

Evaluation of Clinical Features in Patients with Temporomandibular Joint Disorders

Research Article

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Abstract

Objective: Temporomandibular joint disorder [TMD] is a muscular and articular disorder. There are various clinical features associated with TMD. These include clicking sound, deviation of jaw, pain on palpation, and limited mouth opening. The aim of the study was to assess the various clinical features occurring predominantly in patients with temporomandibular joint disorders in our regional population.

Methods: In this retrospective study, a total of 192 patients who had temporomandibular disorders were included. The following parameters were evaluated based on the dental records; age, gender, types of TMD and clinical manifestations of TMD. Excel tabulation and SPSS version 23 was used for data analysis and results obtained.

Results: The age group most affected with TMD was 21-30 years with a predilection for males. Disc-condyle disorders was the predominant type of TMD [especially in the younger population] followed by MPDS and degenerative disorders in the study population. Clicking and pain on palpation were the most predominant clinical features of TMD followed by a combination of pain, clicking and deviation of the jaws. Least prevalent findings were limited mouth opening and a combination of pain on palpation and the deviation of the jaws. Pain on palpation among elderly people and clicking and a combination of pain, clicking and deviation of the jaws among younger people were the predominant signs and symptoms of TMD. Pain on palpation was present predominantly in male participants and clicking was seen predominantly in female participants. Pain on palpation was the predominant finding in degenerative disorders. Pain on palpation followed by limited mouth opening were the predominant findings in MPDS. Clicking sound followed by a combination of pain, clicking and deviation of the jaws were the predominant features in disc condyle disorders. The association between age, gender and the types of TMD was statistically significant. Also, the association between the age, gender, types of TMD with the clinical features of TMD was also statistically significant.

Conclusion: TMJ disorders are now evolving commonly among the younger population. Males are slightly more affected with TMD than females. Disc-condyle disorders occurs more commonly than the other types of TMD. Among the clinical manifestations of TMD, pain on palpation and clicking were found to be the predominant signs and symptoms in our present scenario. The association between the age, gender, types of TMD with the clinical features of TMD were statistically significant.

Keywords: Temporomandibular Joint Disorder; Pain; Deviation of Jaws; MPDS; Dislocation; Clicking; Trismus; Internal Derangement.

Introduction

The temporomandibular articulation is composed of bilateral, diarthrodial, temporomandibular joints (TMJs). Each joint is formed by a mandibular condyle and its corresponding temporal cavity (glenoid fossa and articular eminence). The TMJ and its

associated structures play an essential role in guiding mandibular motion and distributing stresses produced by everyday tasks, such as chewing, swallowing, and speaking. TMJ disorders (TMD) are a class of degenerative musculoskeletal conditions associated with morphological and functional deformities [1, 2]. Some terms described the suggested etiologic factors, such as occlusal mandibu-

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lar disturbance and myoarthropathy of the temporomandibular joint, whereas others stressed the pain dysfunction syndrome, myofascial pain dysfunction syndrome and temporomandibular pain dysfunction syndrome.

Temporomandibular joint disorders include TMJ internal derangements [with degenerative disorders], Hypermobility disorders [subluxation, dislocation], Myofascial dysfunction syndrome [MPDS] and TMJ ankylosis. Both TMJ internal derangements and Hypermobility disorders exhibit abnormal Disc-condyle apparatus and configurations. Internal derangement of TMJ or disc displacement is classified into: 1) Disc displacement with reduction 2) Disc displacement with reduction with intermittent locking 3) Disc displacement without reduction with limited opening and 4) Disc displacement without reduction without limited opening. The degenerative changes in the TMJ are believed to result from dysfunctional remodeling, due to a decreased host-adaptive capacity of the articulating surfaces and/or functional overloading of the joint that exceeds the normal adaptive capacity. In the TMJ Dislocation condyle is displaced out of the glenoid fossa and traverses in front of the articular eminence. In contrast, subluxation is the condition in which the dislocated condyle can be reduced back into the normal position by patient themselves, without any professional assistance. Myofascial pain can be defined as “a regional myogenous pain condition characterised by local areas of firm, hypersensitive bands of muscle tissue known as trigger points”. Temporomandibular joint (TMJ) ankylosis is defined as bony or fibrous adhesion of the anatomic joint components accompanied by limitation of mouth opening, causing difficulty in mastication, speech, and oral hygiene [3].

