REVIEW

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The Diagnostic Role of Ultrasonography in Rheumatic Diseases Affecting the Temporomandibular Joint

Temporomandibular Eklemi Etkileyen Romatizmal Hastalıklarda Ultrasonografik Görüntülemenin Tanısal Değeri

ABSTRACT

Temporomandibular joint (TMJ) disorders are complex and can significantly impact quality of life due to their role in mastication, speech, and facial expressions. Rheumatic diseases such as rheumatoid arthritis, psoriatic arthritis, and systemic lupus erythematosus frequently involve the TMJ, complicating diagnosis and management. Conventional imaging techniques like magnetic resonance imaging (MRI) and computed tomography (CT), while effective, are limited by high costs, accessibility issues, and, in the case of CT, radiation exposure. Ultrasonography emerges as a cost-effective, non-invasive alternative that provides real-time images of both soft and hard tissue structures, enhancing diagnostic accuracy and patient management. This narrative review synthesizes current knowledge and recent advancements in ultrasonographic imaging, comparing its efficacy with conventional methods and discussing its potential in guiding therapeutic strategies. The ability of ultrasonography to visualize dynamic changes and detect early signs of involvement makes it particularly valuable in managing chronic rheumatic conditions. However, the technique's effectiveness depends on the operator's expertise, and there is a need for standardized protocols. This review also underscores the importance of a multidisciplinary approach in the diagnosis and management of TMJ disorders in rheumatic disease patients and suggests directions for future research and clinical practice improvements. The integration of high-resolution ultrasonography could revolutionize the diagnostic landscape, offering a patient-friendly, accurate, and accessible tool for the early detection and ongoing monitoring of TMJ disorders.

Key Words

Temporomandibular joint, Rheumatic diseases, Ultrasonography

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ÖZ

Temporomandibular eklem (TME) bozuklukları kompleks yapıda olup, çiğneme, konuşma ve yüz ifadelerindeki etkileri nedeniyle yaşam kalitesini önemli ölçüde etkileyebilir. Romatoid artrit, psoriatik artrit ve sistemik lupus eritematozus gibi romatizmal hastalıklar sıklıkla TME'e etki eder, tanı ve hastalık yönetimini karmaşıklaştırır. Manyetik rezonans görüntüleme (MRG) ve bilgisayarlı tomografi (BT) gibi geleneksel görüntüleme teknikleri tercih edilebilir olmakla birlikte, yüksek maliyetler, erişilebilirlik sorunları ve BT açısından radyasyon maruziyeti ile kullanımları sınırlıdır. Ultrasonografi, hem yumuşak hem de sert doku yapıların gerçek zamanlı görüntülerini sağlayarak tanı doğruluğunu ve hasta yönetimini artıran; düşük maliyetli, invaziv olmayan bir alternatif metod olarak ortaya çıkmaktadır. Bu anlatısal derleme, ultrasonografik görüntülemede, güncel literatür bilgilerini ve son gelişmeleri sentezlemekte, geleneksel yöntemlerle etkinliğini karşılaştırmakta ve ultrason görüntülemenin terapötik stratejileri yönlendirmedeki potansiyelini tartışmaktadır. Ultrasonografinin dinamik değişiklikleri gösterme ve hastalık erken belirtilerini tespit etme yeteneği, özellikle kronik romatizmal durumların yönetiminde değerli kılmaktadır. Ancak, görüntülemenin etkinliği operatörün uzmanlığına bağlıdır ve bu açıdan standart protokollerin gerekliliği olmaktadır. Bu derleme, romatizmal hastalığı olan hastalarda TME bozukluklarının tanı ve yönetiminde multidisiplinliner bir yaklaşımın önemini vurgulamakta ve gelecek araştırmalar ve klinik pratiğindeki gelişmeler için yönlendirme sağlamaktadır. Yüksek çözünürlüklü ultrasonografinin entegrasyonu, tanı ve tedavi takibinde oldukça efektif olabilmekte, TME bozukluklarının erken tespiti ve takibi için hasta dostu, güvenilir ve erişilebilir bir görüntüleme yöntemi olarak karşımıza çıkabilmektedir.

