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Temporomandibular Disorders: A Study of Prevalence and Intervention Strategies in Rural Haryana, India

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ABSTRACT

Aim: The aim of the study was evaluate the prevalence of temporomandibular disorders (TMDs) among patients attending the BPS Government Medical College for Women, KhanpurKalan, Haryana, and to assess the efficacy of different management strategies.

Materials and Methods: This study was conducted at BPS Government Medical College for Women, Haryana (January 2022–December 2023), involved 600 patients (421 females, 179 males) aged 18-50 with orofacial pain or TMJ complaints. A standardized clinical protocol assessed masticatory muscles, TMJ palpation, mandibular range of motion, and TMJ sounds. Patients were diagnosed with Myofascial Pain Dysfunction Syndrome (MPDS), Internal Derangement (ID), or Osteoarthritis (OA) based on research criteria.

Results: Among them, 238 were female (56.5%), while 84 were male (45.8%), indicating a higher prevalence among females. The age of patients ranged from 18 to 50 years, with a mean age of 32.4 ± 7.6years. TMD prevalence was slightly higher in the 18-35 age group (54.2%) compared to the 36-50 age group (52.8%), but the difference was not statistically significant ($p>0.05$). Based on Research Diagnostic Criteria for TMD (rdc/TMD), the distribution of patients among different diagnostic subcategories was Myofascial Pain Dysfunction Syndrome (MPDS): 48.1% (n=155) of TMD cases. Internal Derangement (ID): 35.4% (n=114) of TMD cases. Osteoarthritis (OA): 16.5% (n=53) of TMD cases.

Conclusion: This study highlights the high prevalence of TMD in rural Indian populations, particularly among women, and emphasizes the need for a multimodal treatment approach. Conservative treatments are effective, with surgery reserved for severe cases. The findings suggest that physical, psychosocial, and cultural factors contribute to the high prevalence. Early detection and tailored interventions focusing on ergonomics, stress management, and symptom recognition are crucial, and further research is needed to optimize treatment protocols.

Keywords: Temporomandibular disorders (TMD); temporomandibular joint; rural population; prevalence; multimodal treatment.

INTRODUCTION

Temporomandibular disorders (TMDs) encompass a spectrum of conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and surrounding tissues.[1]TMD is recognized as a significant contributor to non-dental pain in the

orofacial region, often associated with functional limitations such as restricted mouth opening, clicking or popping sounds, and difficulty in chewing or speaking.[1,2] Its etiology is multifactorial, with genetic, anatomical, and psychosocial factors playing a role.

The prevalence of TMD varies globally, but reports indicate a higher occurrence among women, particularly in their reproductive years.[3,4] In rural India, limited access to specialized dental and maxillofacial care further complicates the diagnosis and management of TMD. The aim of this study is to evaluate the prevalence of TMDs among patients attending the BPS Government Medical College for Women, KhanpurKalan, Haryanaand to assess the efficacy of different management strategies, including conservative and surgical interventions.

MATERIALS AND METHODS

The study was conducted in the Department of Dentistry from January 2021 to December 2023. A total of 800 patients visiting the OPD for orofacial pain or TMJ-related complaints were initially surveyed. After excluding patients with systemic conditions, craniofacial trauma, or prior TMJ surgery, 600 patients were included in the final analysis. The cohort consisted of 421 females and 179 males, predominantly in the 18-50 age group, representative of the rural population in Haryana.

Patients were evaluated using a standardized clinical protocol that included:palpation of the masticatory muscles and TMJ, measurement of mandibular range of motion (35mm-50mm), assessment of TMJ sounds (clicking, crepitus, popping), deviation or deflection during mouth opening, pain on palpation or function and class IIdivision II with deep bite.

The research diagnostic criteria for temporomandibular disorders (rdc/TMD) were employed to classify patients into three major diagnostic categories; a) Myofascial pain dysfunction syndrome (MPDS), b) Internal derangement (ID), and c) Osteoarthritis (OA).Descriptive statistics were used

to evaluate the prevalence of TMD symptoms. Chi-square test was applied to assess differences between gender and age groups, with significance set at $p < 0.05$.

