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Shoulder Girdle Pain and Disability in Patients with Temporomandibular Joint Disorder: A Cross-Sectional Study

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DECLARATIONS

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ABSTRACT

Background: Temporomandibular disorder is characterized by discomfort and dysfunctional alterations involving the masticatory muscles and temporomandibular joints; these are thought to be the most frequent reasons for ongoing discomfort in the orofacial area. **Objective:** To find the prevalence of the temporomandibular disorder and its association with shoulder girdle pain and disability. **Methodology:** This cross-sectional study was carried out within six months after the approval of the synopsis and the data was collected from the University of Lahore Teaching Hospital, Evercare Hospital, and Valencia Health Clinic in Lahore. The participants were asked to fill out the questionnaires after receiving their written consent. The study included participants aged 25 to 60 years. People who had recent injury on their face or upper limbs, or had surgery on their face, jaw, mandible, or upper limb, or had been diagnosed with RA, SEL, fibromyalgia, or other systemic joint diseases. The temporomandibular disorder Short Screen Checklist and Shoulder Pain and Disability Index were used for data collection. The data was collected after completing the questionnaires to assess the prevalence of shoulder pain and disability and their association with this disorder. Using SPSS version 25.0, the data was analyzed, and for the quantitative variables, means and standard deviations were computed, while the qualitative variables were shown as frequencies and percentages. **Results:** The prevalence of shoulder pain and disability among temporomandibular disorders in the study sample was 28.4%. Out of 95, the majority of the participants i.e. 37(38.9%) were from the age group 50 to 60 years. About 42(44.2%) participants were males and 53 (55.8%) were females. The mean pain scale score of SPADI was 15.43±16.75 and the mean disability scale score of SPADI was 23.08±21.26. There was a significant association between the Short Screen Checklist and the Pain scale of SPADI i.e. shoulder pain ($p<0.001$) and the Short Screen Checklist and the disability scale of SPADI i.e. shoulder disability ($p<0.001$). **Conclusion:** This study found a moderate prevalence of shoulder pain and disability in patients with temporomandibular joint disorders. There was a significant association between temporomandibular disorder and shoulder pain and disability.

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INTRODUCTION

An articular disc connects the temporal bone to the mandible at the temporomandibular joint, a complicated synovial joint that hinge-slides. Most frequently, temporomandibular joint dysfunctions involve multiple disease entities and a range of symptoms and conditions. Pain originating from a muscle or joint is one of the initial signs of the illness. Temporomandibular disorders (TMD) are characterized by painful and/or dysfunctional changes involving the masticatory muscles and temporomandibular joints (TMJ), and collectively, they are considered the most common cause of chronic pain in the oro-facial region.[1] The National Institute of Dental and Craniofacial Research (NIDCR) estimates that 5–12% of Americans currently are experiencing or have previously had TMD-related issues.[2]

Generalized pain in the joints and muscles, as well as physical manifestations of other persistent pain illnesses and multiple medical conditions, is frequently linked to TMJ discomfort.[3] Scattered pain problems were previously thought to be caused by psychological or imaginary elements, and the medical evaluation of people with numerous pain concerns was underreported. It is currently thought that alterations in both the central and peripheral nerve systems can be linked to several chronic pain issues. Genetic factors, such as changes in the genes for the beta-2 adrenoceptor and catechol-O-methyltransferase, may cause hypersensitivity to synthetic pain in at least half of the cases that were looked at. Individuals may be more prone to chronic pain throughout their lives due to these same variables.[4]

Myofascial TMD pain is the main cause of orofacial pain (42%), followed by arthralgia (30%) and disc displacement (30%).[5] Myofascial pain is pain that comes from a muscle and is affected by jaw movement, function, or parafunction. This pain repeats itself when the masticatory muscles are stimulated, going beyond the point of palpation but still inside the muscle when the myofascial examination protocol is used.[6] The TMDs can affect 5-10% of the population. Some studies have even reported higher incidences, up to twenty-five percent and thirty-three percent to forty percent in the overall population. Less than five percent of patients will seek medical treatment.[7] The TMD occurrence among patients with orthodontics ranges from twenty-one to seventy-three percent, according to a comprehensive review by Lai et al.[8] A World Health Organization (WHO) research study states that TMD is the third stomatological problem to be classified as a general disease, following periodontal conditions and tooth decay.[9] Genetic, ecological (smoking), psychological (anxiety and depression), interpersonal, and mental factors are the causes of TMJ joint disease. Other pain diseases (such as persistent migraines), fatigue, autoimmune conditions (such as lupus erythematosus, rheumatoid arthritis, and Sjogren syndrome), psychological disorders, and breathing problems during sleep are consistently linked.[10] According to particular research, indicators of TMJ joint disease are linked to panic, depressive disorders, anxiety, as well as dental parafunctions, including aggression, in teenagers.

