

Temporomandibular Disorders: A Comprehensive Review

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ABSTRACT

TMD (Temporomandibular Disorder) is musculoskeletal condition of masticatory system that causes discomfort as well as dysfunction with in jaw's joints and other structures. TMD is commonly seen as a masticatory repetitive motion condition with several similarities to musculoskeletal illnesses. Temporomandibular disorders are characterized by reduced mandibular range of muscle, motion and joint discomfort, joint crepitus, and limited mobility or deviations in jaw opening. The utmost common sign of temporomandibular disorder is ache in masticatory muscles and TMJ. Temporomandibular dysfunction pain has a complex cause. According to several researches, predisposing, initiating, and aggravating factors all play a role in this condition. Commonest diagnosis is based on the patient's medical and physical investigation. When there is a probability of malocclusion or intra-articular abnormalities, diagnostic imaging may be helpful. The majority of patients benefit from non-invasive treatments includes individual's education, personal care, medicine, perceptive behaviour therapy, physical treatment or occlusal strategies. Replacement of the temporomandibular joint is reserved for seriously affected joints that have failed all other conservative treatment methods.

Key words: TMD, Temporomandibular dysfunction, Aetiology, Diagnosis of TMD

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INTRODUCTION

TMD (Temporomandibular Disorder) is musculoskeletal condition of masticatory system that causes discomfort as well as dysfunction with in jaw's joints and other structures. According to the glossary of prosthodontic terms, Temporomandibular Disorders (TMD) are defined as: "Conditions producing abnormal, incomplete or impaired function of the temporomandibular joint(s)" or "a collection of symptoms related to the masticatory system, frequently observed in various combinations" [1]. Others have defined TMD as a collective term, embracing several clinical problems involving the muscles, Temporomandibular Joint (TMJ), or both [2].

TMD is a frequent problem with adults from the age of 20 to 40. Over 33% of people seem to have minimum single symptom of temporomandibular disorder, while 3.6% to 7% of individuals have this disorder more complicated which requires treatment. Those with TMD might have variety of sub-diagnoses, such as myofascial pain and TMJ inflammation [3]. A self-reported anamnestic questionnaire is used to estimate the prevalence and

severity of TMD. TMD affects 34.83% of people, 8.38 percent of people have moderate TMD, and 1.96% of people have severe TMD.

TMDs (especially those of myofascial origin) are commonly related to psychological, social, as well as behavioural components, equivalent to certain other chronic pains, some symptoms such as anxiety, anger, frustration, and depression, and also the habits such as bruxism, bad posture, inadequate physical activity, poor dietary and sleep habits, dependencies over drugs, as well as other tension related habits, could be present. Each of these signs or behaviours has the potential to muddle the clinical picture. Instructions for self-management of TMD, ask patients for resting their masticatory muscles by avoiding hard or chewy foods and preventing from activities that overuse the masticatory muscles (e.g., oral habits, clenching teeth, chewing gum, and yawning wide) [4]. As with other musculoskeletal disorders, pain during function and/or at rest is the primary reason patients seek treatment, and reduction in pain is generally the primary goal of therapy. Masticatory stiffness, restricted mandibular motion, TMJ dislocation, and unexplained occlusion are all indications of TMJ catching and locking in which people seek TMD therapy (change in position of mandibular midline and either anterior or posterior open bite). On other hand, TMJ noises are frequent in the general population which are typically unrecognized by individuals or practitioner and are infrequently treated

which may not respond to treatment [5]. The goal of such a scientific outlook is just for presenting the assessment and handling of TMD through the perspectives of both the dentist and the physical therapist. When the dentist lacks expertise or the management of the patient's condition begins to exceed their capacity to handle independently, the dentist should consider cooperating with other health care providers, such as the patient's physician or competent medical or dental experts. Before beginning any surgery that may permanently affect the dentition or jaw connections, the patient must be fully informed of the hazards. Consent that is truly informed is critical. Re-evaluation during therapy is also necessary to ensure that the diagnosis is correct and that the treatment path is suitable.

TMD is a disability of the TMJ which impairs normal jaw function and thus land up in handicapped situation for the patient to perform normal masticatory function. Paucity of appliances and methods of intervention of TMD makes it one of the most neglected aspects in orthodontics and it also adversely affects the functional ability of patient. Many appliances are there for the treatment of TMD but no appliance will give definitive treatment. TMD may get worsen due to orthodontic treatment so it should for diagnosed and treated before starting treatment.

There are different treatment modalities available for treating TMD which can be categorized as conservative treatment in which comes are physical treatment, local steam application, external muscle relaxation, occlusal alteration, analgesia, psychotropic medicine, splint therapy, alternative therapies which includes acupuncture, treatment modalities for example ultrasound, easy laser, diathermy, infrared radiation and surgical managing [6]. Purpose of this study is to reassess information regarding etiology, diagnosis and treatment planning of temporomandibular disorder. So, the current article reassessed the narrative regarding temporomandibular disorders.

