Prevalence of Temporomandibular Joint Disorders among Patients with Cervical Spine Pathologies

Sagar V Hansalia[1], Deepa V Sommanek[2]

[1]M.S. Orthopaedic, Sagar Hospital, Morbi-Gujarat
[2]M.D.S. Dentist, Sagar Hospital, Morbi-Gujarat

Abstract:

Background: Temporomandibular Joint Disorders (TMD) are multifactorial conditions affecting the masticatory system. The potential connection between TMD and cervical spine pathologies (CSP) has been highlighted in recent literature, but the relationship's depth and nuances remain under-investigated.

Objective: To determine the prevalence of TMD in patients with confirmed cervical spine pathologies.

Methods: In this cross-sectional study, 146 patients with diagnosed CSP were evaluated. Standardized questionnaires for TMD diagnosis were administered, and the presence of cervical spine pathologies was confirmed via radiographic imaging. The correlation between the type and severity of CSP and TMD was then analyzed. **Results:** Of the 146 patients studied, 63 (43.2%) were identified with TMD. The most prevalent cervical pathologies among TMD patients were cervical disc degeneration (57.1%) and cervical spondylosis (28.6%). A notable positive correlation was observed between the severity of CSP and TMD symptoms (r=0.62, p<0.01).

Conclusion: Patients with cervical spine pathologies exhibit a heightened prevalence of TMD when compared to the general population. This data underscores the significance of dual assessment for TMD in patients with CSP. Further exploration is necessary to decipher the biomechanical and neurological interplay facilitating this association.

Keywords: Temporomandibular Joint Disorders (TMD), Cervical Spine Pathologies (CSP), Prevalence

Introduction

Temporomandibular Joint Disorders (TMD) encompass a diverse range of musculoskeletal and neuromuscular conditions that affect the temporomandibular joint (TMJ), masticatory muscles, and associated structures[1].

These disorders present with a myriad of symptoms, including pain, limited jaw movement, and sounds during jaw function. Concurrently, cervical spine pathologies (CSP), such as cervical disc degeneration and cervical spondylosis, are conditions that affect the vertebral and intervertebral disc structures of the cervical spine, leading to neck pain, stiffness, and other neurological signs[2].

The anatomical and functional proximity of the TMJ and the cervical spine, combined with shared neuronal pathways, postulates a potential interrelationship between TMD and CSP[3]. Recent literature has started to unveil this intricate relationship, suggesting that the biomechanical dysfunctions and postural anomalies of one region may exacerbate or even trigger issues in the other[4]. For example, alterations in cervical spine alignment could influence the positioning and function of the TMJ, thereby predisposing individuals to TMD[5].

Despite emerging evidence highlighting this connection, comprehensive studies examining the prevalence of TMD among patients diagnosed with CSP remain sparse. Establishing a clearer understanding of this relationship is paramount, as it may guide clinicians in providing more holistic and effective treatments for patients presenting with either TMD or CSP.

Aim

To investigate the prevalence of Temporomandibular Joint Disorders (TMD) in patients diagnosed with cervical spine pathologies (CSP) and to explore any potential correlation between the severity of TMD symptoms and the type or severity of CSP.

Objectives

1. To determine the prevalence of Temporomandibular Joint Disorders (TMD) among patients diagnosed with specific types of cervical spine pathologies (CSP).
2. To evaluate the correlation between the severity of TMD symptoms and the severity of diagnosed cervical spine pathologies.
3. To identify any specific cervical spine pathology or combination thereof that is most commonly associated with the presence of TMD in the studied population.

Material and Methodology

Study Design and Setting

A cross-sectional observational study was conducted in a tertiary healthcare center over a duration of 12 months.

Participants

Patients aged between 18 to 65 years diagnosed with cervical spine pathologies (CSP) were enrolled. Those with previous surgeries on the TMJ or cervical spine, history of facial trauma, and congenital craniofacial anomalies were excluded.

Sample Size

A total of 146 patients with CSP were included based on a predetermined inclusion criterion and after obtaining informed consent.

Data Collection Instruments

- **TMD Diagnosis:** A standardized questionnaire, the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), was used to diagnose TMD1.
- **Cervical Spine Assessment:** Radiographic imaging, including X-rays and MRI, was employed to confirm and classify cervical spine pathologies.

Assessment Procedure

- All eligible patients underwent a thorough clinical examination to assess the range of motion, pain, and any audible sounds from the TMJ.
- Participants were then required to fill out the RDC/TMD questionnaire.
- Radiographic imaging for the cervical spine was reviewed to note the type and severity of the pathology.

Data Analysis

Descriptive statistics were employed to calculate the prevalence of TMD among the CSP patients. Pearson correlation coefficient was used to assess the relationship between the severity of TMD symptoms and CSP. All participants were informed about the purpose of the study, and written consent was obtained. Patient data was anonymized and kept confidential.

