



Considerations in the Diagnosis and Management of Temporomandibular Disorders in Older Adults: A Narrative Review

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This narrative review discusses the changes in the masticatory system due to the physiologic aging process in humans and how these changes should be considered when diagnosing and managing temporomandibular disorders (TMDs) in older adults. Age-related changes in the masticatory system, specifically the temporomandibular joint (TMJ) and masticatory muscles, are associated with an increased prevalence of degenerative TMJ osteoarthritis in older adults, changes in muscle function and often affect masticatory function. Considering older adults' physiologic changes and comorbidities and their quality of life, diagnosing and managing TMDs in older adults needs a more comprehensive approach than in younger adults. Managing TMDs in older adults can improve orofacial function, such as mastication, leading to improved physical function and quality of life by reducing the risk of frailty.

Keywords: Aged; Frailty; Mastication; Temporomandibular disorders

INTRODUCTION

Temporomandibular disorders (TMDs) are musculoskeletal disorders that encompass abnormalities of the temporomandibular joint (TMJ), masticatory muscles, and other related tissues or structures involved in the opening and closing movements of the jaw and the function of mastication [1]. The age distribution of TMD patients is generally described as an inverted U-shaped curve, with a low prevalence in children and the elderly and a prevalence known to be prevalent in the age group of approximately 35 to 45 years [2].

In recent years, there has been a notable increase in life expectancy worldwide, largely attributed to improved living standards and medical technology advancements [3]. Consequently, the proportion of older people is increasing. Notably, Korea is one of the countries in the world experiencing a rapid aging trend. It is expected to enter a

super-aged society in 2025, with people aged 65 and over accounting for 20% of the total population [4]. This trend toward an aging population is expected to influence changes in the age distribution of TMDs.

TMDs can be divided into three groups based on the anatomical structures affected: muscular, disc, and joint [5]. Most studies have reported that symptoms of TMDs tend to be self-limiting [6-8] and that the prevalence of TMD may be lower in older patients [9]. However, the prevalence of each group shows that although the clinical symptoms of TMJ degeneration are minimal [10-12], the prevalence of degenerative TMJ osteoarthritis (OA) tends to increase with age [13-16]. In contrast, it is evident that TMJ disc disease gradually decreases with age [10,13,14], but disc displacement is commonly associated with TMJ degeneration in older adults [17]. Moreover, the incidence of muscular TMD decreases with age [2,18]; however, muscular TMD in older adults is characterized differently than in younger people,

with less muscle tenderness but more muscle weakness and reduced function, leading to muscle overload [18].

The research diagnostic criteria for TMD and diagnostic criteria for TMD (DC/TMD), which were developed for the systematic diagnosis of TMDs, have been validated in adults [1]. Recently, for children and adolescents with growth potential, the DC/TMD criteria were deemed to require adjustments [19] and separate diagnostic criteria were published [20,21]. Although older adults are typically considered equivalent to adulthood, it is crucial to recognize that they may exhibit a reduction in their physiological reserve, impairing their capacity to withstand challenging circumstances such as surgical procedures, illness, and injury [22]. In addition, even among older adults, individual physiological reserves may be more widely and heterogeneously distributed due to chronic diseases and medication use [23,24].

TMDs are regarded as the leading cause of chronic pain from non-dental causes in the orofacial area [25]. In addition, the prevalence of chronic orofacial pain, like other chronic pain conditions, appears to increase with age, possibly due to the physiologic aging of the oral structures and masticatory system and the cumulative effects of oral and systemic diseases [18]. Furthermore, the restriction of masticatory function resulting from TMDs can have a detrimental impact on nutritional status, ultimately leading to a decline in quality of life and an increased risk of frailty [26,27]. However, most research on masticatory function or frailty focuses on disease or aging of the oral structures and rarely addresses changes in the masticatory system or its association with TMDs [22,24].

This narrative review discusses changes in the masticatory system caused by the physiologic aging process in humans and its association with masticatory function and frailty. It also explores how these changes should be considered when diagnosing and managing TMDs in older patients.

AGING PROCESSES THAT AFFECT TEMPOROMANDIBULAR JOINT AND MASTICATORY MUSCLES

In the musculoskeletal system, the physiological aging process reduces bone mineralization and structural strength, and joints stiffen due to a decrease in the water content of

the tissues in the joint cavity [22,28]. Like other joints in the body, the TMJ undergoes degenerative changes as part of the physiologic aging process [9,13,14,29]. Interestingly, it is notable that the TMJ is less affected by aging than other joints because, unlike other joints whose articular surfaces are covered with hyaline cartilage, the TMJ is composed of fibrocartilage [2]. This fibrocartilaginous structure may be more resistant to age-related changes. However, pathologic deterioration occurs when the remodeling capacity of TMJ fibrocartilage decreases with age, reaching a point where the functional demands placed on the joint exceed its remodeling capacity [30,31]. There may also be a correlation between decreased levels of endogenous hormones and TMJ degeneration [9]. In particular, estrogen plays a role in up-regulating type II collagen in the fibrocartilage of the mandibular condyle [32]. The decrease in estrogen levels after menopause can decrease the mechanical strength and integrity of TMJ fibrocartilage, which can increase the risk of TMJ degeneration in postmenopausal females [32-34].

Research on the effects of aging on masticatory muscles remains limited. Animal studies have reported that aging can lead to muscle fiber degeneration [35] and loss of muscle function, possibly contributing to pain [36]. Human studies have also reported decreased cross-sectional area of the masseter and medial pterygoid muscles in older adults [37], but conflicting results exist [38]. These inconsistent results are due to the fact that in addition to the masticatory muscles, local and systemic factors such as oral disease and dental conditions affect masticatory function [39].