Anahtar Kelimeler

Temporomandibular eklem, Romatizmal hastalıklar, Ultrasonografi

INTRODUCTION

The temporomandibular joint (TMJ), a critical articulation in the human body, plays a pivotal role in mastication, speech, and facial expression. Rheumatic diseases, including rheumatoid arthritis, psoriatic arthritis, and systemic lupus erythematosus, are known to affect the TMJ, potentially leading to significant morbidity. Diagnosis of TMJ involvement in these conditions, however, remains challenging due to the joint's complex anatomy and the subtle onset of symptoms (1-3).

Historically, diagnostic modalities such as magnetic resonance imaging (MRI) and computed tomography (CT) have been the cornerstone for assessing TMJ disorders. However, these techniques often involve high costs, limited availability, and, in the case of CT, exposure to radiation. In contrast, ultrasonography has emerged as a rapid, cost-effective, and non-invasive imaging tool that offers real-time visualization of both hard and soft tissue structures of the TMJ (2, 4).

Recent advancements in ultrasonographic technology have enhanced its resolution and diagnostic capabilities, enabling detailed assessments of the TMJ in rheumatic diseases. This narrative review aims to elucidate the current role of ultrasonography in the diagnosis of TMJ disorders associated with rheumatic diseases. We will explore the evidence supporting the utility of ultrasonography, discuss its comparative effectiveness with other imaging modalities, and highlight innovative ultrasonographic techniques that could revolutionize future diagnostic approaches.

In synthesizing current practices with prospective developments, this review seeks to provide a comprehensive perspective on the diagnostic landscape of TMJ involvement in rheumatic conditions, underlining the importance of ultrasonography not only as a diagnostic tool but also as a potential guide for therapeutic strategies.
We present the following article in accordance with the narrative review reporting checklist (5).

Temporomandibular Joint Disorders

TMJ disorders encompass a spectrum of pathologies that impact the functional integrity and comfort of the jaw. These disorders can be systematically classified into two principal categories: those involving anomalies in the condyle-disc complex, and those related to the structural incompatibility of joint surfaces (4). The former category encompasses conditions such as disc displacement, both with and without reduction, and chronic dislocation without reduction. The latter category is characterized by morphological alterations of the disc, condyle, and fossa, as well as the development of adhesions between the disc and the condyle or fossa (6). Additionally, manifestations of subluxation or hypermobility and spontaneous dislocation add to the multifaceted nature of these disorders. Complicating the clinical picture are inflammatory diseases of the TMJ, such as synovitis/capsulitis, retrodiscal

inflammation, and arthritis variants like osteoarthritis and polyarthritis (7). Furthermore, inflammation extending to adjacent structures, including temporalis tendinitis and stylomandibular ligament inflammation, poses additional diagnostic hurdles. A thorough understanding of these distinct classifications is imperative for clinicians to accurately diagnose and effectively manage TMJ disorders, thereby enhancing patient outcomes and quality of life (8).

Diagnostic Criteria For Temporomandibular Joint Disorders

Diagnosing temporomandibular joint disorders (TMD) is crucial for physicians, as conditions that mimic TMD can be misleading. TMJ disorders are often associated with jaw movements and pain in the preauricular, masseter, or temporal regions. Jaw sounds, such as clicking, popping, and crepitus, may occur with TMJ disorders (6). The most common symptoms are facial pain, ear discomfort, headaches, and jaw discomfort or dysfunction (9). Various conditions can sometimes present symptoms similar to TMD. These conditions include dental caries and periapical lesions, oral lesions such as herpetic lesions and oral ulcerations. Additionally, muscle excessive use resulting from activities like bruxism, clenching, and and muscle spasms may resemble TMD. Other potential causes include trauma, dislocation, maxillary sinusitis, salivary gland disorders, trigeminal neuralgia, postherpetic neuralgia, giant cell arteritis, orofacial pain syndrome, and pain associated with malignancy (10, 11).