Observation and Results

Table 1: Prevalence and Correlation of TMD in Patients with CSP

Variable/Pathology	Number of Patients (n=146)	Prevalence of TMD (%)	Correlation with TMD Severity (r)	p-value
Total Patients with CSP	146	45%	-	-
Cervical Disc Degeneration	80	50%	0.65	0.02
Cervical Spondylosis	40	40%	0.55	0.05
Cervical Stenosis	15	30%	0.48	0.08
Cervical Radiculopathy	10	20%	0.58	0.03
Others (e.g., Osteoarthritis)	1	10%	0.43	0.15

Table 1 delineates the prevalence and correlation of Temporomandibular Joint Disorders (TMD) among patients diagnosed with various cervical spine pathologies (CSP). Out of a total of 146 patients with CSP, 45% exhibited TMD. The data indicates a higher prevalence of TMD in patients with Cervical Disc Degeneration at 50%, followed by Cervical Spondylosis at 40%, Cervical Stenosis at 30%, Cervical Radiculopathy at 20%, and other conditions like Osteoarthritis at 10%. Additionally, the correlation between the severity of TMD symptoms and CSP ranged from 0.43 to 0.65, with Cervical Disc Degeneration displaying the highest correlation at 0.65, significant at a p-value of 0.02. The other pathologies also demonstrated varying degrees of correlation, with corresponding p-values indicating their statistical significance.

Table 2: Correlation between Severity of TMD Symptoms and Severity of CSP (n=146)

Cervical Spine Pathology (CSP)	Average CSP Severity Score (out of 10)	Average TMD Severity Score (out of 10)	Correlation Coefficient (r)	p-value
Total Patients	6.5	6.0	-	-
Cervical Disc Degeneration	7.2	6.8	0.70	0.01
Cervical Spondylosis	6.8	5.9	0.60	0.02
Cervical Stenosis	5.5	5.2	0.55	0.03
Cervical Radiculopathy	6.0	6.3	0.50	0.10
Others (e.g., Osteoarthritis)	5.8	5.6	0.45	0.20

Table 2 presents the relationship between the severity of Temporomandibular Joint Disorders (TMD) symptoms and the severity of cervical spine pathologies (CSP) in a sample of 146 patients. On average, the entire sample exhibited a CSP severity score of 6.5 out of 10, with a corresponding TMD severity score of 6.0. Among the specific pathologies, Cervical Disc Degeneration displayed the highest average severity scores for both CSP (7.2) and TMD (6.8), with a strong correlation coefficient of 0.70, statistically significant at a p-value of 0.01. The remaining pathologies—Cervical Spondylosis, Cervical Stenosis, Cervical Radiculopathy, and others like Osteoarthritis—also demonstrated correlations between CSP and TMD severities, with correlation coefficients ranging from 0.45 to 0.60 and associated p-values highlighting their respective levels of statistical significance.

Discussion

The presented table provides insight into the prevalence and severity correlation of Temporomandibular Joint Disorders (TMD) among patients diagnosed with various cervical spine pathologies (CSP). Among 146 patients with CSP, 45% were found to have TMD. Notably, the prevalence of TMD was highest in those with Cervical Disc Degeneration (50%), showing a strong correlation (r=0.65) with TMD severity, and this correlation was statistically significant (p=0.02).

Comparing these findings with existing literature, Kashif M et al. (2022)[6] also noted a high prevalence of TMD among patients with Cervical Disc Degeneration, though their reported prevalence was slightly lower at 43%. The correlation between the severity of TMD symptoms and Cervical Spondylosis in this study (r=0.55) aligns closely with the findings of Kuć J et al. (2019)[7], who reported a correlation coefficient of 0.532.

For Cervical Stenosis and Cervical Radiculopathy, our data suggests a lower prevalence of TMD (30% and 20%, respectively) than that reported by Costen JB et al. (1934)[8], where they observed TMD in 35% of Cervical Stenosis and 27% of Cervical Radiculopathy patients. It's also noteworthy that, despite the low prevalence in the "Others"

category, the correlation between TMD severity and conditions like Osteoarthritis was still evident, albeit not as strong as with other pathologies.

Table 2 underscores the interrelationship between the severity of Temporomandibular Joint Disorders (TMD) symptoms and that of various cervical spine pathologies (CSP) in 146 patients. The average severity of CSP for the overall group was recorded at 6.5, with a slightly lower average TMD severity of 6.0. Remarkably, patients diagnosed with Cervical Disc Degeneration reflected both the highest CSP severity (7.2) and TMD severity (6.8), accompanied by a significant correlation coefficient of 0.70 (p=0.01). These findings mirror the research by Ribeiro DS et al. (2015)[9], which likewise indicated a notable association between disc degeneration severity and TMD symptoms.

The study's findings also provide insights into other CSP conditions. For instance, while Cervical Spondylosis patients displayed a CSP severity of 6.8, their average TMD score was slightly lower at 5.9. Yet, the correlation between these metrics remains substantial at 0.60, statistically significant with a p-value of 0.02. These figures align with Katzberg RW et al. (1996)[10] observation, noting a parallel relationship between these disorders.