The primary mode of treatment for TMD was conservative management involving physiotherapy, splint therapy and pharmacological management. The preferred first-line treatment involved physiotherapy, including customized exercises aimed at improving jaw mobility and alleviating pain.

Splints were used to alleviate muscle tension and stabilize the joint, especially in cases of bruxism or myofascial pain and NSAIDs were prescribed for pain management, along with muscle relaxants in some cases. For patients with persistent or severe symptoms, particularly those with internal derangement, surgical intervention was considered.

In surgical interventions, arthrocentesis-a minimally invasive procedure to irrigate the joint and remove inflammatory by-products, arthroscopy used for patients with significant internal derangement, providing a direct visual assessment and treatment of the joint and open joint surgery was reserved for advanced cases with severe structural damage or osteoarthritis.

RESULTS

Of the 600 patients analyzed, 53.7% (n=322) exhibited signs and symptoms consistent with TMD. Among them, 238 were female (56.5%), while 84 were male (45.8%), indicating a higher prevalence among females. The male-to-female ratio in the total study population was 1:2.35, reflecting a female predominance. The age of patients ranged from 18 to 50 years, with a mean age of 32.4 ± 7.6 years. TMD prevalence was slightly higher in the 18-35 age group (54.2%) compared to the 36-50 age group (52.8%). However, differences in TMD prevalence between age groups were not statistically significant ($p > 0.05$). (Table 1)

Table 1: Demographic Distribution and Prevalence of Temporomandibular Disorder (TMD) Among 600 Patients

Category	Value
Total Patients Analysed	600
Patients with TMD (53.7%)	322
Gender Distribution (TMD Patients)	
- Female	238 (56.5%)
- Male	84 (45.8%)
Male-to-Female Ratio (Total Study Population)	1:2.35
Age Range	18 to 50 years
Mean Age (TMD Patients)	32.4 ± 7.6 years
TMD Prevalence by Age Group	
- 18-35 years	54.2%
- 36-50 years	52.8%
Statistical Significance	$p > 0.05$ (not significant)

The most frequent symptoms were mandibular deviation during mouth opening 42.1% (n=253) and TMJ clicking 38.6% (n=232). Pain on palpation of TMJ or muscles: Present in 34.3% (n=206) of cases. Restricted mandibular range of motion (<35mm) observed in 27.5% (n=165) patients. Crepitus or popping sounds identified in 22.8% (n=137) cases. (Table 2)

Table 2: Frequency and Distribution of Symptoms in Temporomandibular Disorder (TMD) Patients

Symptom	Frequency (%)	Number of Cases (n)
Mandibular Deviation During Mouth Opening	42.1%	253
TMJ Clicking	38.6%	232
Pain on Palpation of TMJ or Muscles	34.3%	206
Restricted Mandibular Range of Motion (<35mm)	27.5%	165
Crepitus or Popping Sounds	22.8%	137

The prevalence of specific TMD conditions including myofascial pain dysfunction syndrome (MPDS): 48.1% (n=155) of TMD cases,internal Derangement (ID): 35.4% (n=114) of the cases andosteoarthritis (OA): 16.5% (n=53) was observed based on Research Diagnostic Criteria for TMD (rdc/TMD), the distribution of patients among different diagnostic subcategories. The gender-wise distribution within subcategories was as follows: In MPDS, 96 females (61.9%) and 59 males (38.1%) were reported. For ID, there were 74 females (64.9%) and 40 males (35.1%). In OA, 22 females (41.5%) and 31 males (58.5%) were observed, with OA being notably more common in males. (Table 3)

Table 3: Prevalence and Gender Distribution of Specific TMD Conditions

TMD Condition	Prevalence (%)	Number of Cases (n)	Gender Distribution
Myofascial Pain Dysfunction Syndrome (MPDS)	48.1%	155	96 females (61.9%), 59 males (38.1%)
Internal Derangement (ID)	35.4%	114	74 females (64.9%), 40 males (35.1%)
Osteoarthritis (OA)	16.5%	53	22 females (41.5%), 31 males (58.5%)