A further investigation revealed that an elevated stress degree and quality of sleep constituted two significant indicators of risk for TMJ. In the nation of Sweden, TMJ problems are additionally linked to socioeconomic background (e.g., college degree, greater educational degree, and cautious biting) and a poorer general state of health. Another study has linked higher levels of discomfort to feminine gender, separate or divorced relationships, and lesser educational attainment. It has also been reported that racial differences exist because Caucasians experience face and mandible discomfort more frequently and at a younger age than African Americans.[11] This study is important because it looks at how the shoulder girdle and TMJ are linked. These are two important body parts that can affect each other because they share musculoskeletal pathways.

Examining how common shoulder girdle problems are in TMJ patients may reveal coexisting diseases, resulting in more thorough and efficient treatment plans. The therapy of shoulder girdle dysfunction may improve functional outcomes and pain management. Persistent pain linked to TMJ issues frequently reduces quality of life. Furthermore, this topic fills a significant research gap by addressing the little-known connection between TMJ disorders and shoulder girdle problems. This will lay the groundwork for future studies and encourage a patient-centered approach to care.

METHODOLOGY

This cross-sectional study was carried out within

six months after the approval of the synopsis and the data was collected from the University of Lahore Teaching Hospital, Evercare Hospital, and Valencia Health Clinic in Lahore. The participants were asked to fill out the questionnaires after receiving their written consent. The study included participants aged 25 to 60 years. People who had recent injury on their face or upper limbs, or had surgery on their face, jaw, mandible, or upper limb, or had been diagnosed with RA, SEL, fibromyalgia, or other systemic joint diseases.

The TMD Short Screen Checklist and Shoulder Pain and Disability Index were used for data collection. The survey included a total of 20 closed-ended questions, including the participants' demographic information, such as age and gender. The data was collected after completing the questionnaires to assess the prevalence of shoulder pain and disability and their association with this disorder. Using SPSS version 25.0, the data was analyzed, and for the quantitative variables, means and standard deviations were computed, while the qualitative variables were shown as frequencies and percentages. Out of 95 participants, 37 (38.9%) were aged 50–60 years. 28 (29.5%) participants were from the age group 40-49 years, 19 (20%) respondents were from the age group 30-39 years, and 11 (11.6%) respondents were from the age group 25-29 years. A convenient sampling technique was used and the size of the sample was calculated bin $\frac{(Z2 \times P \times (1-P))}{e2}$ Where, Z = confidence level = 0.95 × 100 = 95% CI, P = expected true proportion = 0.197, e = desired precision (half desired CI width) = 0.08 n = sample size = 95

RESULTS

Out of 95 participants, 37 (38.9%) were aged 50–60 years. 28 (29.5%) participants were from the age group 40-49 years, 19 (20%) participants were from the age group 30-39 years, and 11 (11.6%) participants were from the age group 25-29 years. 42 (44.2%) of the participants were males, and 53 (55.8%) were females. TMD Short Screen Checklist score was as follows: 68 (71.6%) of the participants scored less than 3, indicating negative for TMD, and 27 (28.4%) scored equal to or greater than 3, indicating positive for TMD. In terms of SPADI, the average pain scale score of SPADI was 15.43 ± 16.75 with a minimum score of 0 and a maximum score of 48, whereas the average disability scale score of SPADI was 23.08 ± 21.26 with a minimum score of 0 and the maximum score of 71. Crosstabs and chi-square analysis were used to find the link between the TMD Short Screen Checklist and the Pain Scale if SPADI and the link between the TMD Short Screen Checklist and the Disability Scale if SPADI. The TMD Short Screen Checklist and the pain scale of SPADI, i.e., shoulder pain, were statistically significantly associated with each other ($p < 0.001$). Out of 95, 17 (17.9%) participants with a negative TMD screening score had no pain, 51 (53.7%) participants with a negative TMD screening score had mild pain, 9 (9.5%) participants with a positive TMD screening score had moderate pain, and 18 (18.9%) participants with a positive TMD screening score had severe pain on the SPADI. The TMD Short Screen Checklist and the disability scale of SPADI, i.e., shoulder pain, were statistically significantly associated with each other ($p < 0.001$). 18 (18.9%) participants with a negative TMD screening score had no disability; 50 (52.6%) participants with a negative TMD screening score had a mild disability; 19 (20%) participants with a positive TMD screening score had a moderate disability; and 8 (8.4%) participants with a positive TMD screening score had a severe disability on the SPADI.

