



Association of Systemic Co-Morbidities in Patients with Temporomandibular Disorder - A Retrospective Clinical Analysis.

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KEYWORDS

Temporomandibular joint disorder, Comorbidity, Systemic disease, Diabetes Mellitus, Hypertension, Myocardial infarction.

ABSTRACT:

Introduction: Systemic comorbidities frequently coexist with temporomandibular disorder (TMD), which affects how the condition is presented clinically and treated. TMD is commonly accompanied by conditions like migraine, and anxiety disorders, which can complicate diagnosis and affect treatment results.

Materials and methods: This retrospective clinical study consists of 157 subjects with TMD out of which 74 were males and 83 were females. Patients with all kinds of TMD were included in the study. The statistical analysis was performed using Statistical Package for Social Sciences, version 17.

Results: A high percentage of TMD occurrence was observed in Type II Diabetes Mellitus (27.4%) and a low percentage was observed in Hypotension (1.2%). The p-value showed a statistical significance for Type II Diabetes Mellitus ($p=0.018$), Hypothyroidism ($p=0.006$), and Myocardial infarction ($p=0.006$).

Conclusions: Among the population involved in the study, Type II Diabetes Mellitus followed by Hypertension has been found prevalent in patients with TMD. Also, the statistical significance tells us that, Diabetes Mellitus, hypothyroidism, and myocardial infarction do affect the lifestyle of the patient who already has TMD.

Introduction

A sound chewing system is vital for an individual's physical and emotional well-being. It necessitates its role in respiration, mastication, deglutition, and speaking by acting as the hinge that joins the jawbone to the skull. Smooth articulation is made possible by the complex connections between muscles, ligaments, and bones in this joint. [1] The temporomandibular joint (TMJ), masticatory muscles, and the teeth together form the stomatognathic system. The apparatus is controlled and synchronized by the central nervous system. However, it can be affected by a number of conditions, which can lead to pain, discomfort, and restricted mobility. [2]

A common disorder that affects the jaw joint and surrounding muscles, temporomandibular joint dysfunction (TMJ) is characterized by pain and limited movement in the jaw region. The term "temporomandibular joint disorders" (TMD) refers to a group of diseases that include inflammation and joint dislocation and are frequently linked to illnesses like arthritis, stress, and teeth grinding. [3] It is the second most common cause of musculoskeletal pain. [4] TMD can develop from multiple causes, including injury to the

jaw, habitual clenching or grinding of teeth, dislocation of the disc, emotional stress, and systemic joint disorders such as osteoarthritis or rheumatoid arthritis. [5] This illness is characterized by a variety of symptoms that can seriously lower one's quality of life. The temporomandibular joint facilitates vital processes such as speaking, eating, and swallowing by acting as a link between the jawbone and the skull. Dysfunction in this joint can cause a number of painful symptoms, such as headaches, earaches, shoulder and neck pain, trouble opening or closing the mouth completely, and jaw pain. [6] Medication, physical therapy, and in extreme circumstances, surgery is some of the treatment options available. To reduce symptoms and enhance quality of life, it is essential to properly understand and treat TMJ issues. Owing to its complex nature, TMJ can be difficult to diagnose and treat, frequently necessitating a multidisciplinary team effort including pain management specialists, dental surgeons, physical therapists, and occasionally psychologists. It is essential to comprehend the intricacies of TMJ dysfunction to effectively manage and alleviate symptoms. [7] The illnesses affecting the temporomandibular joint (TMJ) are becoming more widely acknowledged for their possible link to systemic



comorbidities. These correlations imply common pathophysiological mechanisms and risk factors. [8]

The systemic comorbidities assessed in the study were: Type II Diabetes Miletus, Hypertension, Hypotension, Asthma, Hyperthyroidism, Hypothyroidism, Sinusitis, Myocardial infarction, Cholesterol, Epilepsy, Depression, and Autoimmune diseases. The study is conducted to overcome the research gap in the previous works of literature that have been done in patients with TMD and systemic illness. The goal of the study was to clarify the processes behind these coexisting illnesses and how they may affect each other's severity. We hypothesized that there was a substantial correlation between TMD and systemic disorders and that this correlation would be stronger in the event of TMD and systemic comorbidity, leading to a greater disease burden.

