

Altered Quality of Life in Patients with Temporomandibular Joint Disorders: A Review

ABHISHEK DEEPAK SANCHLA¹, SUNITA SHRIVASTAV², RANJIT HARIDAS KAMBLE³, SUMUKH ARVIND NERURKAR⁴, NANDALAL TOSHNIWAL⁵



ABSTRACT

Temporomandibular Joint Disorders (TMD's) represents a cluster of disorders that include the Temporomandibular Joint (TMJ) and also the masticatory apparatus. Any alteration in its function will have an impact on the overall function of the masticatory apparatus and in turn the stomatognathic system. Though the aetiology, symptoms, and treatment modalities for TMD's have been extensively studied, they remain a subject of prime concern for clinicians as it not only affects the form and function but also negatively affects the overall standard of living of the patient. Symptoms of TMD's such as chronic pain, restriction of function, and psychological effects lead to a lower Quality of Life (QoL) for the patient, which is caused due to various factors such as chronic pain, sleep deprivation, and stress or anxiety. Additionally, personal, professional, and social problems directly or indirectly affect the lifestyle of the patient. Some extra-craniofacial symptoms such as otologic and neurologic symptoms tend to worsen the situation. Majority of patients reporting to an orthodontist present with atleast one symptom of TMD that has affected their QoL. Various questionnaires can be used to assess the patient's QoL, and plan the treatment accordingly. Managing TMD's at an early stage while considering these factors and a multidisciplinary approach may help in improving the QoL of the patient.

Keywords: Anxiety disorder, Jaw diseases, Oral health, Sleep disorder, Stress

INTRODUCTION

The joint between the cranium and mandible is called the Temporomandibular Joint (TMJ). It is often also named craniomandibular articulation based on its function [1]. The TMJ is a complex joint in the orofacial region that is directly or indirectly involved in various functions of the stomatognathic system such as mastication, swallowing and speech [2]. Any alteration in its function will have an impact on the overall function of the masticatory apparatus and in turn the stomatognathic system [2]. The disorders involving the TMJ are termed as TMJ Disorders (TMD's).

TMD is a complex entity that includes clinical dysfunction of the TMJ, muscles of mastication, and all the related masticatory apparatus [3]. Several studies [1-3] revolve around this craniomandibular joint which is a prime area of interest for orthodontists, prosthodontists, and also oral surgeons. The reason for this may be the impact of TMD's on the overall Quality of Life (QoL) of patients [4]. The frequency of occurrence of TMD's has been studied to a great extent. The prevalence rate of TMD ranges from 10% to over 50%. The prevalence broadly depends on the parameters used for diagnosis, the type of samples selected, and also the age of the patients [5,6]. It is noted that one out of every 10 patients reporting to an orthodontist has atleast one symptom of TMD's [7]. TMD's causes functional and physical limitations to patients with different levels of morbidity depending on their severity. The aetiological factors and symptoms of TMD's have been extensively discussed in the light of development for assessing the QoL of the patients suffering from it and for the development of criteria that helps in grading the impact of the disorder on the QoL of an individual [8].

Persons with TMD's constantly suffer from physical and psychological problems as a consequence of dysfunction from the disease. These sufferings are caused mainly due to orofacial pain, which is the most frequently occurring symptom of TMD's and also the main reason of concern for the patients [9]. In addition to orofacial pain; stress, anxiety, and depression are also major contributors to the disorder. According to current concepts, physical condition and

systemic factors along with psychological elements are responsible for targeting and worsening TMD's. Normal acceptance is that long-term chronic pain affects the standard with which a patient negatively lives his/her life. The impact of this pain and other dysfunctions caused by TMD's are described scarcely [10]. Patients undergoing TMJ-related evaluation or treatment are often not evaluated for psychological impact on the disorder [6]. Various aspects such as anxiety, depression, and social functioning related to the aetiology or outcome of TMD's are not been extensively discussed in the past, which has been the prime factor for decreased attention to the general health and QoL of patients [10]. The prime objective of the present review is to define the correlation of TMD's with the altered QoL and also review the elements responsible for it followed by the various problems faced by them.

Symptoms of TMD's

The symptomatology of TMD's is vast, ranging from mild to very severe symptoms. This may affect various orofacial, craniofacial, and also extra-craniofacial symptoms. The most frequently occurring symptoms of TMD's are:

Tenderness: This occurs in the TMJ and adjoining orofacial region is one of the most common symptoms encountered by the patients. This is said to be associated with 17% of the patients affected [5].

TMJ sounds: This includes clicking sounds during opening or closing of the mouth and crepitus or grating sounds. These are the most common symptoms of TMD's with around 24% of the patients being affected [5].