CHANGES IN MASTICATORY FUNCTION IN OLDER ADULTS

As age increases, the likelihood of developing multimorbidity of chronic diseases also increases [24], leading to polypharmacy, which can result in adverse drug reactions, decreased quality of life, and functional limitations [40]. Functional limitations in the orofacial region can interfere with masticatory function, leading to an unbalanced diet closely related to sarcopenia [3,7,41]. Impaired mastication in the elderly is not only associated with frailty but also with cognitive decline and increased mortality [42,43]. A review of studies on masticatory function and sarcopenia

found that among people diagnosed with sarcopenia, there was a statistically significant association between subjective ratings of difficulty eating and objective ratings of masticatory function [3]. Additionally, masseter muscle volume measurement using computed tomography was statistically significantly associated with whole-body nutritional status, suggesting that masseter muscle could be used as a nutritional biomarker for assessing sarcopenia [44]. These findings underscore the importance of maintaining masticatory function in the aging population.

CONSIDERATIONS FOR DIAGNOSING AND MANAGING TEMPOROMANDIBULAR DISORDERS IN THE ELDERLY

Diagnosing TMDs requires a comprehensive approach that includes a detailed history of the patient's chief complaint, a thorough medical and dental history, a structured clinical examination, a radiological examination, and a psychological evaluation [45]. The diagnostic process for TMDs is based on an established DC/TMD [1]. During the history-taking process, it is necessary to evaluate the patient's overall physical condition, including medical history, to assess physiological and functional abnormalities associated with aging. As mentioned in the aging process, degenerative TMJ OA is age-related among TMDs, but its clinical presentation is mild or relatively limited [9]. Therefore, evaluating the patient's chief complaint and its association with degenerative TMJ OA in older adults is necessary. To diagnose degenerative TMJ OA, patients report crepitus of the TMJ during mandibular movement, which the clinician confirms during a clinical examination [2]. Radiographic assessment of the TMJ is essential for detecting TMJ OA, and cone beam computed tomography is currently the preferred imaging modality for diagnosing TMJ OA [46].

Psychological factors like depression and anxiety showed consistent statistically significant associations with TMD [2,47,48]. Therefore, a psychological examination should also be performed in addition to the physical examination to diagnose TMD effectively. The DC/TMD test consists of two axes and corresponding assessment tools: Axis I for physical diagnosis and Axis II for assessing psychological status and quality of life [1].

Given the multifactorial etiology of TMDs, treatment should take the form of symptom management and focus on improving quality of life through relieving pain and restoring function [1,45]. Reversible conservative therapy is recommended as first-line management, and combination therapies are known to be more effective in controlling TMD symptoms than any single modality [49]. Physical therapy, exercise therapy, medication, and occlusal appliance therapy are the main components of conservative management performed by clinicians, and these professional therapies should be complemented by education in a home care program that empowers patients to manage their symptoms [2,45,49]. In particular, degenerative TMJ OA may benefit from TMJ arthrocentesis, a minimally invasive intervention in addition to the above conservative procedures [9,50].

Pharmacotherapy involves the use of acetaminophen to control pain and non-steroidal anti-inflammatory drugs if acetaminophen does not improve symptoms [2]. Pharmacotherapy involves the use of acetaminophen to control pain and non-steroidal anti-inflammatory drugs if acetaminophen does not improve symptoms [22,51]. However, elderly patients are at increased risk for drug interactions and side effects such as gastrointestinal bleeding or renal dysfunction. They are also more likely to be exposed to polypharmacy due to multiple comorbidities or systemic diseases [24]. Polypharmacy is defined as the simultaneous use of five or more different medications [52], a global trend with an increasingly aging population, and in South Korea, the prevalence of polypharmacy among older adults is approximately 46.6% [53,54]. Polypharmacy can lead to adverse consequences, such as drug interactions and side effects, due to physiological changes associated with the aging process, such as decreased kidney and liver detoxification capacity and changes in the body's muscle-to-fat ratio [24]. In addition, polypharmacy and multiple comorbidities are closely linked and can lead to poor clinical outcomes and reduced quality of life, especially in older adults [53]. Therefore, a multidisciplinary and holistic approach to pain management is needed, including adjusting medication dosages and implementing non-drug therapies to address the challenges posed by polypharmacy [18].

However, even after these treatments, it is not uncommon

for patients to complain of pain or reduced chewing function. Complaints of dysfunction during eating are often accompanied by jaw pain, fatigue, and joint noises during chewing, which may be consistent with physical examination findings of decreased masticatory muscle activity, strength, or endurance [55]. The evaluation of masticatory function mainly involves subjective evaluation of masticatory function, masticatory efficiency, and occlusal force measurement [3]. The most common risk factors for masticatory function in the elderly were tooth loss and musculoskeletal conditions associated with sarcopenia, and to protect against these, functional dentition maintenance and restoration, oral exercise, and food texture must be maintained [56]. Therefore, when treating TMDs in elderly patients, it is essential to first control pain and then consider chewing gum, muscle strengthening, and range-of-motion exercises to restore masticatory function [2,3,56].

CONCLUSION

Globally, the population of older adults continues to grow, and life expectancy is increasing. The aging process affects the TMJ and masticatory muscles, increasing the prevalence of degenerative TMJ OA and altered muscle function, which can subsequently affect masticatory function. Given the physiologic changes and comorbidities of older adults and their associated quality of life, the diagnosis and management of TMDs in older adults requires a more comprehensive approach than that of younger adults. Conservative management of TMDs should focus on pain relief and restoration of masticatory function. Managing TMDs in older adults could improve orofacial function, such as mastication, improve overall quality of life, and reduce the risk of frailty.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

DATA AVAILABILITY STATEMENT

The datasets used in the current study are available from

the corresponding author upon reasonable request.

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