For the management patients were categorized into three primary management strategies based on their diagnosis and symptom severity.Conservative management was used in 289 cases, making up 89.8% of TMD cases. Pharmacological therapy included NSAIDs in 226 cases (78.2%), muscle relaxants in 138 cases (47.8%), and tricyclic antidepressants in 64 cases (22.1%). Physical therapy involved jaw exercises in 215 cases (74.2%) and hot fomentation in 176 cases (60.9%).

Occlusal splints were used in 94 cases (32.2%), mostly for internal derangement cases. Minimally invasive interventions were applied in 27 cases, accounting for 8.4% of TMD cases. Intra-articular steroid injections were administered in 15 cases (55.5%), predominantly for osteoarthritis patients. Hyaluronic acid injections were used in 12 cases (44.4%), particularly in internal derangement and degenerative cases. Surgical management was employed in 6 cases, representing 1.8% of TMD cases. Arthrocentesis was performed in 4 cases (66.7%), primarily for persistent internal derangement. Arthroscopy was carried out in 2 cases (33.3%), mainly for severe osteoarthritis with joint degeneration. (Table 4)

Table 4: Management Strategies and Treatment Modalities for Temporomandibular Disorder (TMD)

Management Strategy	Number of Cases (n)	Percentage of TMD Cases
Conservative Management	289	89.8%
Pharmacological Therapy		
- NSAIDs	226	78.2%
- Muscle Relaxants	138	47.8%
- Tricyclic Antidepressants	64	22.1%
Physical Therapy		
- Jaw Exercises	215	74.2%
- Hot Fomentation	176	60.9%
Occlusal Splints	94	32.2%
Minimally Invasive Interventions	27	8.4%
- Intra-articular Steroid Injections	15	55.5%
- Hyaluronic Acid Injections	12	44.4%
Surgical Management	6	1.8%
- Arthrocentesis	4	66.7%
- Arthroscopy	2	33.3%

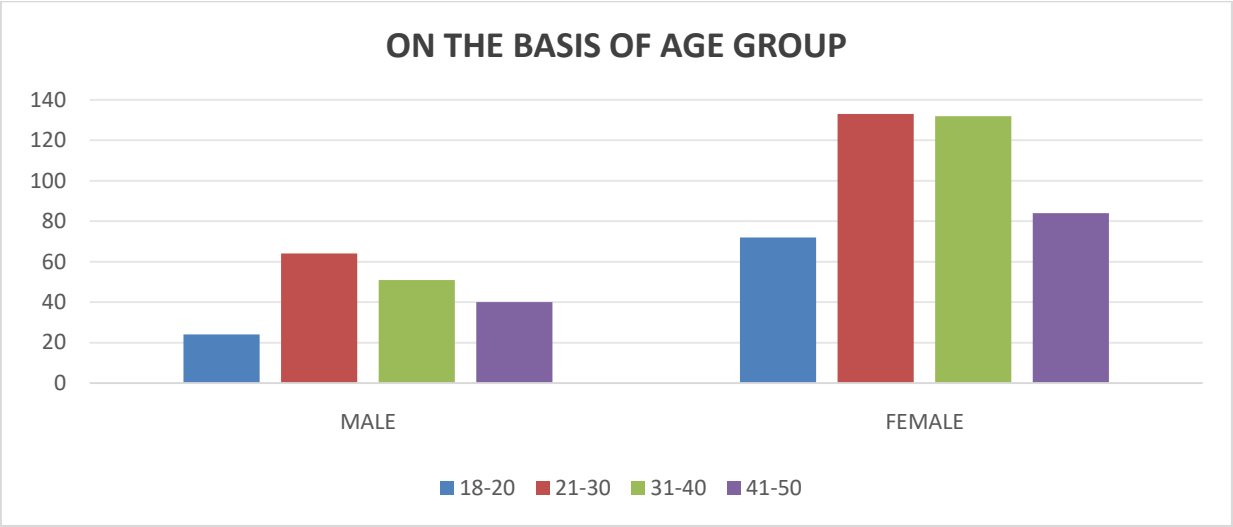
Male and female TMJ patients were divided into four age groups (18-20, 21-30, 31-40, 41-50) and analyzed for the frequency of different treatment modalities. It revealed that physiotherapy and pharmacological therapy were the most commonly utilized approaches, particularly in the 21-30 and 31-40 age groups. Surgical interventions such as arthrocentesis, arthroscopy, and open joint surgery were less frequently performed. (Table 4) The 21-30 age group males exhibited the highest frequency of treatment, indicating that TMJ disorders are more prevalent in younger male populations. Surgical procedures are less common among males. (Table 5)