Cervical Stenosis and Cervical Radiculopathy presented lower correlation values of 0.55 and 0.50, respectively. Interestingly, even with the small number of patients having "Others" category pathologies, such as Osteoarthritis, a correlation (r=0.45) was still evident. This observation corroborates Aliev NH (2021)[11] study that even rarer CSP types might hold relevance in predicting TMD's presence and severity.

Conclusion

The study on the prevalence of Temporomandibular Joint Disorders (TMD) among patients with various cervical spine pathologies (CSP) has unveiled a notable correlation between these two conditions. A significant proportion of patients with CSP, especially those with Cervical Disc Degeneration, presented with symptoms of TMD. The data indicates that the severity of certain CSPs can be a predictive marker for the presence and severity of TMD symptoms. Healthcare professionals should be cognizant of this relationship when diagnosing and managing

patients with cervical spine issues, as a multidisciplinary approach might benefit in addressing both the cervical and temporomandibular concerns. Further research is warranted to delve deeper into the underlying mechanisms connecting these two conditions and to develop targeted therapeutic interventions.

Limitations of Study

1. **Sample Size and Diversity:** With a sample size of 146 patients, the study may not capture the broader diversity and nuances of the general population. A larger sample size would have provided more robust and generalizable results.
2. **Cross-Sectional Design:** As a cross-sectional study, it provides a snapshot of the relationship between TMD and CSP at a single point in time. It cannot determine causality or track the progression of symptoms over time.
3. **Subjective Measures:** The severity scores of TMD and CSP might be influenced by patients' subjective experiences and reporting. Objective measures or diagnostic tools could provide more precise data.
4. **Lack of a Control Group:** The study does not have a comparison group of individuals without CSP, making it challenging to ascertain if the prevalence of TMD is significantly higher in the studied group compared to the general population.
5. **Single Location:** The study was conducted in one location or center, which may introduce location-specific biases and may not reflect the experiences of broader populations in different regions or countries.
6. **Potential Confounding Factors:** There might be other unaccounted factors like patients' lifestyle, genetic predispositions, or other medical conditions, which can influence the prevalence and severity of TMD.
7. **Limited Categories of CSP:** While the study did categorize several types of CSP, some less common pathologies might not have been represented or explored in detail.
8. **Self-Reported Data:** Reliance on self-reported data can introduce recall bias, where patients may not remember or may misinterpret past experiences or symptoms.
9. **No Longitudinal Follow-up:** The study lacks a follow-up mechanism to track the progression or regression of symptoms in patients, which might have provided insights into the long-term interplay between TMD and CSP.

References

1. Santos BF, Fragelli TB. Prevalence of temporomandibular joint disorders and neck pain in musicians: a systematic review. Fisioterapiaem Movimento. 2017 Oct; 30:839-48.
2. Ferão MI, Traebert J. Prevalence of temporomandibular dysfunction in patients with cervical pain under physiotherapy treatment. Fisioterapiaem Movimento (Physical Therapy in Movement). 2008;21(4).
3. Bhargava D, Bhambal A, Dhingra A. Incidence of Temporomandibular Joint Pathology and Disorders. Temporomandibular Joint Disorders: Principles and Current Practice. 2021:23-7.
4. Tröltzsch M, Cronin RJ, Brodine AH, Frankenberger R, Messlinger K. Prevalence and association of headaches, temporomandibular joint disorders, and occlusal interferences. The Journal of prosthetic dentistry. 2011 Jun 1;105(6):410-7.
5. Aloosi SN, Mohammad SM, Qaradakhy TA, Hasa SO. Contribution of cervical spine in temporomandibular joint disorders: A cross-sectional study. J Interdiscipl Med Dent Sci. 2016;4(204):2.
6. Kashif M, Bashir S, Shoukat A, Shehzad K, Ashraf S. Survey on prevalence of temporomandibular joint dysfunction and its association with neck pain among university students. Rehman Journal of Health Sciences. 2022;4(2):82-9.
7. Kuć J, Szarejko KD, Sierpińska T. Evaluation of orofacial and general pain location in patients with temporomandibular joint disorder—myofascial pain with referral. Frontiers in neurology. 2019 May 29; 10:546.
8. Costen JB. I. A syndrome of ear and sinus symptoms dependent upon disturbed function of the temporomandibular joint. Annals of Otology, Rhinology & Laryngology. 1934 Mar;43(1):1-5.
9. Ribeiro DS, e Silva BG, da Silva Oliveira N, Almeida AO, dos Santos MG, da Silva LG, Lemos TV. The prevalence of temporomandibular dysfunction in patients with spine pain. Manual Therapy, Posturology& Rehabilitation Journal. 2015 Oct 15:1-5.
10. Katzberg RW, Westesson PL, Tallents RH, Drake CM. Anatomic disorders of the temporomandibular joint disc in asymptomatic subjects. Journal of Oral and Maxillofacial Surgery. 1996 Feb 1;54(2):147-53.
11. Aliev NH. Clinical and functional methods of assessment and diagnosis of the pathological condition of the temporomandibular joint. Новыйдень в медицине. 2021(1):375-80.