Temporomandibular disorders (TMDs) are defined by the American Academy of Orofacial Pain as “a collective term that embraces a number of clinical problems that involve the masticatory muscles, the TMJ and the associated structures.” Its key characteristics are pain in the TMJ and surrounding tissues; dysfunction, clicking and locking of the mandible. Common symptoms of TMJ disorders include jaw pain, limited or painful jaw movement, headache, neck pain or stiffness, clicking or grating within the joint, and, occasionally, an inability to open the mouth painlessly [4, 5].

The signs and symptoms of TMD are experienced by up to 60% of the general population at some stage in their life occurring across all ages and gender [6]. Symptoms and signs include painful joint sounds, restricted or deviating range of motion, and cranial and/or muscular pain known as orofacial pain [7]. TMDs have multiple etiological factors. Many studies show a poor correlation between any single etiological factor and resulting signs and symptoms [8]. Alterations in any one or a combination of teeth periodontal ligament, the TMJ, or the muscles of mastication eventually can lead to TMD. The injuries to the joint can be direct or indirect. The microtrauma as in bruxism and macrotrauma such as direct blow to the face may provoke tearing in ligaments that affect the temporalis and masseter muscle by the impulsive movement of the mandible [9] leading to temporomandibular joint disorders. Prolonged immobilization after trauma to the TMJ can result in ankylosis.

Parafunctional habits such as bruxism, clenching, hyperextension, and other repetitive habitual behavior may lead to TMD by joint overloading that leads to cartilage breakdown, synovial fluid al-

terations and other changes within the joint [10]. In some patients with steep articular eminences, they are more likely to demonstrate greater condyle-disk movement during function. This exaggerated condyle-disk movement may increase the risk of ligament elongation and hence leading to disk derangement disorders [11]. Various psychological factors such as emotional behavior, stress, and personality disorders may act as predisposing factors in the development of TMJ dysfunction as they can result in excessive load on the masticatory system. The pain dysfunction may be directly or indirectly related with an emotional status of the person [12].

Pain is the main characteristic of most TMDs and also the main reason for patients to seek treatment. Pain may be present at rest, may be continuous or intermittent and characteristically increases with jaw functions. The pain may be dull, poorly localized and unilateral rather than bilateral. It is rarely severe [13]. The pain may occur as a result of the contraction of the masticatory muscles which stimulates extravascular production of inflammatory cytokines around TMJ [14].

Another salient feature of TMJ disorders includes clicking and deviation of the mandible while opening and closing of the jaw. Clicking is not always associated with a TMJ disorder, however many times it is usually a sign. The clicking or popping noise during opening or closing the mouth or while chewing may be the commonest sign of TMD occurring in about 13.5% of patients indicating an articular disc disorder of TMJ [15]. The clicking sound is attributed to the slipping of the disc between the condyle and the glenoid fossa. This slip causes the clicking sound. The most important clinical sign of TMJ clicking is palpable soreness in the lateral pterygoid and temporal muscles.

Limited range of mandibular movement may be the presenting sign of TMDs. There may be locking of the joint, tenderness in the jaw muscles, joints and deviation or deflection of the mandible during the movement of the jaw [16]. A headache occurs in approximately 22% of TMD patients which may arise from neural, vascular, muscular, ligament, and bony tissues as it forms a functional complex with the cervical region. The physiological, aging or minor degenerative alterations in the condyle, disc, and fossa can cause deviations and dysfunction, which significantly affects the mandibular movements. Whether the deviation of the mandibular posture causes the adaptable growth of the mandible or osteoarthritic change of the condyle, these conditions would be recognized as morphological change of the facial skeleton, especially in the mandible.

TMDs are known to be one of hosts of unusual conditions that contribute as a part of chronic orofacial pain disorders. TMD is a multifaceted condition of yet unknown pathogenesis. It is important to assess and investigate the etiological patterns of this disorder and the various clinical and laboratory investigations related to the etiology of TMD, provide understanding for the management of patients with TMD [17].

Temporomandibular joints retain their capacity for remodelling and continue to change their structure and morphology with age. Association of pain with TMDs is an important consideration for patient as well as physician that led to increased investigations of Temporomandibular joint disorders. Several studies have reported that TMDs have complex aetiology, wide range of manifestations,

variability in prevalence of symptoms in different population with age, gender, and race variations [18].

