygoid muscles. It was stated that during denture fabrication,

establishment of proper vertical dimension is particularly effective in the treatment of denture wearers presenting with symptoms of TMD [19]. The loss of natural teeth can cause psychological problems that increase emotional stress and may contribute to the development of TMD [20,21].

Recent epidemiologic studies have generally found that women have significantly more frequent and more severe TMD signs and symptoms than men. This has been interpreted as a "more women than men appear to seek treatment for TMD symptoms", or reflect biological, psychosocial and hormonal differences between the two groups [22-26]. Ribeiro et al., found that patients with complete dentures had TMD symptoms with a frequency similar to natural dentate [27]. Al-Shumailan and Manaseer carried out a study to determine the prevalence of TMD features in completely edentulous patients wearing upper and lower complete dentures, and compared this to the prevalence of features in dentate patients with complete set of natural teeth [12]. Their results showed a difference between the 2 groups regarding the prevalence of temporomandibular features. They found twice as many TMD signs and symptoms in dentate patients than in patients using complete dentures. Edentulous patients were reported to have more TMD signs in comparison to the denture wearing subjects. Signs of temporomandibular joint tenderness and clicking sound were observed more in dentate subjects. Sign of crepitus were seen more in denture wearing subjects when compared to dentate patients. A non significant variation in the pattern of the tenderness related to muscles of mastication was also seen [12].

In the study done by Shetty, which was planned to find the prevalence of various TMD's in edentulous patients, 59% of the subjects exhibited one or more signs of Temporomandibular Joint dysfunction, 41% of the subjects did not show any signs of Temporomandibular Joint dysfunction. 56.6% of males reported signs of Temporomandibular Joint dysfunction when compared with females which was 62.5%. 43.3% of males did not show any signs of Temporomandibular Joint dysfunction when compared with those of the females which was 37.5%. The number of subjects who showed two signs was 29%, subjects who had only one sign was 25% [8]. Meyerowitz however reported that 32% of 190 completely edentulous patients who had not complained of any TMJ pain dysfunction presented pain on palpation of muscles of mastication [28]. Thus, many of the edentulous patients who report with no signs of TMD on a random examination may show one or more symptoms of it. There does exist the possibility that these signs could develop into a recognizable TMD at a later stage, hence an early recognition of these signs should be considered beneficial [8]. Shi and Wang studied the prevalence of TMD in edentulous individuals of Beijing area and analysed the correlative risk factors. They observed that prevalence of clinically positive signs of TMD's in the edentulous subjects was 43.2%, among which TMJ noise was the highest prevalent sign while TMJ pain on movement was the lowest. The prevalence of mandibular movement deviation fitted in between. The prevalence of these clinically positive signs in male individuals was 36.9% and was 51.3% in the females and this difference was statistically significant [29].

Serman et al., and Divaris et al., reported that patients with complete dentures had more TMD signs and symptoms than patients with natural teeth [30,31]. The majority of complete denture wearers may exhibit a sensibly reduced occlusal vertical dimension as a result of denture tooth wear and alveolar bone loss. It was thought that the most common causes of signs and symptoms of TMD in complete denture wearers was the incorrect vertical dimension as stated above [32].

The anamnesis and physical examination, thorough evaluation and palpation of muscles and TMJ, as well as evaluation of maxillomandibular relationships, are of great value in obtaining a correct diagnosis of occlusal conditions [33]. It is necessary to

manage an edentulous patient with TMD's to prevent the worsening of the joint problems and to maintain the harmony of orofacial musculature. TMD's in edentulous patients can be effectively treated by a multidisciplinary approach consisting primary care physician, a dental specialist, a physiotherapist, a psychotherapist and counselor, a pharmacologist [34].

The principles of treating TMD's in edentulous subjects depend on a favorable prognosis and an appreciation of the lack of clinically controlled trials indicating the superiority, reliability, and safety of the treatments that are presently being implemented [35]. To achieve this, a number of successful treatment outcomes have been reported, which include education, self-care, physical therapy, occlusal splints, physiotherapy, behavioural therapy, and relaxation techniques, muscle-relaxing appliances, and medicinal interventions. Along with this, preventing the muscle spasm and restoring correct muscular coordination by fabrication of well fitting dentures are of prime importance [1]. Despite its diverse aetiology, occlusal instability has been long considered as an important aetiological factor. In complete denture wearers with mandibular dysfunction, symptoms often disappear after improvement of the occlusion [22,36].