Materials and methods

The study consists of 157 samples out of which 74 were males and 83 were females. The study was conducted in the Department of Oral Medicine and Radiology of Saveetha Dental College and Hospital, ethical approval number IHEC/SDC/OMED-2204/23/104. Patients with all kinds of TMD were included in the study. Informed consent was obtained from the participants included in the study. The statistical analysis was performed using Statistical Package for Social Sciences, version 17.

The systemic comorbidities assessed in the present study are Type II Diabetes Miletus, Hypertension, Hypotension, Asthma, Hyperthyroidism, Hypothyroidism, Sinusitis, Myocardial infarction, Cholesterol, Epilepsy, Depression, and Autoimmune diseases.

Results

The distribution of the samples according to different age groups in males and females is represented in Figure 1. The distribution of systemic comorbidities among males and females and their statistical significance are discussed in Table 1. The distribution of the systemic diseases among the study population is discussed in Figure 2.

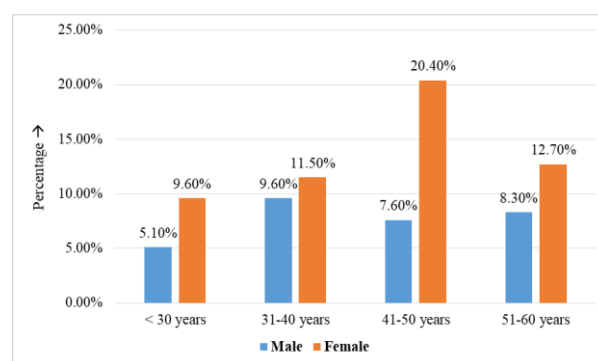


Figure 1: Distribution of the study population based on age and gender.

The percentage of males involved in the study for the age group less than 30 years is 5.1%, 31-40 years is 9.6%, 41-50 years is 7.6%, and 51-60 years is 8.3%. The percentage of females involved in the study for the age group less than 30 years is 9.6%, 31-40 years is 11.5%, 41-50 years is 20.4%, and 51-60 years is 12.7%. The highest percentage of samples for males is observed in the age group, 31-40 years, and the lowest percentage is observed in the age group less than 30 years. The highest percentage of samples for females is observed in the age group, 41-50 years, and the lowest percentage is observed in the age group less than 30 years.

Co-morbidities	Male n (%)	Female n (%)	Total n (%)	p-value
Type II Diabetes Mellitus	24 (15.2)	19 (12.1)	43 (27.4)	0.018*
Hypertension	12 (7.6)	16 (10.2)	28 (17.8)	0.804
Hypotension	2 (1.2)	1 (0.6)	3 (1.2)	0.357
Asthma	5 (3.2)	11 (7)	16 (10.2)	0.414
Hyperthyroidism	0	2 (1.3)	2 (1.3)	0.238
Hypothyroidism	4 (2.5)	21 (13.4)	25 (15.9)	0.006*
Sinusitis	2 (1.3)	10 (6.4)	12 (7.6)	0.077
Myocardial Infarction	5 (3.2)	0	5 (3.2)	0.006*



Cholesterol	3 (1.9)	4 (2.5)	7 (4.5)	0.908
Epilepsy	3 (1.9)	2 (1.3)	5 (3.2)	0.374
Depression	3 (1.8)	3 (1.9)	6 (3.8)	0.639
Autoimmune disease	1 (0.6)	4 (2.5)	5 (3.2)	0.237

Table 1: Distribution of study population based on comorbidities.

The percentage of comorbidities existing in the study population among males and females is discussed in Table 1. Type II Diabetes Mellitus obtained a total score of 27.4%, Hypertension obtained 17.8%, Hypotension obtained 1.2%, Asthma obtained 10.2%, Hyperthyroidism obtained 1.3%, Hypothyroidism obtained 15.9%, Sinusitis obtained 7.6%, Myocardial infarction obtained 3.2%, Cholesterol obtained 4.5%,

Epilepsy obtained 3.2%, Depression obtained 3.8%, and Autoimmune diseases obtained 3.2%. A high percentage of occurrence was observed in Type II Diabetes Mellitus and a low percentage was observed in Hypotension. The p-value showed a statistical significance for Type II Diabetes Mellitus ($p=0.018$), Hypothyroidism ($p=0.006$), and Myocardial infarction ($p=0.006$).