Table 5- Distribution of treatment modalities among female and male patients by age group

	Females (in age group)				**Males (in age group)**			
INTERVENTION	**18-20**	**21-30**	**31-40**	**41-50**	**18-20**	**21-30**	**31-40**	**41-50**
Physiotherapy	28	54	48	38	10	24	21	17
Occlusal Splint	12	17	13	8	2	12	9	4
Pharmacological	22	37	53	27	8	16	13	12
Arthrocentensis	4	10	8	5	1	5	3	3
Arthroscopy	3	9	6	4	1	4	2	3
Open Joint Surgery	3	6	4	2	2	3	3	1

Females undertook TMJ treatments at a significantly higher rate than males. The preference for physiotherapy is evident, followed by pharmacological treatment. The data also emphasizes that surgical interventions are less frequently performed across both genders. (Bar graph 1)

Bar Graph 1: Comparison of treatment modalities by gender and age group.



Statistically the difference in TMD prevalence between males and females was statistically significant ($p < 0.05$), confirming a higher risk in females.However, the difference in TMD prevalence between different age groups was not statistically significant ($p > 0.05$), indicating that age alone was not a determining factor for TMD in this rural population.Management outcomes showed better symptom relief in patients undergoing a combination of physical therapy and pharmacological treatment compared to monotherapy ($p < 0.05$).

DISCUSSION

TMDs represent a spectrum of conditions affecting the TMJ, surrounding muscles, and associated structures.[1,2] As a leading cause of orofacial pain, TMDs have both a functional and psychosocial impact on affected individuals.[5] This study provides valuable insights into the prevalence and management strategies of TMDs in a rural population, a demographic often underrepresented in TMD research. The findings align with global trends in TMD prevalence but also highlight region-specific challenges and treatment protocols in resource-limited settings.

In the present study, TMD symptoms were observed in 53.7% of the surveyed population, consistent with previous research on TMD prevalence in various populations. Studies by Manfredini et al. (2011)[2] and Schiffman et al. (2014)[6] reported a prevalence range of 20–60% depending on the diagnostic criteria and population examined. The high prevalence in the current study could be attributed to the lack of early diagnosis and awareness about TMD in rural areas, where specialized healthcare services are often limited.

Females aged 18 and older show a higher prevalence of TMD than males, a trend linked to hormonal, anatomical, and behavioral factors.[3] Warren et al. (2001)[7] noted that estrogen affects pain sensitivity and TMD risk. This study supports global patterns, especially among females of reproductive age, suggesting hormonal influences on TMD development. Additionally, estrogen fluctuations during menstruation, pregnancy, and menopause may worsen TMD symptoms.[3]The differences in TMD incidence across various age groups were not statistically significant in this study. This observation suggests that age-related factors may not be as influential in this rural population, a finding that contrasts with studies from urban settings where TMD prevalence peaks in middle-aged individuals.[2] TMDs are more common particularly in rural women and low-resource settings. Several factors may contribute to this gender disparity in rural populations, with a combination of physical, social, and behavioral influences.[4]