Tenderness in the masticatory apparatus: Tenderness is mostly evident with the Lateral Pterygoid Muscle (LPM) because of its proximity and anatomic relation with the TMJ. This symptom is present in about 15% of the population with more predilection in female patients.

Difficulty during mouth opening and lateral deviation: Some patients with TMD's suffer from locking of the jaw during the opening

of the mouth while difficulty during lateral deviation which is another symptom is said to be the least common symptom associated [5].

Psychological effects of TMD's: Psychological factors are considered both a causative factor and also as a symptom of TMD's following a vicious cycle. Various studies have concluded stress to be the prime aetiologic factor causing or aggravating TMD's [11, 12].

Extra-craniofacial symptoms: Apart from these routinely encountered symptoms of TMD's present in the orofacial region, the pain from TMJ is also referred to distant regions such as the neck, back, and shoulders. Neural symptoms and auditory symptoms are also evident in some cases' and are also said to affect the mobility of the cervical spine and in turn, affect the overall posture of the body and also cause cervical spine pain [5]. Headaches and migraine as a symptom of TMD's have also been noted in the literature. So, due to the well-distributed symptomatology of TMD's we can estimate the amount of dysfunction it can cause in an individual's life and hence lead to an altered QoL [13, 14].

The related studies to these symptoms are listed in [Table/Fig-1] [11-24].

well-being of a person in a negative way. This causes disability, dysfunction, and sleep deprivation as an outcome [27,28]. The pain associated is mainly orofacial pain, which is a broad entity that comprises painful conditions involving the oral cavity, masticatory apparatus, and the maxillofacial region. While evaluating TMD's, the pain is to be differentiated from pain originating from periodontal and pulpal tissues though they can be present as a secondary feature in patients [29].

Pain due to TMJ problems is considered one of the index symptoms of non odontogenic origin encountered around the craniofacial area by clinicians. An observation done by Shueb SS et al., noted that pain in patients with TMD's had an Oral Health Impact Profile (OHIP) score similar to trigeminal neuralgia, which is considered to be a very painful condition [26]. Orofacial pain is considered to impact a patient's economic life too through a decreased working capacity of an individual and also by increasing the cost of healthcare [27]. QoL may also be affected to different extents depending upon the nature and intensity of pain encountered by the patient. The pain may be acute sudden onset pain or chronic pain of long duration [27]. In

Symptom	Author/Year	Study	Observation/Outcome
TMJ tenderness			
	Nilsson IM et al., 2005 [15]	Evaluating prevalence of self-reported TMJ pain	The prevalence was low that increased with age and higher among girls as compared to boys
	Cairns BE, 2010 [16]	Assessing pathophysiology of TMJ pain	TMJ pain may be a centrally mediated response caused by heritable genes and analgesics are useful in treating them
	Akdag O et al., 2018 [17]	MRI correlation with patient symptoms in TMD cases	The main symptom in patients with TMJ disk derangements was chronic pain assessed using the Visual Analogue Scale (VAS)
TMJ sounds			
	Rauch A et al., 2020 [18]	Assessment of TMD symptoms	TMJ sounds and headaches were highly prevalent in adolescents
	Iodice G et al., 2019 [19]	Evaluation of TMJ pain/noise/oral habits	TMJ clicking was found to be the most common symptom followed by pain and crepitus
	Ju HM et al., 2019 [20]	To evaluate if crepitus is an early sign of TMJ osteoarthritis	More number of patients with crepitus progressed to osteoarthritis
Tenderness in masticatory apparatus			
	Ferreira CL et al., 2019 [21]	Masticatory pattern and chewing difficulties in young adults with TMD's	TMD effect was evident on jaw mobility and function in the vertical plane showing that groups differed in the perception of opening limitation and mandibular limitation depending on TMD status
	Zhang XH et al., 2021 [22]	Evaluating LPM contraction in patients with TMD's using MRI	This study affirmed that the constriction of the LPM diminished in patients with TMJ-disk displacement
	Soydan Çabuk D et al., 2021 [23]	The evaluation of lateral pterygoid signal intensity changes related to TMJ anterior disc displacement	The internal derangement of the unaffected joint didn't influence the signal intensity of superior and inferior heads of examined LPM in both T1- and T2-weighted images. The inferior head of the muscle was also found affected by disc displacement
Psychological effects of TMD's			
	Yap AU et al., 2021 [12]	Associating TMD symptoms with psychological well-being and distress	Mental well-being decreased the probability of painful and capsular TMD symptoms. Conversely, overall anxiety increased the symptoms
	Yap AU et al., 2022 [11]	Comparing psychological states and Oral Health-Related QoL (OHRQoL) patients with increasing severity of TMDs	Patients with moderate/extreme TMD had essentially more significant levels of mental unsettling influence and less fortunate OHRQoL
Extra-craniofacial symptoms			
	Kim D et al., 2019 [24]	Evaluating the relationship between spinal pain and TMD's in the Korean population	Spinal pain was positively related to TMD's and also increased with the severity of disorders
	Balthazard P et al., 2020 [14]	Associating cervical spine symptoms with TMD's	Cervical spine pain was consistently associated with TMD's as the severity increased
	Aldè M et al., 2022 [13]	Evaluating the prevalence of ear related symptoms in patients with TMD's	By and large, recently seeming otological side effects were accounted for by the most extreme number of subjects with TMD. The fullness of the ear was the most widely recognised side effect, trailed by tinnitus

[Table/Fig-1]: Studies related to TMD symptoms [11-24].