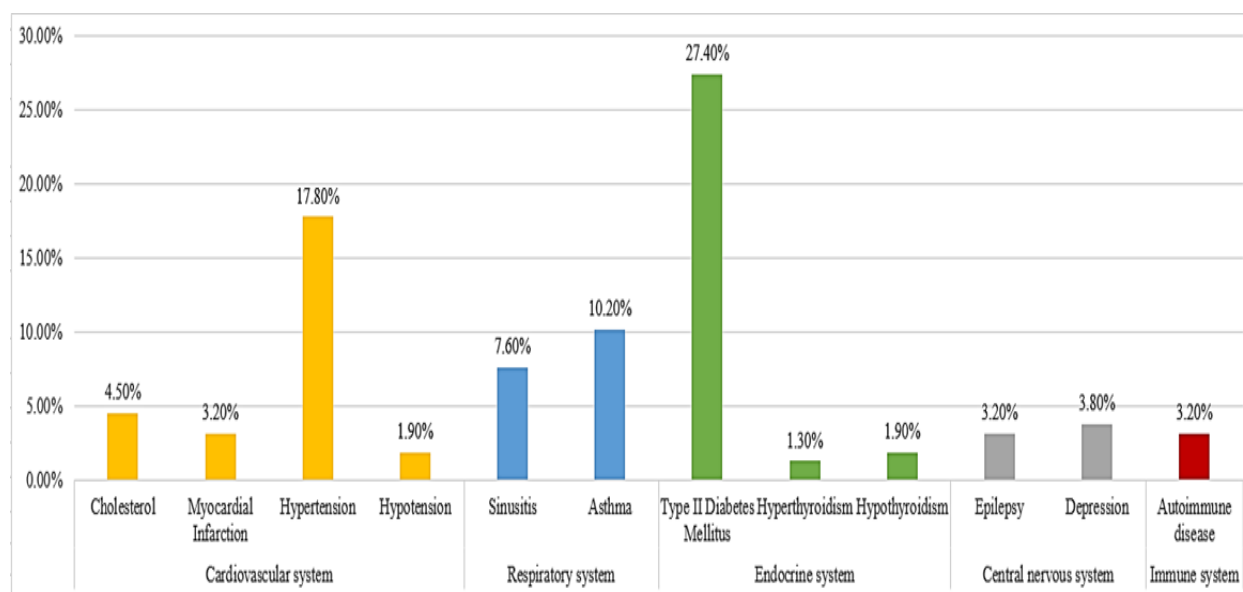


Figure 2: Distribution of systemic diseases among the study population.

Among the study population, Cholesterol was 4.5%, Myocardial infarction was 3.2%, Hypertension was 17.8%, Hypotension was 1.9%, Sinusitis was 7.6%, Asthma showed 10.2%, Diabetes Mellitus showed 27.4%, Hyperthyroidism showed 1.3%, Hypothyroidism showed 1.9%, Epilepsy showed 3.2%, Depression showed 3.8%, and Autoimmune disease showed 3.2%. A high percentage of occurrence was observed in Type II Diabetes Mellitus (27.4%) and a low percentage was observed in Hyperthyroidism (1.3%).