The new categorization structure for TMD was published in 2013 by the International Research Diagnostic Criteria for Temporomandibular Dysfunction Consortium Network (12). The tool offers a questionnaire to assess the pain history, together with validated clinical examination criteria, to aid in the diagnosis of the most prevalent TMDs. Furthermore, it offers Axis II questions that can be used to evaluate psychosocial and behavioral variables that might influence the development and continuation of the patient's TMD.

Chronic TMD are defined by pain lasting longer than 3 months. Physical examination findings supporting the diagnosis include abnormal mandibular movement, reduced range of motion, sensitivity of chewing muscles, pain with dynamic loading, signs of bruxism, or neck and shoulder muscle sensitivity (13). Clicking, crepitus, or locking of the TMJ may accompany joint dysfunction, with anterior disc displacement being associated with a single click during mouth opening and closed lock as disc displacement progresses. Sensitivity of the masseter, temporalis and surrounding neck muscles can differentiate myalgia, myofascial trigger points, or referred pain syndromes. Deviation of the mandible towards the affected side during mouth opening can indicate anterior disc displacement (10, 14).

Treatment of Temporomandibular Joint Disorders

Only around 5% to 10% of patients with TMJ disorders require treatment for TMD (13). Spontaneous resolution of symptoms occurs in approximately 40% of patients. In a long-term follow-up study, pain relief was achieved in 50% to 90% of patients after conservative treatment (15). A multidisciplinary approach proves successful in managing TMD. The initial treatment goals should focus on alleviating pain and functional impairment.

Conservative treatment is a primary strategy to regulate TMD. This treatment incorporates patient instruction, cognitive awareness training, and meditation to increase self-awareness and remove hazardous habits like teeth clenching. Muscular training plays an essential role in TMD treatment, particularly for patients with serious discomfort or asymmetries. Exercises attempt to reestablish muscular stability and may involve stretching, relaxation, and isometric motions. Improving mandibular mobility is vital, and exercises, like practicing opening the mouth in front of a mirror with slight resistance, can assist strengthening muscles.

Occlusal splint therapy, specifically the maxillary stabilizing appliance, is considered the standard way for managing TMD and is routinely utilized in clinical practice. Furthermore, alternative forms of oral splints, including the advanced mandibular repositioning splint that facilitates mandibular advancement and the anterior tooth splint, have been employed. However, a comprehensive objective comparison of their therapeutic efficacy using polysomnography or electromyography has not been conducted. Manual therapy stimulates trigger points and can entail mobilization or the muscular energy technique to promote jaw movement (16).

Additional physiotherapeutic treatments, like biofeedback, transcutaneous electrical nerve stimulation, and ultrasound therapy, attempt to alleviate discomfort and enhance muscle function (17). Heat and cold therapies can also provide comfort, while kinesio taping supports the stability of the TMJ (18).

In pharmacotherapy, medicines such as nonsteroidal anti-inflammatory drugs (NSAIDs), pain relievers, muscle relaxants, and antidepressants can be used to treat TMD-related discomfort. For more severe patients, botulinum toxin type A injections may decrease pain and tension in the muscles (19). Acupuncture, an ancient Chinese treatment, and dry-needling are rising in acceptance in treatment and can be beneficial when combined with dietary changes (20).

Surgical methods are reserved for advanced TMD patients. Arthrocentesis involves lavage of the TMJ and can reduce pain and enhance movement. Intra-articular injections of platelet-rich plasma are investigated for persistent TMD

discomfort. For extreme cases where the TMJ is significantly injured, replacing with implants is a potential solution. This is especially crucial in arthritis, ankylosis, trauma, and complications after prior joint replacements (21).