The most common clinical indicators of TMD identified in this study were mandibular deviation during mouth opening (42.1%) and clicking sounds (38.6%). These findings are in line with prior research, where deviation and joint sounds are recognized as hallmark signs of internal derangement, a common form of TMD characterized by abnormal positioning of the TMJ disc.[2,7]

Internal derangement was the most common TMD subtype, consistent with previous studies in rural and underserved populations. The current study found that 38.3% of participants were diagnosed with internal derangement, based on the rdc/TMD criteria. This subtype is often linked to disc displacement, joint clicking, and limited mandibular movement. Studies by wright and north (2009)[8] also support the high prevalence of disc displacement in TMD patients, suggesting that this condition is often underdiagnosed in early stages.

The relatively low prevalence of myofascial pain dysfunction syndrome (0.8%) in the present study contrasts with other studies where it represents a larger share of TMD cases. Myofascial pain, often linked to stress, bruxism, and emotional factors, may be underreported in rural areas due to cultural differences in pain perception or limited awareness of stress-related TMD causes. This underscores the need for better education and outreach to improve recognition of MPDS in rural populations.

Additionally, the diagnosis of osteoarthritis (14.6%) in this population reflects the degenerative changes observed in older individuals with prolonged TMJ dysfunction. Osteoarthritis in the TMJ is typically characterized by joint stiffness, crepitus, and pain, and it represents the end stage of untreated or chronic internal derangement.[9]

Management of TMD in the study population followed a multimodal approach, combining conservative treatments with surgical interventions in select cases. The preferred first-line treatment involved physiotherapy.[10]Research has shown that physical therapy effectively reduces muscle tension and enhances joint function, especially when combined with patient education on preventing parafunctional habits.[10]

Splint therapy was another key conservative modality used in this study. Splints, or occlusal appliances, are designed to reduce muscle tension and prevent further damage to the TMJ by stabilizing the occlusion and distributing forces more evenly across the joint. Research by okeson (2013)[11] supports the use of splint therapy for TMD patients, noting its success in reducing pain and improving function in patients with myofascial pain and internal derangement.

For patients with severe symptoms unresponsive to conservative methods, surgical evaluation was recommended, particularly for those diagnosed with significant internal derangement. The surgical interventions considered in this study included arthrocentesis, arthroscopy, and open joint surgery, depending on the severity of the joint pathology.

Studies by Vos et al. (2014)[12] have demonstrated the success of arthrocentesis as a primary treatment modality for TMJ disorders.

Arthroscopy was used for patients with more advanced internal derangement or osteoarthritis. This procedure allows direct visualization of the joint and the removal of adhesions, offering a less invasive alternative to open joint surgery. For severe cases where conservative and minimally invasive options were unsuccessful, open joint surgery was considered, particularly in cases of osteoarthritis or joint ankylosis.

The findings of this study emphasize the need for early detection and intervention for TMD in rural populations, where access to specialized care may be limited. TMD, if left untreated, can lead to chronic pain, functional impairment, and a decline in quality of life. The high prevalence of TMD symptoms in this study suggests that TMD is a significant public health concern in rural India, warranting increased attention from healthcare providers and policymakers.

Education and outreach programs aimed at raising awareness about TMD and its management, particularly in underserved areas, are essential. Training primary care physicians and dentists to recognize early signs of TMD can help reduce the burden of the disease by facilitating timely referrals to specialists.

CONCLUSION

This study highlights the high prevalence of TMD in rural Indian populations, particularly among women, and emphasizes the need for a multimodal treatment approach. Conservative treatments like physiotherapy and splint therapy are the key, with surgery reserved for severe cases.

The high prevalence is linked to physical stress from agricultural work, psychosocial stress from family responsibilities, and cultural factors impacting health-seeking behaviour. Early detection and management are critical to prevent severe cases, and tailored interventions addressing ergonomics, stress management, and early TMD symptom recognition are essential. Further research is needed to optimize treatment protocols and explore the role of psychosocial factors in rural settings.

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