FACTORS AFFECTING QoL

Pain

Pain has been considered to be one of the primary reasons, a person seeks medical attention [25,26]. Pain is said to be the main factor responsible for impaired QoL in patients with TMD's. It is responsible for the impact on the functioning of life and the

comparison with acute pain sufferers, patients with chronic painful conditions have a greater impact on lifestyle, relationships, and mental health. So, the efforts of any clinician treating TMD's should be focused on decreasing the severity and chronicity of the condition and hence decreasing the intensity of pain. Chronic pain may make it compulsive for the patient to skip work at various instances in his/her life or the patient may not be able to perform the tasks at work

with full efficiency because of the disturbing pain which may lead to deduction of pay at work. This will have an impact on the economic condition of the patient and a deteriorated standard of living leading to compromised QoL for them and their families. Deprivation of sleep due to pain also causes decreased concentration during the daily routine and an impaired lifestyle. Patients suffering from pain suffer from mental distress, which further ruins their personal and professional relationships [30]. Many studies have been conducted on the effect of pain on QoL of patients [31-33].

Stress, Depression, and Psychological Factors

Stressful situations are those which threaten to exceed the management option or resources available to a person. Everyone at some point of time in their life is exposed to stressful encounters or situations at a personal, professional, or social level. This supports the concept of stress and anxiety altering the QoL of an individual [34,35].

Various studies in the literature have pointed out an altered QoL of TMD patients due to psychological factors that have been known to be both, symptoms and also one of the main aetiological factors [33-42].

Psychological factors encountered in a patient with TMD's can be divided into behavioural symptoms, including bruxism, emotions like stress, anxiety, and depression, cognitive behaviour, and also elements related to long-term memory [36]. All the above-mentioned factors relating to the psychology-related elements for example stress, anxiety, depression, and distress cause a straight impact on the overall well-being of an individual and hence affect their QoL. The majority of patients reporting to the orthodontist are teenagers or young adults. Stress is an important factor during this period of life that plays a key role in the development of an individual. If a

patient is suffering from TMD's during this phase of life and causing psychological effects, it will hamper the productivity of the individual in their student life or career and lead to a lack of concentration. This will have an ill effect on the patient on a personal as well as professional level and simultaneously alter the social relations. All these factors summed up will lead to impaired QoL [34,35].

Sleep: Sleep disturbances have been reported mainly due to pain, stress, or anxiety which is in turn caused by dysfunction present in TMD's. Patients suffering from acute as well as chronic pain face difficulties falling asleep and also mid-sleep disturbances. Also, those having TMD's experienced poor quality of sleep and reduced duration of sleep in comparison with the majority of the population [30]. Sleep is a very important factor in maintaining a higher virtue of life and is also considered one of the basic needs of the body. Deprivation of sleep is not a direct symptom of TMD's but an indirect effect due to other prevalent symptoms. Sleep quality can be readily assessed using self-administered questionnaires which can then be correlated with the severity of the disorder [43]. Numerous studies in the literature have demonstrated the impact of sleep on QoL of TMD patients [44-47].

Other factors: Apart from being dependent on pain, stress, and sleep quality, the overall QoL also depends on various other factors such as employment, personal relationships, social life, professional relationships, etc. Patients with TMD's have also reported problems managing their personal, professional and social life due to morbidity and also due to the psychological impact of the disorder [48].

[Table/Fig-2] enlists the studies on the effects of pain, sleep, anxiety and other factors on QoL of patients with TMD's [31-33,36-42,44-48].