LITERATURE REVIEW

History of TMDs

Historically, rather than research the dentist lacks expertise or the treatment of the patient's condition starts to cross the limit of their capacity to handle independently, the clinician should consider cooperating with other health care providers, such as the patient's physician or competent medical or dental experts. Before beginning any surgery that may permanently affect the dentition or jaw connections, the patient must be fully informed of the hazards. Consent that is truly informed is critical. Re-evaluation during therapy is also necessary to ensure regarding the diagnosis is accurate and the treatment path is suitable. In 1940 and 1950, the significance of occlusal therapies in masticatory muscle diseases where given [7]. In 1960 and 1970, occlusion and eventually emotional tension were reported as the major cause of functional masticatory system disorders. Further in the 1970's an explosion of interest in pain

disorders arising from intracapsular sources was concerned and described by Farrar and McCarty [8]. The majority of TMD patients benefit from non-invasive, conservative treatment to alleviate their symptoms.

Etiology

The causative factors and etiology of temporomandibular disorders are complex and multidimensional (Figure 1). The factors that mainly contribute to TMD disorder are biomechanical, bio psychosocial, neuromuscular and neurobiological [9]. These several factors are classified into three:

- **Pre-disposing factors:** these factor increases the risk of TMD
 - Medical diseases such as rheumatic infections, dietary and metabolic issues are examples of systemic factors.
 - Personality and behaviour-Psychological elements
 - Structural reasons-occlusal discrepancies of all kinds, poor tooth hygiene Factors that are genetic
- **Initiating factors:** these factor causes the onset of TMD
 - Trauma-Micro or macro trauma
- **Perpetuating factors (para function, hormonal, or psychosocial factors):** these factors mainly interfere with the process of healing which enhances the progression of TMD [10].
 - Mechanical and muscular stress
 - Metabolic issues
 - Overloading of joint structures-Para functional habits, etc.

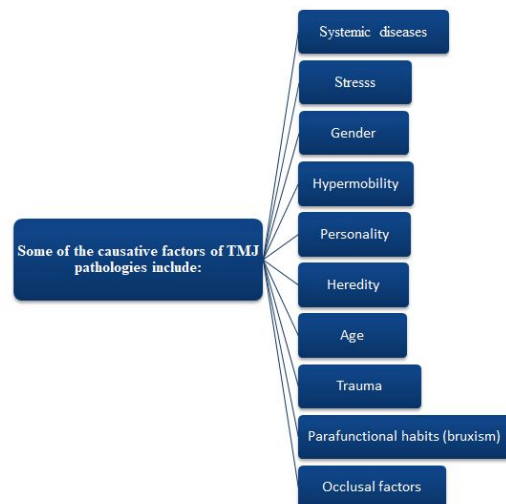


Figure 1: Some of the causative factors of TMJ pathologies.

Occlusal conditions

The main causative factor earlier, in which the correlation between occlusal variables and TMD and their contribution to TMD, has been an intense discussion in the dentistry. Both static and dynamic circumstances

should be used to assess the link between occlusion and TMDs. Reverse articulation, for example, is thought to cause asymmetric muscle function, but whether or not it is linked to TMD has yet to be determined [11]. However, four occlusal structures mainly appeared in patients:

- Occurrence of skeletal anterior open bite.
- Retruded intercuspal site and intercuspal site slides of superior than 4 mm.
- Overjet of more than 6-7 mm.
- 5 or additional misplaced, unreplaced posterior teeth [12].

Trauma

The circumstance that, the trauma causes TMDs has sufficient evidences in which intra capsular disorders have a bigger impact than muscle problems. There are two types of traumas: macro trauma and micro trauma. The most prevalent structural changes affecting the TMJ caused by macro trauma are elongation of the discal ligaments. Direct (open mouth, close mouth, iatrogenic) and indirect (non-iatrogenic) trauma are the two types of macro trauma in which TMJ injury is caused by rapid force which do not immediately strike and interacts the mandible. Micro trauma is defined as any little force applied repeatedly to joint structures over a lengthy period of time [13].

Emotional stress

Stress and personality have been studied extensively for aetiology of temporomandibular pain dysfunction syndrome. Psychological studies shows patient with temporomandibular disorders might have psychological appearances and dysfunction which are similar to chronic musculoskeletal pain disorders as headache and arthritis pain [14]. The association between depression and stress and different physical symptoms of TMD is widely acknowledged [15]. The relations in the psychological features and Para functions have been underlined in several studies [16]; Psychological factors mainly have an indirect effect rather than direct effect on TMD symptoms. The general level of depression or anxiety might alter the grinding and clenching habits [17].