The harmonious function of the postural muscles and muscles associated with facial expressions requires a suitable support from the natural dentition and the ridge areas or from the adequate designed prostheses. Good muscular control and co-ordination are essential for effective use of complete denture [37]. There is equilibrium on both sides of the denture in a balanced occlusion. Smooth uninterrupted tooth contact in the dynamics of daily mandible movements are provided by a balanced occlusion. The denture base is more stable during various functional movements which will be less likely to abuse the foundation tissue which in turn reduces the bone resorption and hence reduces the load transmitted to temporomandibular joints and masticatory apparatus [38].

Classification of TMD's and the need for the proposed classification

Classification inscribing eight dimensions within the global concept of dysfunction which comprehended hyperactivity of the muscles of mastication, capsular and synovial inflammation, capsular ligaments rupture or distension, displacement of articular disc anteriorly, muscular in coordination, and reduced mandibular movement range secondary to degenerative joint disease was proposed. Various deficiencies were noted in this system. Another classification stationed on orthopaedic and neurological models of pain and dysfunction of TMJ was proximately proposed. It was entirely established on neurological and rheumatological considerations. An orthopaedic-mechanical model positioned classification was also been proposed. It extricated the categories such as masticatory pain, limitation of mandibular movements, joint interference during mandibular movements, and acute malocclusion. A clinical diagnostic criterion for TMD was also reported in literature. It figured out amidst myalgia and myofascial pain, disc displacement with or without reduction, capsulitis/synovitis and disc perforation, and degenerative disorders of TMJ. This classification was contemplated as a sterling aid for the management of TMD's. Modifying this classification a research diagnostic criterion for temporomandibular disorders was proposed to set a uniform criteria for research, based on the accessible knowledge on TMJ pathology. This scheme was an admissible augmentation, because this system incorporated the psychological factors for the first time the diagnosis, and is analysed by means of confirmable and reproducible methodology [39-43].

After reviewing the existing literature no classification was known to be exiting which incorporated both clinical and radiological changes in edentulous patients, hence a new classification (Dr. Bader's Classification) of edentulous patients according to TMJ changes based on clinical and radiological findings have been proposed

[Table/Fig-1]. The classification will be a helpful tool for assessment as well as for planning treatment for edentulous patients. Further clinical studies should be conducted for new classification validation and reliability evaluation.

Type 1	Patients with no TMJ changes
Type 2	Patients with mild TMJ changes <ul style="list-style-type: none"> • Popping • Clicking of the jaw • Feeling of muscle spasms • Normal mouth opening (32–62 mm) [44]
Type 3	Patients with mild and moderate TMJ changes <p>Which include combination of type 2 and</p> <ul style="list-style-type: none"> • Headaches and occasionally, migraine-like headaches • Cervical pain • Limited mouth opening (<35 mm) [45,46] • Deviation/deflection of mandible during opening and closing
Type 4	Patients with mild, moderate and severe TMJ changes <p>Which include combination of type 3 and</p> <ul style="list-style-type: none"> • Tenderness of muscles of mastication • Tenderness over TMJ • Pain while opening in mouth • Locking of TMJ • Luxation of TMJ
Type 5	Patients with Mild, moderate, severe and advanced TMJ changes <p>Which include combination of type 4 and radiographic changes such as presence of</p> <ul style="list-style-type: none"> • flattening • erosion • osteophytes and • sclerosis in the joint components

[Table/Fig-1]: Proposed classification of temporomandibular disorders (TMD) in edentulous patients

CONCLUSION

TMD represent a major cause of non-dental pain in the orofacial region, the effects of which may be presumed to form at the site where the greatest forces are exerted and host resistance is least. The signs and symptoms of TMD which are observed in patients with natural teeth may also occur in edentulous patients wearing complete dentures. The literature reviewed in the present work revealed that the controversy regarding the prevalence of TMD signs and symptoms in different groups of individuals, still persists. There could be many reasons for this, but the most frequently suggested are differences in diagnostic criteria, clinical examination, patient selection, methodology used and the diversification of the study population. Timely identification and the management of this condition may improve the quality of life of the patients.

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Date of Submission: **Feb 15, 2015**

Date of Peer Review: **Mar 11, 2015**

Date of Acceptance: **Mar 17, 2015**

Date of Publishing: **Apr 01, 2015**

FINANCIAL OR OTHER COMPETING INTERESTS: None.