Factor	Author/Year	Study	Observation/Outcome
Pain			
	Wira WV et al., 2018 [31]	Assessing relationship between chronic pain severity and QoL in TMD patients	The higher seriousness of persistent agony as evaluated by Graded Chronic Pain Scale (GCPS-ID), the lower the QoL in subjects with TMD as surveyed by OHIP-TMD's-ID
	Gumay RA et al., 2017 [32]	Assessing the relationship between TMD's and QoL-related orofacial pain	This study showed that TMD was connected with the QoL of patients with orofacial pain. In any case, there was no connection between TMD and QoL with socio-segment factors (age, orientation, schooling level, and financial level)
	Bayat M et al., 2018 [33]	Studying oral health-related QoL in patients with TMD's	Mental distress adversely impacted the OHRQoL, especially in patients with mental hindrances. In the meantime, age and orientation didn't appear to make a serious difference. Consequently, advancing the QoL of patients with TMD requires an accentuation on the constant torment of the executives and keeping up with great emotional well-being
Stress, anxiety, and depression			
	De Leeuw JR et al., 1994 [36]	Psychosocial aspects of craniomandibular dysfunction, an assessment of clinical and community findings	There existed a correlation between TMD's and psychosocial and psychometric aspects in the life of an individual
	Dyrbye LN et al., 2006 [37]	Systematically reviewing depression, anxiety, and other indicators of psychological distress among US furthermore, Canadian medical students	Professionals in the health sectors had higher levels of stress and anxiety starting as early as their training years which had an impact on their studying ability but also elevated the risk of alternative diseases
	Nash JM and Thebarg RW, 2006 [38]	Assessing mental pressure, its organic cycles, and its effect on headaches	Psychological parameters lead to general health problems such as headaches
	Fong M and Loi NM, 2016 [39]	The mediating role of self-compassion in student psychological health	It is generally evident that the common reaction to a stressful situation is intrusive and avoidant thought processes, including fearful notions and dreams
	Natu VP et al., 2018 [40]	Assessment of TMD side effects and their relationship with QoL, profound states, and rest quality in South-East Asian adolescents	Consequences of the current review recommend a high commonness of TMD in Southeast Asian teenagers/youthful grown-ups. Moreover, the presence and seriousness of TMD are interrelated to QoL, as well as sleep quality. Patients with TMD's additionally had more elevated levels of misery, nervousness, and stress when contrasted with the people who are side effect free
	Machado NAG et al., 2020 [41]	Identifying the relationship between anxiety, QoL, socio-demographic characteristics, and TMD	Patients with TMD have higher nervousness levels and lower QoL, and this can obstruct treatment, building up the requirement for treatments that address different elements of the problem
	De Resende CM et al., 2020 [42]	Association of oral health QoL is with jaw function and depression in patients with myelogenous TMD's	Depression symptoms and jaw function were significantly associated with OHRQoL. Jaw function was the best indicator for it
Sleep			
	McCarberg BH et al., 2008 [44]	The impact of sleep on QoL (an internet survey)	It was reported that 29% of patients with acute pain had trouble falling asleep whereas atleast 38% of the patients suffering from long-standing pain experienced trouble falling asleep

	Benoliel R et al., 2017 [45]	Assessing sleep quality in TMD patients and association with disease characteristics and OHRQoL	TMD patients had poorer sleep quality which was positively associated with TMD disease characteristics, comorbid pain conditions, and poorer OHRQoL
	Herrero Babiloni A et al., 2020 [46]	Evaluating sleep disturbances in patients with TMD's	Rest aggravations were present in TMD patients when estimated emotionally and equitably. It was concluded that dental specialists need to evaluate for conduct and physical rest-related issue (e.g., sluggishness, weariness, state of mind unsteadiness) that might direct them to distinguish rest problems like a sleeping disorder, sleep apnoea, and sleep bruxism
	Lee YH et al., 2022 [47]	Comparing sleep quality in patients with chronic TMD's with those of healthy controls	Patients with chronic TMD's had an impaired sleep cycle and quality. Poorer sleep-in patients with chronic TMD's were associated with several factors which included a higher incidence of daytime sleepiness, older age, female sex, higher Epworth sleepiness scale scores, and also headache
Social/personal problems			
	Durham J et al., 2010 [48]	Evaluating the certainty/uncertainty of the effect of TMD's on the routine lives of patients	The most uncertainty was caused due to missed diagnosis of TMD's, which negatively impacted the patient

[Table/Fig-2]: Factors affecting QoL [31-33,36-42,44-48].

ASSESSMENT OF QoL

To evaluate one's QoL that is impacted by TMD's, assessing the OHRQoL is important. The OHIP was developed by Slade GD and Spencer AJ in the year 1994 and originally consisted of a 49-item checklist. This list was further modified as per requirements for the assessment of the QoL in TMD's patients [49].

The World Health Organisation (WHO) QoL questionnaire can also be used. This contains two questions related to the patient's perception regarding his/her QoL and an additional list of 24 questions divided into four categories relating to physical, psychological, social, and environmental domains which can then be related to the severity of TMD's [50].

Hawthorne G et al., developed another method for assessing the HRQoL known as the, 'Assessment of QoL Instrument', which was developed using psychometric procedures. This consisted of a total of 15 items that embraced both the physical and social aspects of HRQoL [51]. Based on this assessment, it can be decided to what extent the QoL of a patient is affected due to TMD's, following which subsequent measures can be undertaken to improve the patient's lifestyle and provide appropriate treatment.