Parafunctional factor (bruxism)

TMD has been associated to bruxism as an initiating or recurring cause. Prior studies directed that 87.5% of patients have myofascial pain and displacement of disc and 68.9% of myofascial pain patient's reports of clenching teeth [18]. This hypothesized that bruxism might be aetiology factor for myofascial discomfort, masticatory muscle ache, and TMJ pain [19].

Clinical features

Clinical features show in Figure 2.



Figure 2: Signs and symptoms.

Diagnostic criteria for TMD

Diagnosis: TMD is diagnosed mainly from the patient's medical history and physical examination findings. Jaw movement such as opening and closing the mouth, chewing and pain in the pre auricular, masseter or temporal region are common TMD symptoms. If pain is not relieved by adjusting the jaw, another cause of orofacial pain should be considered. TMD can cause unusual jaw noises (such as clicking, cracking, crepitus), although it can also happen in up to 50% of people with no symptoms [20]. Commonest prevalent signs and symptoms, according to great reflective research (n=4,528) conducted by a single examiner over 25 years are facial pain, ear discomfort, headache, and jaw discomfort or dysfunction [21]. Extra signs and indications may be drowsiness, ache in neck, eye, arm, or back region.

Imaging: Plain radiography, such as panoramic radiography, can detect dislocations, acute fractures or severe degenerative disease, whereas computer tomography permits more thorough analysis of delicate bony morphology. MRI is the ideal imaging modality for TMJ. In symptomatic patients, MRI findings and joint morphology have a 78-95% association. Ultrasound, which is dynamic, affordable, non-invasive method of diagnosing inner TMJ dysfunction in absence of an MRI [22].

Questionnaire: The questionnaire was used to evaluate the degree of TMD in the participants. The questionnaire is framed of series of questions, evaluating for the presence of pain in TMJ, head, and while chewing, Para functional habits, limitation of movements, joint clicking, and perception of malocclusion, and emotional stress, which becomes a vital instrument for diagnosis [23].

Various indexes are:

- Helkimo Index
- Fonseca Index
- Research Diagnostic Criteria for TMD

- Craniomandibular Index
- TMD Disability Index

Frequently accepted criteria for TMD evaluation is research diagnostic criteria. The developed RDC/TMD Axis I diagnostic algorithms are valid for the most severe pain-related TMD as well as TMJ intra-articular condition. The RDC/TMD Axis II instruments are accurate and reliable.

Physical examination: A thorough physical examination will aid in identifying the source of discomfort and the severity of the condition. TMJ assessment includes joint range of motion, pain palpation, joint sound inspection and muscle palpation in the section of the evaluation. For some patients, additional diagnostic testing may be required. Dental and occlusal evaluations are also performed [24].

TMJ evaluation: Pain on palpation, range of Joint's motion and joint sounds are present during movements of mandible and opening movement are all common criteria for a TMJ clinical examination.

TMJ range of motion: Limitation in mouth opening and difficulty in mandibular mobility are two of the major complaints. The patient is being asked to open their mouth completely, and total of interincisal measurement and overbite is recorded using the millimetre rule. The usual maximal opening is between 45 and 55 mm, while lesser figures are common in asymptomatic individuals [25]. To evaluate deviation or deflection, the mandibular closing and opening movements could keep on performing in the straight line. Protrusion measurements, as well as lateral right and left movements, should be recorded. It is advised to mark 2 markings points on mandible and maxilla, approximately towards midline, for those measurements. These reference areas shall provide a movement series which measures mandibular excursion.

Recognition of the joint sounds: The presence of joint noises during mouth opening and mandibular excursion can help to detect disc-condyle incoordination. The clinical assessment of articular sounds using physical examination or stethoscope is considered to be quite effective [25]. The maximum frequent sounds in TMD patients are clicking, a terminal thud (relative to hyper translation) and crepitation.

TMJ palpation: One of the most essential indicators in the identification of intra capsular diseases is tenderness upon palpation. The physician should look for the lateral polo of the mandibular condyle following repeated opening and closing movements. Simultaneously, with the patient's mouth in a comfortable situation, bilateral tactual exploration of lateral part of the TMJ should be performed. Pressure of 1 kg should be applied to the lateral and posterior sides of the joints during this palpation. Capsulitis and/or synovitis can be diagnosed based on pain reports. Scores ranging from 0 to 3 can be used to grade the patient's response to palpation which indicates as follows:

- 0=indicates no pain when palpated

- 1=indicates slight discomfort
- 2=indicates sensible pain
- 3=indicates acute pain, palpebral reaction, and "jump sign" [26].