Thus, the aim of this study was to assess the various clinical features in patients with temporomandibular joint disorders visiting our institution and to evaluate if there is a difference in their manifestations based on the age, gender, and type of TMD. This will help in diagnosis and treatment protocol planning, thereby providing appropriate treatment for Temporomandibular joint disorder conditions in our regional population.

Materials And Methods

Study design and Study setting

This retrospective cross-sectional study was conducted in Saveetha dental college and hospital, Saveetha university, Chennai, to assess the Clinical Features in Patients with Temporomandibular Joint Disorders among dental patients reporting from June 2019 to March 2021. The study was initiated after approval from the institutional review board and it was covered by the following ethical approval number; SDC/ SIHEC/2020/DIASDATA/0619-0320.

Study population and sampling

Inclusion criteria for the study were adult dental patients with TMD. Exclusion criteria included immunocompromised patients, dental anomalies, systemic diseases with cognitive problems and speech problems, missing or incomplete data. After assessment in the university patient data registry, consecutive case records of 192 patients who were diagnosed with TMD and were eligible for the study were included in the study. Cross verification of data for errors was done with the help of an external examiner.

Data collection and tabulation

Data regarding patients having TMD were retrieved after analysing 86000 case sheets. The following parameters were evaluated based on the dental records; age, gender and types of TMD. Chief complaints, medical and dental history, treatment report of the patients and all the clinical manifestations of TMDs were examined for the data collection and recorded. Patients diagnosed with TMD were further classified into disc-condyle disorder [TMJ internal derangement, TMJ dislocation/subluxation], degenerative disorder and myofascial pain and dysfunction syndrome (MPDS). The clinical presentations of TMD were considered

into several variables and the patients were classified according to the severity of the TMD for diagnosis and treatment purposes. The clinical variables can be individual or a combination of them which includes: clicking, pain on palpation, deviation of jaws, limited mouth opening, pain on palpation and deviation of the jaws, or a combination of clicking, pain and deviation of the jaws. Data was entered in excel and was imported to SPSS. The variables were defined.

Statistical Analysis

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Descriptive analysis was used to describe age, gender, types of TMD and clinical manifestations of TMD among the study population. Categorical variables were expressed in frequency and percentage; and continuous variables in mean and standard deviation. Chi-square test was used to test associations between categorical variables (age, gender, types of TMD, and clinical manifestations of TMD). P value < 0.05 was considered statistically significant.

Results

In our study, a total of 192 patients were assessed with the age range of 10 to 70 years. The details of age distribution are depicted in Figure 1. Participants in the age range between 21-30 years were seen to have more incidences of Temporomandibular joint disorders followed by 31-40 years. Out of the 192 patients, 106 patients were males and 86 patients were females. Males were more affected with TMD than the females [Figure 2]. Figure 3 shows the type of TMD seen in the patients, with disc-condyle disorders being the most common among 107 patients followed by MPDS in 63 patients and degenerative disorder in 22 patients. Thus, Disc-condyle disorder was the most prevalent TMD disorder among the study population. Various clinical features of TMD were also assessed among the patients. Figure 4 shows that 26 patients had deviation of jaws, 44 patients had pain on palpation, 43 patients experienced clicking sound of jaws, Deviation of jaws along with pain on palpation was seen among 25 patients, and 28 patients showed all the clinical features such as deviation of jaws, pain on palpation and clicking sound. It was also seen that only 26 patients reported with limited mouth opening. Thus, clicking and pain on palpation were the most predominant clinical features of TMD followed by a combination of pain, clicking and deviation of the jaws. Least prevalent findings were limited

Figure 1. Bar graph showing distribution of age of the patients with temporomandibular joint disorders. X axis represents the age group and Y axis represents the number of patients with TMD. Age group of 21-30 years shows more incidence of TMD followed by 31-40 years.