The Global Mental Health Assessment Tool (GMHAT) and Warwick-Edinburgh scale have also been used most frequently for assessment and grading QoL and the mental health of patients with TMD's [52,53].

Reason for Lower QoL in Victims with TMD's

Victims with TMD's are forced to live a compromised life in the context of QoL when correlated with the normal community. Chronic pain in addition to the loss of energy restricts their daily activities and also it becomes difficult for patients to indulge in various outdoor activities, be it exercise or sports. The tasks that others can perform with ease are difficult for these patients. Restriction of movement may be one of the reasons. Food is considered the fuel of the body which is in linear association with QoL. In TMD patients, there is difficulty in eating food and frequently pain associated with it, which sometimes makes it obligatory for the patient to avoid eating food or having food in less quantity leading to an unhealthy lifestyle [54,55]. Change in voice is also a matter of concern for patients as this

becomes a hindrance in communication. The patient is unable to develop good social, personal, and professional relations due to a lack of communication which may sometimes create a problem at the workplace and may lead to psychological effects due to an unfavourable workplace environment [45].

Apart from all the physical restrictions that lead to poor QoL, the effect on the mental health of an individual is a major problem. Patients with severe TMD's are often termed as handicapped by society which leads to lower self-esteem which results in worst psychological status [43]. Knowing these reasons, a clinician can help the patients overcome these difficulties and give way to a good QoL while their disorder is being treated.

How can the QoL be Improved in Patients Suffering from TMD's?

Managing TMD's and simultaneously improving the QoL should be of chief concern for an orthodontist or any clinician dealing with a case of TMD. Patients with severe TMD's require a customised approach to management [54]. QoL can be improved by decreasing the severity of symptoms like pain and reducing the physical restrictions of patients caused due to decreased mobility. Symptomatic relief from pain early in the treatment can immediately improve the patient's QoL. A reduction in pain will automatically improve the patients' sleep patterns and also improve the quality of sleep. But the reduction in pain, dysfunction, and improvement in sleep quality will only partly have an impact on the psychological effects caused by the disease. A problem-oriented approach is best suited to finding a solution for the psychological impacts [56]. Various studies have shown that specific interventions improve QoL in patients with TMD's [Table/Fig-3] [54,55,57,58].

So, while treating a patient with TMD's, as a clinician, one should look beyond the clinical constraints of the illness followed by planning a treatment taking into consideration the elements that may alter the patient's class of life and aim at improving it.

In present times, more attention has been paid to QoL attributed to oral health and also life's quality related to general health. Disorders

S. No.	Author/Year	Intervention	Outcome
1.	Villa S et al., 2019 [54]	Botulinum Toxin Injection (BTX-A) in temporalis and masseter muscle	QoL in patients with TMD improved on day 1 and 90 days after BTX-A infusions, BTX-A infusion in the masticatory muscles of patients with TMD can be a helpful steady treatment to control and further develop QoL
2.	de Resende CM et al., 2013 [55]	Occlusal splint, physical therapy, and psychological counseling in different groups	These treatments were successful over the long haul, further improving pain condition, sleep quality, and overall QoL
3.	de Salles-Neto FT et al., 2020 [57]	Acupuncture in masticatory muscles	The acupuncture group showed a significant reduction in pain, showed significant improvements in mandibular function and OHRQoL
4.	Moleirinho-Alves PM et al., 2021 [58]	Therapeutic exercise and aerobic exercise programmes	Therapeutic exercises and therapeutic exercises combined with aerobic exercise groups had a significant decrease in pain and OHRQoL at 8 and 12 weeks. These decreases were not seen for the aerobic exercise group

[Table/Fig-3]: Interventions improving QoL in TMD patients [54,55,57,58].

of the TMJ are no less a contributor to altering the QoL of a patient. In past literature, much focus is given to improving this aspect of TMD's. The overall target of a treatment plan for a case of TMD's should be focused to reduce the severity of symptoms and at the same time relieve chronic pain and increasing the mobility of the joint and improving the quality of sleep [55,59,60]. This will in turn pave the way for overall upliftment in the virtue of a life of an individual by improving their life in all aspects of life, including somatic, psychological, communal as well as environmental. More research and discussion are needed on this topic as the QoL is partly an occurrence of personal perception too.

CONCLUSION(S)

Patients with disorders of the TMJ are likely to have a high association with an inferior QoL in comparison to the general population. A multidisciplinary and problem-oriented approach is essential in treating TMD patients and planning a treatment that not only aims at treating the ailment but at the same time aims at improving the patient's quality and standard of life.