DISCUSSION

TMDs and other chronic pain syndromes are painful conditions that have the potential to sensitize the central nervous system, leading to widespread allodynia and hyperalgesia. Most people with TMD only have mild, short-term symptoms. However, 10% of patients have severe changes because of chronic pain, which can affect not only the oro-facial area but also other parts of the body and cause back or neck pain in addition to temporomandibular joint pain.[12] The shoulder girdle may also indirectly impact the temporomandibular joint. Adolescents with postural issues frequently exhibit the forward head position and the extended shoulder. This deformity is more common in girls, and neck and shoulder pain is caused by breast growth during adolescence and hiding them from peers (dysmorphia). Stress, worry, and depression may worsen symptoms of the TMJ joint.[13] A thorough examination of the respondents' posture and TMJ revealed that 83.3% had high shoulder placement and that persons with shoulder asymmetry had a

Table 1: Cross-tabulation and Chi-Square analysis between TMD Short Screen Checklist and Pain Scale of SPADI

		TMD Short Screen Checklist		Total	p-value
		< 3 – negative	>3 - Positive		
Shoulder Pain and Disability Index – Pain Scale	No Pain (0)	17	0	17	0.001
		17.9%	0.0%	17.9%	
	Mild Pain (1–24)	51	0	51	
		53.7%	0.0%	53.7%	
	Moderate Pain (25–39)	0	9	9	
		0.0%	9.5%	9.5%	
	Severe Pain (40–50)	0	18	18	
		0.0%	18.9%	18.9%	
Total		68	27	95	

Table 2: Cross-tabulation between TMD Short Screen Checklist and Disability Scale of SPADI

		TMD Short Screen Checklist		Total	p-value
		< 3 - negative	>3 - Positive		
Shoulder Pain and Disability Index – Disability Scale	No Disability (0)	18	0	18	0.001
		18.9%	0.0%	18.9%	
	Mild Disability (1–29)	50	0	50	
		52.6%	0.0%	52.6%	
	Moderate Disability (30–59)	0	19	19	
		0.0%	20.0%	20.0%	
	Severe Disability (60–80)	0	8	8	
		0.0%	8.4%	8.4%	
Total		68	27	95	

6% chance of developing TMD.[14] The current study's 28.4% TMD prevalence rate among physicians is similar to previously published figures. According to a recent study, 21.1% of the 739 musicians reported having pain in the jaw, cheek, or temple area.[15] Others discovered that 23% and 28.9% of the orchestra players had TMD pain.[17] Central sensitization could be the cause of the comorbidity between TMD pain and other pain problems. The impacts of stressors on the central nervous system have been linked, according to new research. Endocrine problems, sympathetic upregulation, and central sensitization can all be caused by long-term nociception and stress.[16] The hypothalamic-pituitary-adrenal (HPA) axis is the primary neuroendocrine element of the stress response. Researchers have linked the lessening of hormones and neurotransmitters in the HPA axis to many illnesses and disorders, including fibromyalgia and depression. Myogenous TMD has also been associated with these conditions.[17] Eighty-three percent of people with TMD also had other body symptoms, and 62%, mostly women, said they had pain and tightness in other joints. This was found in a different study that looked at

189,977 people who had both TMD and other pain complaints.[18] In our investigation, we found that the majority (16.5%) of TMD patients were female.

The results of another study revealed that the number of participants with TMD increased as the frequency of painful joints associated with TMJ increased, a trend that was not observed in the control group, despite the control group also having a significant percentage of discomfort-ridden joints (64%).[19] Ten years ago, a study revealed no discernible variations in shoulder angles across the study groups. An increased angle in the shoulder indicates protraction of the scapula, while a decreased angle indicates retraction. Because of the way the jaw or skull is positioned about the shoulder girdle, it can affect the TMJ through several muscles, such as the hyoid, platysma, sternocleidomastoid, and trapezius. But there was no connection between TMDs and the shoulder's angle. However, the current study found a significant association between TMDs and shoulder pain and disability.[20]

Compared to men, women reported more cases of TMD and various types of pain in more locations, according to a study. More than that, the LCA analysis showed that women had a much higher risk of having TMD as a part of multiple pain syndrome compared to men.[21] Women were also less likely to be in the "no pain cluster" category. On the other hand, membership in the local pain TMD cluster was not affected by gender. These results suggest that the universality of pain conditions may mediate the gender disparities reported in TMD.[22] As mentioned above, the current study's findings endorsed those of other research indicating a link between TMD and widespread pain, particularly in women. This study also had some limitations. The limited sample size may reduce the generality of the findings. We relied on self-reported measures of pain and disability, which may introduce bias or variability in the data.

CONCLUSION

In conclusion, this study found that a moderate number of people with temporomandibular joint disorders also had shoulder pain and disability. The results show that there is a strong link between temporomandibular joint dysfunction and shoulder pain and disability, most likely because of shared biomechanical and neuromuscular pathways. This shows how important it is to use a multidisciplinary approach when diagnosing and treating temporomandibular joint disorders, including strategies to improve shoulder girdle dysfunction for better patient outcomes.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.
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