Palpation of the muscles: Tactual exploration of muscles is an essential part of the myofascial pain and temporomandibular disorders diagnosis process. Nociceptive neurons in the muscle and myofascial tissues are triggered by mechanical stimuli which are induced by digital pressure, to detect and transfer pain messages to the CNS. Progression of a patient's response to palpation is used to determine the intensity of the pain and for assessing a success of treatment during recall visits. If there is no underlying bone support, palpation must be done bilaterally by a fingers tip or *via* pincer palpation in the relaxed state. The posterior, medial, and anterior temporalis muscles, as well as the superficial and deep masseters and the attachment of the medial pterygoid muscle, should all be explored. Significant cervical muscles which are also taken into account in this assessment include the sternocleidomastoid, sub occipital and superior trapezius [27].

Dental and occlusal estimation

Dental investigation: Periodontal disorders which may cause pain, such as poor restorations or missing teeth, should be diagnosed during this time. The majority of orofacial pain is caused by dental problems. Dental attrition on the incisal or occlusal surfaces can also signify parafunctional behaviours [28].

Occlusal examination: The over jet and overbite are determined by the existence otherwise by lack of adjacent and frontal guides. The patient is requested to conduct lateral mandibular motions with a cellophane paper to detect occlusal interfering on the side that is not in used [29].

Additional diagnostic tests: Additional testing can assist to define a diagnostic impression if there is still any doubt. And here it is where modulation of functional muscles, cryotherapy, TMJ overworking, also investigative nerve blocking is beneficial [29].

Treatment

TMD treatment is usually required in 5-10% of individuals; however, 40% of cases recover on their own. Conservative therapy is estimated to be 50-90% successful in studies. Surgical intervention is usually reserved for patients in whom symptoms had not responded to non-surgical therapy.

Non-pharmacological management

Patient Instruction

- Jaw relaxation, passive stretching exercises, soft diet, warm compress.
- Immobilization of Temporomandibular joint is ineffective.

Physical Therapy (PT)

- There is lack of evidences to justify the use of specialised physical treatment such as ultrasonography and electrotherapy.
- Range of motion, coordination, muscle strength and relaxation should all be improved.

Acupuncture

- It is utilized in treatment of myofascial pain.

Biofeedback

- In case of short and long-span treatment of TMD, cognitive behaviour therapy and biofeedback therapy are recommended.
- **Examples are:** avoiding excessive mandibular movements, stress modification, elimination of Para functional habits, and sleep hygiene.

Iontophoresis

Occlusal splints and adjustments. According to Okeson [2].

- Stabilization appliance
- Anterior Repositioning Appliances (ARA)/Mandibular Orthopedic Repositioning Appliance (MORA)

Other types

- Anterior/Posterior bite plane
- Pivoting appliance
- Soft/resilient appliance (silicone)

Surgery: Condylotomy, Arthrocentesis, Arthroscopy, Discectomy for modification in anatomic or articular deviations. Surgical procedures have been demonstrated to improve joint mobility and alleviate TMD symptoms.

Pharmacological therapy

- Acetaminophen
- Anxiolytics
- Benzodiazepines
- Muscle relaxants
- Non-steroidal anti-inflammatory drugs
- Tricyclic antidepressants
- Intra-articular corticosteroids or anaesthetic injections [30].

DISCUSSION

Temporomandibular disorder is musculoskeletal condition of masticatory system that causes discomfort as well as dysfunction within jaws, joints and other structures [31-35]. They are characterized by reduced mandibular range of muscle, motion and joint discomfort, joint crepitus, and limited mobility or deviations in jaw opening. The most common symptom of TMD is pain in the masticatory muscles and temporomandibular joint. Additional signs and symptoms may be drowsiness, pain in the neck, eye, arm, or back region. It impairs normal jaw function and thus land up in handicapped situation for the patient to perform normal masticatory function. The factors that mainly contribute to TMD disorder are biomechanical, bio psychosocial, neuromuscular and neurobiological [9]. Some of the causative factors of TMJ

pathologies include stress, hypermobility, heredity, age, trauma, Para functional habits (bruxism), occlusal factors. TMD is diagnosed mainly from the patient's medical history and physical examination findings [20,36-40]. TMD treatment is usually required only in 5-10% of individuals, 40% of cases recover on their own, which mainly includes non-pharmacological therapy, conservative therapy, surgical intervention and pharmacological therapy [41-45].

CONCLUSION

Dentist is challenged by a temporomandibular mandibular problem at any time and must be prepared to describe it completely even if diagnosis is not possible. This concern becomes absolute when dentist accepts global rehabilitation projects that require an effective mandibular reference position, centric relation, which depends on the state of the musculo articular relationship. Dentist can make a right management posture and adapt the treatment plan to serve the patient's best interests by precisely discovering the source of an existing problem and assessing the risk factors. Dentist must remain careful, well aware of the occlusal condition and ready to change occlusion as needed, without neglecting the importance of establishing a differential diagnosis that excludes "non-TMD" diseases that can be significantly more harmful.

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