REFERENCES

- Okeson JP. Bell's orofacial pains: The clinical management of orofacial pain. Chicago, Ill, USA: Quintessence Publishing Company; 2005 Jan 1.
- de Magalhães Barros V, Seraidarian PI, de Souza Côrtes MI, de Paula LV. The impact of orofacial pain on the quality of life of patients with temporomandibular disorder. *J Orofac Pain*. 2009;23(1):28-37.
- Abdullah BA, Hamed GY. Relationship of TMJ clicking with ear problems and headache. *Int J Res*. 2020;8(5):119-22.
- Reisine ST, Weber J. The effects of temporomandibular joint disorders on patients' quality of life. *Community Dent. Health*. 1989;6(3):257-70.
- de Godoi Gonçalves DA, Dal Fabbro AL, Campos JA, Bigal ME, Speciali JG. Symptoms of temporomandibular disorders in the population: An epidemiological study. *J Orofac Pain*. 2010;24(3):270-78.
- Murphy MK, MacBarb RF, Wong ME, Athanasiou KA. TMJ disorders: A review of etiology, clinical management, and tissue engineering strategies. *Int J Oral Maxillofac Implants*. 2013;28(6):e393.
- Durham J, Steele JG, Wassell RW, Exley C, Meechan JG, Allen PF, et al. Creating a patient-based condition-specific outcome measure for TMD's (TMD'Ss): Oral health impact profile for TMD's (OHIP-TMD'S). *J Oral Rehabil*. 2011;38(12):871-83.
- Chisnoiu AM, Picos AM, Popa S, Chisnoiu PD, Lascu L, Picos A, et al. Factors involved in the etiology of temporomandibular disorders-a literature review. *Clujul Med*. 2015;88(4):473.
- Ahmad M, Schiffman EL. Temporomandibular joint disorders and orofacial pain. *Dent Clin N Am*. 2016;60(1):105-24.
- Tjakkes GH, Reinders JJ, Tenverger EM, Stegenga B. TMD'S pain: The effect on health related quality of life and the influence of pain duration. *Health Qual Life Outcomes*. 2010;8(1):01-08.
- Yap AU, Zhang MJ, Cao Y, Lei J, Fu KY. Comparison of psychological states and oral health-related quality of life of patients with differing severity of temporomandibular disorders. *J Oral Rehabil*. 2022;49(2):177-85.
- Yap AU, Marpaung C, Rahmadini ED. Psychological well-being and distress: Their associations with temporomandibular disorder symptoms and interrelationships. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2021;132(2):163-71.
- Aldè M, Didier HA, Gianni AB, Sessa F, Borromeo G, Didier AH, et al. Prevalence of new-onset otological symptoms in patients with temporomandibular disorders. *OHBM*. 2022;3(2):3.
- Balthazard P, Hasler V, Goldman D, Grondin F. Association of cervical spine signs and symptoms with temporomandibular disorders in adults: A systematic review protocol. *JBI Evid Synth*. 2020;18(6):1334-40.
- Nilsson IM, List T, Drangsholt M. Prevalence of temporomandibular pain and subsequent dental treatment in Swedish adolescents. *J Orofac Pain*. 2005;19(2):144-50.
- Cairns BE. Pathophysiology of TMD pain-basic mechanisms and their implications for pharmacotherapy. *J Oral Rehabil*. 2010;37(6):391-410.
- Akdağ O, Yildiran G, Karamese M. Patient symptoms and magnetic resonance imaging correlation in temporomandibular joint internal derangement. *Turk J Med Sci*. 2018;48(6):1092-95.
- Rauch A, Schierz O, Körner A, Kiess W, Hirsch C. Prevalence of anamnestic symptoms and clinical signs of temporomandibular disorders in adolescents—Results of the epidemiologic LIFE child study. *J Oral Rehabil*. 2020;47(4):425-31.
- Iodice G, Cimino R, Vollaro S, Lobbezoo F, Michelotti A. Prevalence of temporomandibular disorder pain, jaw noises and oral behaviours in an adult Italian population sample. *J Oral Rehabil*. 2019;46(8):691-98.
- Ju HM, Lee SH, Jeon HM, Kim KH, Ahn YW, Ok SM, et al. Could crepitus be an indication for early temporomandibular joint osteoarthritis? *J Oral Med Pain*. 2019;44(2):45-53.
- Ferreira CL, Sforza C, Rusconi FM, Castelo PM, Bommarito S. Masticatory behaviour and chewing difficulties in young adults with temporomandibular disorders. *J Oral Rehabil*. 2019;46(6):533-40.
- Zhang XH, Liu MQ, Hu M, Wang YY, Chen ZY. Evaluation of lateral pterygoid muscle contraction in patients with temporomandibular disorders based on 3D-T2 weighted imaging. *Zhongguo yi xue ke xue Yuan xue bao. Acta Acad Med Sin*. 2021;43(4):579-83.
- Soydan Çabuk D, Etöz M, Akgün İE, Doğan S, Öztürk E, Coşgunarslan A. The evaluation of lateral pterygoid signal intensity changes related to temporomandibular joint anterior disc displacement. *Oral Radiol*. 2021;37(1):74-79.
- Kim D, Ko SG, Lee EK, Jung B. The relationship between spinal pain and temporomandibular joint disorders in Korea: A nationwide propensity score-matched study. *BMC Musculoskelet Disord*. 2019;20(1):01-03.
- Shi Q, Langer G, Cohen J, Cleeland CS. People in pain: How do they seek relief? *J Pain*. 2007;8(8):624-36.
- Shueb SS, Nixdorf DR, John MT, Alonso BF, Durham J. What is the impact of acute and chronic orofacial pain on quality of life? *J Dent*. 2015;43(10):1203-10.