Discussion:

The term "temporomandibular disorders" (TMD) refers to a group of illnesses that impact the masticatory muscles, surrounding structures, and the temporomandibular joint (TMJ). TMD, which is

characterized by pain, dysfunction, and restrictions on jaw movement, can have a serious negative influence on one's quality of life, general health, and dental health.^[9] They are often characterized by soreness in the joint and muscles, along with clicking or creaking sounds during mouth opening or closing.^[10] TMD is a complex etiology that frequently combines biological, psychological, and environmental components. TMD development is influenced by several factors, including trauma to the jaw joint, muscular imbalance or hyperactivity, malocclusion, and parafunctional habits such as clenching or grinding teeth. Stress, worry, and sadness are examples of psychological variables that can intensify symptoms and alter how pain is perceived.^[11]



TMJ clicking or popping sounds, jaw pain or tenderness, trouble biting or chewing, and jaw locking or deviation during movement are all common signs of TMD. Significant discomfort and functional impairment may result from these symptoms, which can range in severity and be intermittent or persistent. A thorough clinical evaluation, which includes the patient's medical history, physical examination, and occasionally imaging tests like MRIs or X-rays, is usually required to diagnose TMD.^[12] The goals of treatment strategies are to reduce discomfort, enhance jaw function, and deal with underlying causes. Conservative treatment options include occlusal splints, physical therapy, stress management strategies, lifestyle changes, and drugs for muscle relaxation and pain alleviation. Surgical intervention or other invasive techniques might be considered in more severe situations.^[13] Reducing symptoms, averting complications, and improving patient outcomes all depend on early diagnosis and effective treatment of TMD. To adequately treat the complicated nature of this problem, a multidisciplinary strategy combining dentists, physiotherapists, pain specialists, and other healthcare experts is frequently required.^[14] Out of all the systemic comorbidities studied, Type II Diabetes Mellitus was found to be prevalent among the study population with a high rate of occurrence, which was followed by Hypertension and Hypothyroidism. A low rate of occurrence was observed in samples who presented with Hypotension followed by Hyperthyroidism.

Through a number of different pathways, type II diabetes mellitus may have an impact on abnormalities of the temporomandibular joint (TMJ). TMJ structural alterations and pain sensitivities may be caused by chronic hyperglycemia, inflammation, and microvascular problems related to type II diabetes. TMJ dysfunction may worsen due to lifestyle variables such as obesity and eating choices that are common in type II diabetes. Comprehending this correlation is essential for customized treatment plans and all-encompassing therapy for patients with type II diabetes and TMJ issues.^[15]

The correlation between diseases of the TMJ and hypertension implies common pathophysiological pathways. The vascular effects of hypertension may impair TMJ tissue perfusion, which would lead to discomfort and degenerative changes. Further, TMJ dysfunction may be made worse by stress and muscle tension associated with hypertension. The correlation between hypertension and TMJ issues highlights the significance of interdisciplinary care, which addresses systemic and oral health variables for the best possible outcomes.^[16]

Compared to hypertension, the relationship between hypotension and diseases of the TMJ is still less well-studied. On the other hand, hypotension may have a substantial effect on TMJ health. Hypotension-induced reduced blood flow to the TMJ may exacerbate tissue ischemia and poor repair, which could worsen TMJ dysfunction and pain. Hypotension-related symptoms like lightheadedness or dizziness may have an impact on jaw mobility and TMJ-related muscle function. To better understand the precise mechanisms underlying this connection and provide individualized treatment plans for those who have both hypotension and TMJ issues, more research is required.^[17]

Because the underlying mechanisms of asthma and diseases of the TMJ are similar, there is growing interest in this association. Respiratory problems associated with asthma may cause tenseness in the muscles and changes in breathing patterns, which can affect TMJ function. Asthma drugs such as corticosteroids may aggravate joint instability and muscular weakness. On the other hand, because TMJ dysfunction and pain can cause stress or impair sleep, they can make asthma symptoms worse. Knowing this link emphasizes the value of multidisciplinary therapy, treating dental and respiratory health issues for the best possible outcome, for patients with TMJ disorders and asthma.^[18]

The correlation between diseases of the TMJ and hyperthyroidism implies intricate interactions. The metabolic effects of hyperthyroidism may affect the integrity and function of the TMJ, possibly resulting in joint hypermobility or muscular weakness. Hyperthyroidism-related hormonal abnormalities may make TMJ-related symptoms like pain or inflammation worse. On the other hand, TMJ issues may make hyperthyroidism symptoms worse by causing hormonal changes brought on by stress or disrupting sleep. For best results, comprehensive care of people with both hyperthyroidism and TMJ issues should take systemic and oral health variables into account.^[19]