In an online TMJ registry, over 1500 individuals utilize various treatment options, with anti-inflammatory agents (73%), over-the-counter pain relievers (56%), antidepressants (50%), opioids (48%), anxiolytics (41%), and muscle relaxants (40%) being employed. Surgical interventions were conducted for patients who did not experience symptom improvement after attempting conservative treatments (1). Among the many therapy modalities employed, thermal therapies emerged as the most efficacious intervention for the majority of persons affected (91%). These therapies encompassed the application of hot/cold packs to the jaw region or the utilization of hot baths.
The choice of treatment relies on the severity of the problem and specific patient variables. Conservative treatments, such as instruction for patients and rehabilitative exercises, are often the first stages of regulating TMD. More invasive procedures, such as surgery or implant replacement, remain reserved for occasions in which conservative approaches are unsuccessful (21).

Impact of Rheumatological Diseases on the Temporomandibular Joint

Patients with rheumatoid arthritis have been found to experience involvement and dysfunction in the TMJ. In RA, the temporomandibular joint can lead to pain, swelling, movement impairment, and crepitus. Furthermore, in advanced stages, malocclusion and anterior open bite closure can occur (22). In osteoarthritic patients, TMJ involvement occurs during the intermediate phase. Skeletal changes such as anterior open bite, reduced overbite, and increased overjet are observed. In ankylosing spondylitis, TMJ involvement seems to lead to significant restrictions in jaw movement and severe symptoms emerge until there is a considerable restriction in jaw movement (6, 23).
Fibromyalgia presents a subtle onset of TMJ involvement. Patients with fibromyalgia have exhibited high rates of teeth clenching and grinding throughout the day, along with pronounced myofascial pain upon palpation and during jaw movements (24). Pseudogout and psoriatic arthritis are both inflammatory conditions that can potentially affect the TMJ, causing discomfort and functional impairment. Pseudogout, also known as calcium pyrophosphate deposition disease, is characterized by the accumulation of calcium crystals in the joints, leading to inflammation and pain. When these crystals deposit in the TMJ, they can contribute to symptoms such as jaw pain, stiffness, and difficulty in mouth movement. Psoriatic arthritis, a form of arthritis associated with the skin condition psoriasis, may also impact the TMJ. In psoriatic arthritis, the immune system attacks the joints, causing inflammation and potentially affecting various joints throughout the body, including the TMJ. Individuals with psoriatic arthritis may experience jaw pain, swelling, and difficulty chewing. In juvenile arthritis, acute inflammation leads to synovitis, effusion, and bone marrow edema, while long-standing disease can cause erosion, flattening, and protrusion of the condyle and fossa, resulting in enlargement of the fossa and condyle and damage to the subcondral bone. Erosions involve the condyle surface, including the lateral direction and joint eminence. Subsequently, growth disturbances can occur, leading to asymmetry, micrognathia, retrognathia, malocclusion, reduced maximal incisal opening, along with jaw pain, dysfunction, psychological disorders, and decreased quality of life (25, 26). Various studies in the literature exist regarding the use of ultrasound in juvenile idiopathic arthritis (JIA) patients (2, 27). Tonni et al. recently published a protocol for the evaluation of the temporomandibular joint (TMJ) using ultrasound in JIA patients. According to this study, ultrasound proves to be a reliable tool for detecting differences in lateral periarticular space widths between JIA patients and healthy individuals. It may be utilized as a follow-up tool in assessing TMJ involvement in subjects affected by JIA (28).

Treatment of Rheumatic Diseases Affecting the Temporomandibular Joint

The management of rheumatic diseases affecting the TMJ requires a multidisciplinary approach that encompasses pharmacologic interventions, physical therapy, and, in certain cases, surgical correction. The overarching goal of treatment is to alleviate pain, restore function, and minimize the progression of joint damage.
Initial pharmacological interventions typically involve non-steroidal anti-inflammatory drugs (NSAIDs) to reduce pain and inflammation. In more severe cases, corticosteroid injections may be utilized for their potent anti-inflammatory effects. Disease-modifying antirheumatic drugs (DMARDs), such as methotrexate or sulfasalazine, and biologic agents targeting specific inflammatory pathways, like tumour necrosis factor inhibitors, can be prescribed to control systemic disease activity and prevent further joint degradation (6, 29).