- Schiffman EL, Friction JR, Haley DP, Shapiro BL. The prevalence and treatment needs of subjects with TMD's. *J Am Dent Assoc*. 1990;120(3):295-303.
- Song YL, Yap AU. Impact of pain-related temporomandibular disorders on jaw functional limitation, psychological distress and quality of life in postoperative class III East Asian patients. *Clin Oral Investig*. 2020;24:953-61.
- Conti PC, Pinto-Fiamengui LM, Cunha CO, Conti AC. Orofacial pain and TMD's: The impact on oral health and quality of life. *Braz Oral Res*. 2012;26(SPE1):120-23.
- Fawzy M, Hamed SA. Prevalence of psychological stress, depression and anxiety among medical students in Egypt. *Psychiatry Res*. 2017;255:186-94.
- Wira VV, Pragustine Y, Himawan LS, Ariani N, Tanti I. Relationship between chronic pain severity and quality of life in TMD patients. *J Int Dent Med Res*. 2018;11(1):215-19.
- Gumay RA, Tanti I, Koesmaningati H. The relationship between temporomandibular disorders and quality-of-life-related orofacial pain. *J Int Dent Med Res*. 2017;10:677-82.
- Bayat M, Abbasi AJ, Noorbala AA, Mohebbi SZ, Moharrami M, Yekaninejad MS. Oral health-related quality of life in patients with temporomandibular disorders: A case-control study considering psychological aspects. *Int J Dent Hyg*. 2018;16(1):165-70.
- Sójka A, Stelcer B, Roy M, Mojs E, Pryliński M. Is there a relationship between psychological factors and TMD's? *Brain Behav*. 2019;9(9):e01360.
- Ribeiro IJ, Pereira R, Freire IV, de Oliveira BG, Casotti CA, Boery EN. Stress and quality of life among university students: A systematic literature review. *Health Prof Educ*. 2018;4(2):70-77.
- De Leeuw JR, Steenks MH, Ros WJ, Bosman F, Winnubst JA, Scholte AM. Psychosocial aspects of craniomandibular dysfunction. An assessment of clinical and community findings. *J Oral Rehabil*. 1994;21(2):127-43.
- Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among US and Canadian medical students. *Acad Med*. 2006;81(4):354-73.
- Nash JM, Theborge RW. Understanding psychological stress, its biological processes, and impact on primary headache. *Headache: J Headache Pain*. 2006;46(9):1377-86.
- Fong M, Loi NM. The mediating role of self-compassion in student psychological health. *Aust Psychol*. 2016;51(6):431-41.
- Natu VP, Yap AU, Su MH, Irfan Ali NM, Ansari A. Temporomandibular disorder symptoms and their association with quality of life, emotional states and sleep quality in South-East Asian youths. *J Oral Rehabil*. 2018;45(10):756-63.
- Machado NAG, Costa YM, Quevedo HM, Stuginiski-Barbosa J, Valle CM, Bonjardim LR, et al. The association of self-reported awake bruxism with anxiety, depression, pain threshold at pressure, pain vigilance, and quality of life in patients undergoing orthodontic treatment. *J Appl Oral Sci*. 2020;28:e20190407.
- de Resende CM, da Silva Rocha LG, de Paiva RP, da Silva Cavalcanti C, de Almeida EO, Roncalli AG, et al. Relationship between anxiety, quality of life, and sociodemographic characteristics and temporomandibular disorder. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2020;129(2):125-32.
- Callahan CD. Stress, coping, and personality hardness in patients with temporomandibular disorders. *Rehabil Psychol*. 2000;45(1):38.
- McCarberg BH, Nicholson BD, Todd KH, Palmer T, Penles L. The impact of pain on quality of life and the unmet needs of pain management: Results from pain sufferers and physicians participating in an Internet survey. *Am J Ther*. 2008;15(4):312-20.
- Benoliel R, Zini A, Zakuto A, Slutzky H, Haviv Y, Sharav Y, et al. Subjective sleep quality in temporomandibular disorder patients and association with disease characteristics and oral health-related quality of life. *J Oral Facial Pain Headache*. 2017;31(4):313-22.
- Herrero Babiloni A, Martel MO, Lavigne GJ. Sleep disturbances in temporomandibular disorders: A narrative review. *J Oral Maxillofac Surg*. 2020;13(4):335-48.
- Lee YH, Auh Q, An JS, Kim T. Poorer sleep quality in patients with chronic temporomandibular disorders compared to healthy controls. *BMC Musculoskelet Disord*. 2022;23(1):01-03.
- Durham J, Steele JG, Wassell RW, Exley C. Living with uncertainty: Temporomandibular disorders. *J Dent Res*. 2010;89(8):827-30.
- Slade GD, Spencer AJ. Development and evaluation of the oral health impact profile. *Community Dent Health*. 1994;11(1):03-11.
- Bitiniene D, Zamaliauskiene R, Kubilius R, Lektas M, Gailius T, Smirnovaite K. Quality of life in patients with TMD's. A systematic review. *Stomatologija*. 2018;20(1):03-09.
- Hawthorne G, Richardson J, Osborne R, McNeil H. The Australian quality of life (AQoL) instrument: Initial validation. Melbourne, Vic.: Centre for Health Program Evaluation; 1997 May.