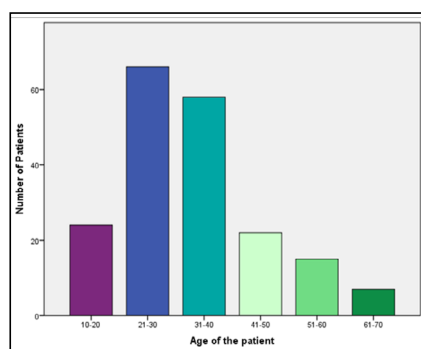


Figure 2. Bar graph showing distribution of gender of the patients with temporomandibular joint disorders. X axis represents the gender of patients and Y axis represents the number of patients with TMD. Blue denotes male participants and red denotes female participants. Males were more affected with TMD than the females.

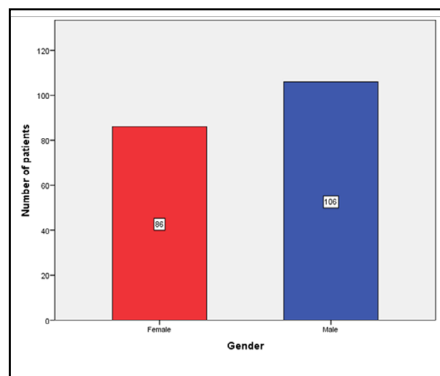


Figure 3. Bar graph showing distribution of types of temporomandibular joint disorders. X axis represents the type of TMD and Y axis represents the number of patients with TMD. Red denotes patients with degenerative disorder, purple denotes patients with disc condyle disorder, and blue denotes patients with MPDS. Disc-condyle disorder was the most prevalent TMD disorder among the study population.

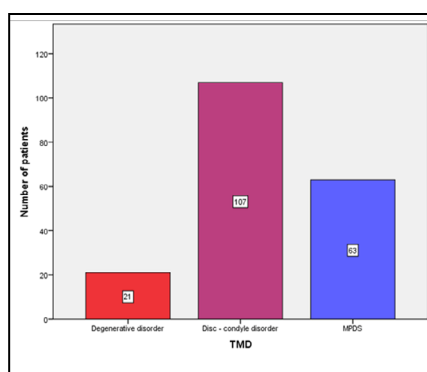
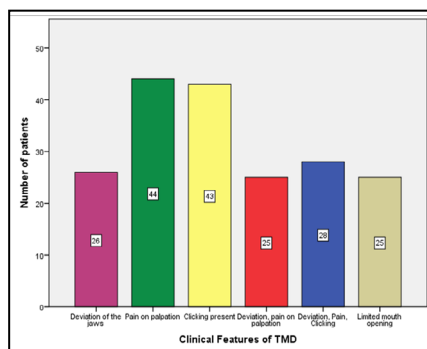


Figure 4. Bar graph showing the predominant clinical features of temporomandibular disorders. Graph shows distribution of patients with jaw deviation, pain on palpation, clicking sound, deviation with pain on palpation, deviation of jaws with pain and clicking sound, and limited mouth opening. X axis denotes the clinical features of TMD and Y axis denotes the number of patients with the various clinical manifestations of TMD. Clicking and pain on palpation were the most predominant clinical features of TMD followed by a combination of pain, clicking and deviation of the jaws. Least prevalent findings were limited mouth opening and a combination of pain on palpation and the deviation of the jaws.



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The association of age and gender of the patients with the type of temporomandibular joint disorders was statistically significant and is depicted in Figure 5 and Figure 6 respectively.

Degenerative disorders were higher in age group 31-40 years, disc-condyle disorders were seen predominantly in age group 21-30 years and 31-40 years and MPDS was present equally in less frequency in the age group of 31-40 years and 21-30 years and the results were statistically significant [Figure 5]. All three types of

TMD were seen more in males than females and the results were statistically significant [Figure 6].

The association of age and gender with the clinical features of TMD is depicted in Figure 7 and Figure 8 respectively and the results were statistically significant. The age group 21-30 years shows more incidences of all the clinical features of TMD followed by the age group 31-40 years. Clicking was common in the age groups of 21-30 years and 31-40 years [younger age]. A combination of pain, clicking and deviation of the jaws is also seen frequently in the 21-30 years age group. Pain on palpation was common in the age group of 51-60 years and 61-70 years [older

age] and the results were statistically significant [Figure 7]. Pain on palpation was present predominantly in male participants and clicking was seen predominantly in female participants and the results were statistically significant [Figure 8]. Figure 9 shows the association between the types of temporomandibular disorders and the various clinical features seen in TMD and the results were statistically significant. Pain on palpation was the predominant finding in degenerative disorders. Pain on palpation followed by limited mouth opening were the predominant findings in MPDS.