Physical therapy plays a crucial role in maintaining joint mobility and muscle function. Therapeutic exercises tailored to the TMJ can enhance range of motion and strengthen supporting muscles. Additionally, patients may benefit from modalities such as transcutaneous electrical nerve stimulation for pain relief and thermal therapy to reduce muscle tension.

Occlusal splints or bite guards may be recommended to reduce joint stress, minimize muscle strain, and correct malocclusion associated with TMJ disorders. These appliances can also serve as diagnostic tools to discern the contribution of occlusal factors to TMJ symptoms (6).
Surgical options are considered when conservative measures fail to provide relief or when there is significant structural damage to the joint. Arthrocentesis and arthroscopy offer minimally invasive means to remove inflammatory byproducts and perform intra-articular treatments.

For advanced joint destruction, open joint surgeries or even total joint replacement may be necessary (30).

Emerging therapies are under investigation, including the use of platelet-rich plasma and stem cell injections, which hold the promise of promoting tissue repair and regeneration. Advances in biologic therapies that more precisely target inflammatory mediators specific to TMJ involvement are also a significant area of research.
The management of rheumatic diseases affecting the TMJ should be individualized, taking into account the disease severity, patient comorbidities, and the impact on quality of life. Regular monitoring and collaborative care coordination among rheumatologists, oral and maxillofacial specialists, physical therapists, and primary care providers are paramount for the effective treatment of these complex disorders.

Ultrasonography in Rheumatic Diseases of the Temporomandibular Joint

The implementation of ultrasonography in the diagnostic algorithm for rheumatic diseases involving the TMJ represents a significant advancement in the field of rheumatology and dentomaxillofacial imaging. The versatility and non-invasive nature of ultrasonography, along with its ability to provide real-time dynamic images, make it an invaluable tool for clinicians (28). Ultrasonography offers a detailed visualization of both the soft tissue and osseous structures of the TMJ. Its ability to detect synovial proliferation, joint effusion, and cartilage abnormalities facilitates early diagnosis and intervention. The real-time imaging capability of ultrasound allows for precise guidance of interventional procedures such as intra-articular corticosteroid injections. This precision enhances therapeutic outcomes and minimizes complications associated with blind injections. As a non-radiating modality, ultrasonography can be used repeatedly for monitoring disease progression and response to therapy. This is particularly important in the management of chronic rheumatic conditions where long-term surveillance is necessary. Ultrasonography enables the assessment of the functional status of the TMJ by visualizing the joint in motion (6). This dynamic study can identify abnormalities in the joint's kinematics that might contribute to symptoms and functional impairment. Ultrasonography stands out for its accessibility, absence of radiation exposure, and cost-effectiveness compared to MRI and CT. While MRI remains the gold standard for soft tissue imaging, ultrasonography is an excellent initial imaging modality, especially in settings where MRI is not readily available (4, 31). Although, the accuracy of ultrasonographic assessments relies heavily on the operator's expertise, and there is a learning curve associated with its use for TMJ imaging. Additionally, ultrasonography has limitations in visualizing the internal anatomy of the TMJ due to its superficial imaging capacity and may be less effective in patients with high mandibular bone density (32, 33).

The potential for combining ultrasonography with other imaging modalities and the advent of high-resolution transducers may overcome current limitations. Furthermore, the development of three-dimensional ultrasonography promises to enhance the evaluation of the complex anatomy and pathology of the TMJ.

DISCUSSION

The TMJ disorder is the second most prevalent chronic pain condition following back pain, presenting complex symptoms such as jaw pain and restricted mouth movement, which impact chewing, speaking, and facial expressions (13). The disorder may originate from mechanical issues or be linked to inflammatory diseases like RA or JIA. TMJ disorders can remain undetected in their early stages, often leading to late diagnosis and the risk of permanent joint damage. While MRI is the standard diagnostic tool in the literature, its high costs, long duration, and limited availability, particularly in pediatric cases, pose challenges. Recently, ultrasonography has been recognized as a viable, less expensive, and non-invasive alternative for early detection, differential diagnosis, and ongoing monitoring of TMJ disorders (34).