The fascinating association between hypothyroidism and diseases of the TMJ raises the possibility of effects on joint integrity and function. The metabolic effects of hypothyroidism may be a factor in TMJ symptoms such as joint deterioration, stiffness, or weakness in the muscles. Hormonal abnormalities linked to hypothyroidism may also make TMJ inflammation and pain worse. Knowing this connection emphasizes how critical it is to provide patients with TMJ difficulties and hypothyroidism with comprehensive therapy that addresses both systemic and oral health issues for the best possible outcome.^[20]

A possible interaction between the upper respiratory tract and craniofacial tissues is suggested by the correlation



between sinusitis and diseases of the TMJ. Inflammation and congestion associated with sinusitis can affect the function of the TMJ by raising intra-tissue pressure, which may exacerbate pain and discomfort. Face pressure or congestion associated with sinusitis might be mistaken for TMJ pain, making diagnosis more difficult. On the other hand, TMJ problems can make sinusitis symptoms worse by causing muscular strain or changing the way the jaw moves, which can impact nasal airflow. Accurate diagnosis and comprehensive care of patients with TMJ issues and sinusitis require recognition of this relationship, which addresses nasal and dental health factors for best results.^[18]

The relationship between abnormalities of the TMJ and myocardial infarction (MI) underscores possible systemic consequences. Stress brought on by MI might worsen TMJ symptoms by tightening the muscles and clenching the jaw. On the other hand, TMJ problems may increase the risk of MI by altering cardiovascular risk factors like inflammation or hypertension. These illnesses may be caused by common underlying mechanisms such as autonomic dysfunction or systemic inflammation. Understanding this correlation highlights the significance of thorough patient evaluation and care, taking into account factors of dental and cardiovascular health for the best possible outcome.^[21]

The correlation shown between hypercholesterolemia and diseases of the TMJ raises the possibility of systemic effects. High cholesterol can exacerbate tissue injury by impairing blood flow to the TMJ and causing atherosclerosis. Additionally, the anti-inflammatory qualities of cholesterol-lowering drugs like statins may have an impact on TMJ health. On the other hand, dietary modifications or decreased physical activity may be linked to TMJ issues and impact cholesterol levels. This correlation emphasizes the significance of taking systemic issues into account while managing TMJ disorders, with a focus on holistic methods that optimize oral and cardiovascular health.^[22]

The correlation between depression and abnormalities of the temporomandibular joint (TMJ) implies a multifaceted interaction between physiological and psychological elements. TMJ-related symptoms may worsen as a result of depression's negative effects on stress and mood, which heighten pain perception and muscle tension. Depression symptoms and a decreased quality of life may be exacerbated by persistent discomfort and dysfunction linked to TMD. These disorders may also be related via shared neurotransmitter pathways and inflammatory processes. Understanding this connection highlights how crucial it is to provide thorough evaluation and care that addresses problems

with the TMJ as well as mental health to get the best possible results and enhance overall well-being.^[23]

Potential immune-mediated processes are highlighted by the correlation observed between TMJ abnormalities and autoimmune illnesses. TMJ inflammation, joint degeneration, and pain can result from autoimmune diseases such as systemic lupus erythematosus and rheumatoid arthritis. Genetic predispositions and common autoimmune pathways may play a role in the co-occurrence of certain disorders. TMJ health may be impacted by autoimmune disease-management drugs because of their immunomodulatory properties. Immunological dysregulation brought on by stress may make autoimmune symptoms worsened by TMJ issues. Understanding this connection emphasizes the value of multidisciplinary treatment, addressing TMJ- and autoimmune-related conditions for all-encompassing care and better patient results.^[24]

Conclusion:

The study observed that, among the population involved in the study, Type II Diabetes Mellitus followed by Hypertension has been found prevalent. Also, the statistical significance tells us that, Diabetes Mellitus, hypothyroidism, and myocardial infarction do affect the lifestyle of the patient who already has TMD. Further studies on different populations should be required to analyze and compare with that of the studied population.

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