Clicking sound followed by a combination of pain, clicking and deviation of the jaws were the predominant features in disc condyle disorders. These results were statistically significant [Figure 9].

Discussion

According to a study by Solberg et al, it was seen that 25% of the population may experience symptoms of TMD [7] and only a

Figure 5. Bar graph depicting the association between age and type of temporomandibular joint disorders. X axis represents the age of the patients and Y axis represents the number of patients with TMD. (Pearson Chi square was done with $p = 0.01 (<0.05)$, hence statistically significant). Blue bars represent degenerative disorders which is higher in age group 31-40 years, green bars represent disc-condyle disorders which is seen predominantly in age group 21-30 years and 31-40 years and yellow bar represents MPDS which is seen equally in less frequency in the age group of 31-40 years and 21-30 years. Thus, the association between age and type of temporomandibular joint disorders was statistically significant.

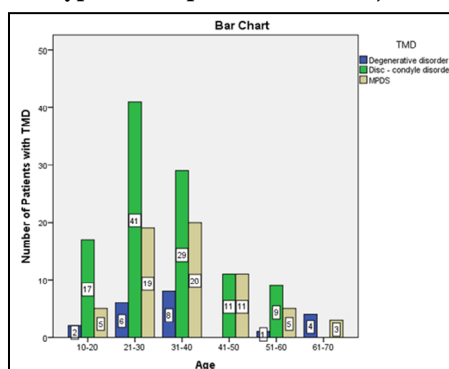


Figure 6. Bar graph showing association between gender and type of temporomandibular joint disorders. X axis denotes the gender of the patient. Y axis denotes the number of patients with TMD. Blue bars represent degenerative disorders, green bars represent disc-condyle disorders and yellow bar represent MPDS. (Pearson Chi square was done with $p = 0.044 (<0.05)$, hence statistically significant). All three types of TMD were seen more in males than females. Thus, the association between gender and type of temporomandibular joint disorders was statistically significant.

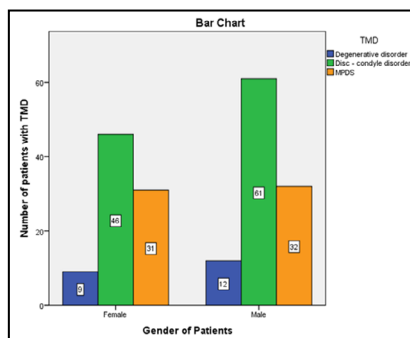


Figure 7. Bar graph showing association between clinical features and age of the patients with temporomandibular joint disorder. X axis denotes age category of the patients and Y axis denotes then number of patients with TMD exhibiting various clinical manifestations. (Pearson Chi square was done with $p = 0.031 (<0.05)$, hence statistically significant). The age group 21-30 years shows more incidences of all the clinical features of TMD followed by the age group 31-40 years. Clicking was common in the age groups of 21-30 years and 31-40 years. A combination of pain, clicking and deviation of the jaws is also seen frequently in the 21-30 years age group. Pain on palpation was common in the age group of 51-60 years and 61-70 years. Thus, the association between clinical features of TMD and the age of the patients was statistically significant.

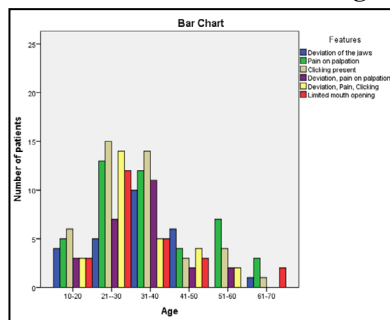


Figure 8. Bar graph showing association between clinical features of TMD and gender of the patients with temporomandibular joint disorders. X axis denotes gender of patients and Y axis denotes the number of patients with TMD exhibiting various clinical manifestations. (Pearson Chi square was done with $p = 0.01 (<0.05)$, hence statistically significant). Pain on palpation was present predominantly in male participants and clicking was seen predominantly in female participants. Thus, the association between clinical features of TMD and gender of the patients was statistically significant.