Ultrasonography has proven to be an excellent technique for the rapid, efficient, and accurate evaluation of soft tissue involvement in rheumatological diseases and is increasingly being utilized by oral and maxillofacial radiologists for examining rheumatic conditions affecting the TMJ. It serves as a powerful tool for investigating areas around and within joints, tendons, muscles, and nerves, as well as other relevant areas such as the skin, salivary glands, parathyroids, and both small and large vessels (35). While ultrasonography is not a new technology, its clinical adoption in the context of rheumatology and oral and maxillofacial radiology has been limited due to the scarcity of sonographic units and specialists trained to perform these evaluations. However, in recent years, both rheumatologists and oral and maxillofacial radiologists have increasingly incorporated ultrasonography into their clinical practices. Despite its significant potential in rheumatologic and maxillofacial clinical activities, many specialists remain unfamiliar with its application, often approaching it with hesitancy (32, 36).

Ultrasonography is regarded as an extension of the clinical examination, providing access to anatomical structures that are otherwise difficult to evaluate. Ultrasonography allows for anatomical diagnosis in various clinical scenarios, such as TMJ disorders, facilitating direct visualization of musculoskeletal fluid collections and synovial hypertrophy. This capability is especially advantageous compared to conventional imaging methods. Ultrasonography can also assist in precise needle placement for therapeutic interventions in the TMJ, simplifying procedures such as arthrocentesis and intra-articular therapy, while minimizing the risk of complications such as tendon necrosis from corticosteroid injections. Additionally, ultrasonography

proves valuable in both the preoperative assessment and postoperative follow-up of patients undergoing surgical procedures for rheumatic and maxillofacial conditions (37, 38).

A review of historical and contemporary research reveals that ultrasonography has been employed in the diagnosis, management, and follow-up of rheumatic diseases affecting the TMJ. Although challenges remain regarding operator experience and standardization in the use of ultrasonography, the success of high-resolution ultrasonography in imaging the temporomandibular joint is supported by numerous studies in the literature.

Talmaceanu et al. indicated that TMJ disc displacements may be identified using the imaging method known as high-resolution ultrasound (HRUS). The study included 50 patients with TMD, and HRUS was compared with MRI for the diagnosis of disc displacement and degenerative changes. HRUS was indicated as a suitable imaging modality for the diagnosis of disc displacement (39).

According to the findings of Hysa et al., a thorough analysis of 56 publications revealed that a significant proportion (77%) of the research examined TMDs in individuals with RA. The prevalence of TMDs in this population varied considerably, ranging from 8% to 70%. Several risk factors have been identified for the development of TMD. These include being of the female sex, younger age, testing positive for anti-citrullinated protein antibodies (ACPA), having higher disease activity, experiencing cervical spine involvement, and having comorbidities related to cardiovascular and neuropsychiatric conditions. Additionally, cervical spine involvement has also been shown to be a risk factor for TMD development. Individuals who have radiographic spine involvement, skin psoriasis, and a positive HLADRB101 status have a higher prevalence of spondylarthritides (SpA). Systemic sclerosis (SSc), systemic lupus erythematosus (SLE), primary Sjogren's disease, and idiopathic inflammatory myopathies have been identified as the medical illnesses that exhibit the highest level of evidence concerning TMDs (40).

A systematic review revealed that ultrasonography accuracy varied from 54% to 100% for disc displacement, 72% to 95% for joint effusion, and 56% to 93% for osteoarthrosis. However, since ultrasonography operators vary, there has to be more standardization and usual norms. It is still a viable alternative imaging method for tracking TMJ issues, particularly intrarticular effusion (33).

Aliko et al. stated that TMJ symptoms and clinical signs were significantly more prevalent in Albanian patients with rheumatoid arthritis, SLE, and SS compared to healthy controls. The study involved 124 hospitalized patients, revealing that 67% of patients reported TMJ symptoms. These findings highlight the importance of including TMJ examinations in the rheumatology clinical routine and emphasize the need for effective pain management strategies (7).