- [52] Sharma VK, Lepping P, Cummins AG, Copeland JR, Parhee R, Mottram P. The global mental health assessment tool-primary care version (GMHAT/PC). Development, reliability and validity. *World J Psychiatry*. 2004;3(2):115-19.
- [53] Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, et al. The Warwick-Edinburgh mental well-being scale (WEMWBS): Development and UK validation. *Health Qual Life Outcomes*. 2007;5(1):01-03.
- [54] Villa S, Raoul G, Machuron F, Ferri J, Nicot R. Improvement in quality of life after botulinum toxin injection for temporomandibular disorder. *J Stomatol Oral Maxillofac Surg*. 2019;120(1):02-06.
- [55] de Resende CM, Alves AC, Coelho LT, Alchieri JC, Roncalli ÂG, Barbosa GA. Quality of life and general health in patients with TMD's. *Braz Oral Res*. 2013;27(2):116-21.
- [56] Türp JC, Motschall E, Schindler HJ, Heydecke G. In patients with temporomandibular disorders, do particular interventions influence oral health-related quality of life? A qualitative systematic review of the literature. *Clin Oral Implants Res*. 2007;18:127-37.
- [57] de Salles-Neto FT, de Paula JS, Romero JG, Almeida-Leite CM. Acupuncture for pain, mandibular function and oral health-related quality of life in patients with masticatory myofascial pain: A randomised controlled trial. *J Oral Rehabil*. 2020;47(10):1193-201.
- [58] Moleirinho-Alves PM, Almeida AM, Exposto FG, Oliveira RA, Pezarat-Correia PL. Effects of therapeutic exercise and aerobic exercise programmes on pain, anxiety and oral health-related quality of life in patients with temporomandibular disorders. *J Oral Rehabil*. 2021;48(11):1201-09.
- [59] Shah SB, Ramanojam S, Gadre PK, Gadre KS. Synovial chondromatosis of TMJ: Journey through 25 decades and a case report. *J Oral Maxillofac Surg*. 2011;69(11):2795-814.
- [60] Gupta A, Kohli VS, Hazarey PV, Kharbanda OP, Gunjal A. Stress distribution in the TMJ after mandibular protraction: A 3-Dimensional finite element method study. Part 1. *Am J Orthod Dentofacial Orthop*. 2009;135(6):737-48.

PARTICULARS OF CONTRIBUTORS:

1. Postgraduate Student, Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College, Mumbai, Maharashtra, India.
2. Professor, Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College, Nagpur, Maharashtra, India.
3. Professor and Head, Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College, Nagpur, Maharashtra, India.
4. Postgraduate Student, Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College, Mumbai, Maharashtra, India.
5. Professor, Department of Orthodontics and Dentofacial Orthopedics, Rural Dental College, PIMS, Loni, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Abhishek Deepak Sanchla,
B/304, Bhushan Park View CHS, Padma Nagar, Chikuwadi, Borivali West,
Mumbai, Maharashtra, India.
E-mail: abhisheksanchla@gmail.com

PLAGIARISM CHECKING METHODS: [\[Lain H et al.\]](#)

- Plagiarism X-checker: Jun 17, 2022
- Manual Googling: Aug 18, 2022
- iThenticate Software: Oct 05, 2022 (4%)

ETYMOLOGY: Author Origin**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? No
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Jun 15, 2022**Date of Peer Review: **Aug 19, 2022**Date of Acceptance: **Oct 12, 2022**Date of Publishing: **Mar 01, 2023**