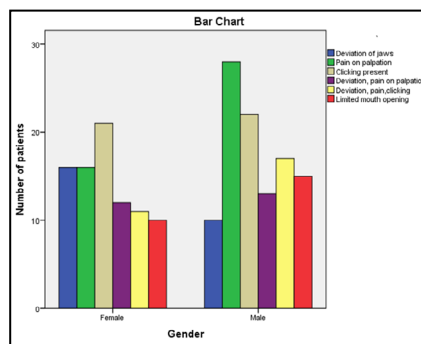
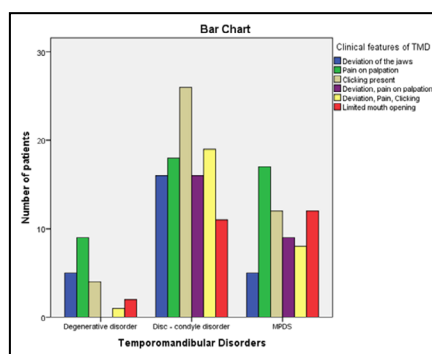


Figure 9. Bar graph showing association between temporomandibular joint disorders and the various clinical features of temporomandibular joint disorders. X axis represents temporomandibular disorder and Y axis denotes number of patients with various clinical manifestations of TMD. (Pearson Chi square was done with $p = 0.001 (<0.05)$, hence statistically significant). Pain on palpation was the predominant finding in degenerative disorders. Pain on palpation followed by limited mouth opening were the predominant findings in MPDS. Clicking sound followed by a combination of pain, clicking and deviation of the jaws were the predominant features in disc condyle disorders. Thus, the association between temporomandibular joint disorders and the various clinical features of temporomandibular joint disorders was statistically significant.



small percentage of individuals seek treatment after experiencing pain, clicking sound, limited mouth opening. In Studies by Carlsson, in the 1980s detected TMD symptoms in 16% to 59% of the population [19], however only 3% to 7% of the adult population actually consulted for treatment and care for pain and dysfunction associated with TMD [20].

In our study it was seen that the age group 21-30 years had more incidences of TMD followed by patients of the age group 31-40 years. Similarly in a study by Van Loon et al, most patients presenting symptoms were aged between 20 and 50 years of age, an unusual distribution for a disease that is considered a degenerative disorder [21]. In our study it was seen that almost 54.9% males reported with TMD and 45.1% females reported with TMD. Hence males showed to have a higher incidence of TMD than females. However, in the studies by Martins et al and Wilkes [22, 23] it is seen that TMD symptoms occur disproportionately between the sexes with a much higher incidence reported in females, and female to male ratios ranged between 2:1-8:1.

According to the studies by Van Loon et al and Farrar et al, up to 70% of TMD patients suffer from pathology or malposition of the TMJ disc which is termed as 'internal derangement' [21, 24]. In a study of patients presenting unilateral TMD pain symptoms during function, palpation, and assisted or unassisted mandibular

opening, it was reported that 54.2% of individuals showed osteoarthritis in the affected joint [25]. In our study, disc-condyle disorders [Internal derangement of TMJ] were more common than the other types of TMD. Our study results also showed that pain on palpation was most prevalent in males and clicking was more prevalent in females. However, a study showed that clicking was the most common sign of TMD among both the sexes [26]. According to the study by Carrara et al, systemic and degenerative diseases, and musculoskeletal diseases as well, might be a confounding factor in the diagnosis of TMD, as they are known to have a multifactorial etiopathogenesis [27].

Previously our team had conducted numerous clinical trials [28-32], in vitro studies [33, 34] and systematic reviews [35, 36] regarding TMD over the past 5 years. Now we are focussing on epidemiological surveys on TMD. The idea for this survey stemmed from the current interest in the community. Limitations of our study are the limited population included and a relatively small sample size. Future scope of the study is that a broad population should be studied with a larger sample size and assessed for a longer period of time.

Conclusion

Within the limitations of the study, it can be concluded that TMJ

disorders are now evolving commonly among the younger population. Males are slightly more affected with TMD than females. Disc-condyle disorders occurs more commonly than the other types of TMD. Among the clinical manifestations of TMD, pain on palpation and clicking were found to be the predominant signs and symptoms in our present scenario. The association between the age, gender, types of TMD with the clinical features of TMD were statistically significant. There has been a recent increase in awareness towards TMJ disorders, however the attitude of TMD patients towards therapy is still sparse.

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