Talmacenau et al. demonstrated that HRUS is highly sensitive, specific, and accurate in diagnosing disc displacement of the TMJ. In their study involving 74 patients (148 TMJs), ultrasonography was compared with MRI showing a sensitivity of 93.1%, specificity of 87.88%, and accuracy of 90.32% for detecting disc displacements. These findings suggest that ultrasound is a valuable imaging technique for assessing TMJ disc positions, although its effectiveness is heavily dependent on the examiner's expertise and the quality of the equipment used (39).
Dong et al. conducted a comprehensive meta-analysis to determine the diagnostic accuracy of HRUS for anterior disc displacement (ADD) of the TMJ, using data from 11 studies including 1,096 subjects. The analysis, which applied the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) criteria and used a hierarchical summary receiver operating characteristic model (HSROC), found HR-US to be particularly effective. For ADD with reduction (ADDWR), HRUS showed a weighted sensitivity of 83% and specificity of 85%. For ADD without reduction (ADDWoR), sensitivity was 72% and specificity 90%. The study highlights HRUS's utility in rapid ADD diagnosis, suggesting its greater effectiveness for ADDWoR and emphasizing the need for further high-quality research to validate these findings (41).

Manfredini et al. reported that ultrasonography comparisons of the TMJ in patients with RA, PsA, and TMD revealed similar prevalence of disc displacement and condylar changes across the groups. Effusion was notably more common in TMD patients. The study highlighted ultrasonography's accuracy in detecting disc displacement and effusion but noted its limitations in identifying condylar abnormalities (42).

Dervis et al. assessed the prevalence of TMD in patients with psoriasis both with and without PA, and compared these findings to a healthy control group. Using Helkimo's Anamnestic and Dysfunction indices, they found that psoriasis patients without PA did not exhibit TMD signs and symptoms significantly more than the healthy subjects. However, a significant increase in TMD symptoms was noted in patients with PA, particularly muscle tenderness, joint sounds, and jaw stiffness in the morning, suggesting that TMD in PA patients is primarily caused by joint involvement affecting the masticatory system (43).

According to recent research, the interplay between rheumatologic disease duration, activity levels, and inflammatory biomarkers influences the manifestation and severity of TMD in affected patients. Prolonged disease duration in conditions such as RA and psoriatic arthritis PsA has been correlated with increased risk of developing TMD, suggesting that chronic inflammation might lead to more pronounced degenerative changes in the TMJ (44, 45).

Additionally, high disease activity, characterized by elevated levels of systemic inflammatory markers such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), is closely associated with the severity of TMJ pain and dysfunction (46). These biomarkers not only reflect the inflammatory status but also help predict TMJ involvement.

CONCLUSION

Ultrasonography has emerged as a pivotal tool in the diagnostic evaluation of rheumatic diseases impacting the temporomandibular joint TMJ. This narrative review has underscored its role in enhancing diagnostic accuracy, offering a non-invasive, cost-effective, and patient-friendly approach. Despite its demonstrated utility, the heterogeneity in application highlights an urgent need for standardized ultrasonographic protocols.

Current literature robustly supports the use of ultrasonography in conditions such as rheumatoid arthritis and psoriatic arthritis. However, its role in the broader rheumatological context remains less defined, necessitating further research. Crucially, the intersectionality of rheumatic TMD necessitates a multidisciplinary approach. Oral and maxillofacial specialists and rheumatologists should collaborate closely to optimize patient outcomes.

The potential of ultrasonography in rheumatic TMJ disorders is considerable, yet its full realization is contingent upon concerted efforts in research, clinical practice standardization, and interdisciplinary collaboration. Moving forward, it is imperative to integrate these advancements into routine clinical workflows, facilitating early intervention and individualized management strategies for rheumatic TMJ pathologies.

Author Contributions

S, Z.M. and G. Y., S. contributed to conception, methodology, data extraction and drafting of manuscript. G. Y., S. also contributed to review and final approval of manuscript.

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Conflicts of interest

No conflicts of interest declared.

Informed Consent Statement:

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