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Pain Patterns of the Temporomandibular Joint Dysfunction and Implications of Stress-Related Behaviors: A Pilot Study

Patrones de Dolor de la Disfunción de la Articulación Temporomandibular e Implicaciones de los Comportamientos Relacionados con el Estrés: Un Estudio Piloto

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SUMMARY: Temporomandibular joint dysfunction interferes with the quality of life and activities of daily living among patients. The symptoms of temporomandibular dysfunction, including pain and clicking and popping sounds, are worsened during stressful events, and patients report increased pain around the temporomandibular joint. Stress-related behaviors, such as teeth clenching and teeth grinding, are commonly reported as increasing during stress. The prevalence of temporomandibular dysfunction and stress-related behaviors is reported differently in the literature. Stress in higher education is common. The purpose of this pilot study was to investigate the prevalence of temporomandibular joint dysfunction and stress-related behaviors among staff members at a local University. The study also sought to explore pain patterns described by people experiencing temporomandibular joint dysfunction and the relationship between stress-related behaviors and pain symptoms experienced. Further, the impact of stress on symptoms experienced by people with temporomandibular dysfunction was investigated in this pilot study.

KEY WORDS: Temporomandibular joint; Temporomandibular joint dysfunction; Stress; Pain; Central sensitization; Teeth clenching.

INTRODUCTION

The temporal mandibular joint (TMJ) is a complex articular joint between the mandibular condyle and the glenoid fossa of the temporal bone (Alomar *et al*., 2007). It is a highly mobile bi-condylar ellipsoid synovial joint with a fibrous capsule, synovium, synovial fluid, articular disc, and ligaments connecting the lower jaw to the cranium (Alomar *et al*., 2007). Bi-condylar surfaces of the mandible move at the same time and the fibrocartilaginous disc functions to absorb stress and weight applied to the joint, a function favored by its thick articular eminence and avascular central portion (Ingawalé & Goswami, 2009). The joint is surrounded by muscles that aid in its various functions, including the temporalis muscle, masseter muscle, and medial and lateral pterygoid muscles (Alomar *et al*., 2007). Mechanical strain from postural disturbances and nearby structures exerts a direct effect on the TMJ (Bond *et al*., 2020). The TMJ is involved in speech and mastication, which requires both a translational and rotational movement of the mandible to be effective (Bond *et al*., 2020).

Temporomandibular joint dysfunction. (TMJD) represents a group of disorders related to the TMJ or related structures that impact the function of the joint (Sharma *et al*., 2011). The prevalence of TMJD ranges from a little over 10 % in children to about 31 % in adults with a higher (1.5 times) female ratio even though most people remain asymptomatic (LeResche, 1997; Valesan *et al*., 2021).

Although previous literature has been primarily concerned with structural causes, including mostly dental malocclusions, other non-structural factors have now been discussed (Slade *et al*., 2016). TMJD has been linked to personality disorders, behavioral problems, stress, emotional factors, biological factors, and sleep disorders (Sharma *et al*., 2011). Solano & Molina (2019) reported

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about one in four persons in their study population who had TMJD reported having some type of personality disorder. Intra- and extra-articular dysfunctions have been implicated in a variety of causes of TMJD (Wieckiewicz *et al*., 2015). Extra-articular dysfunctions arise from the complex interrelations of muscles around the TMJ (Wieckiewicz *et al*., 2015). These may present similarly to painful neurological conditions such as migraine and trigeminal neuralgia because of the development of long-term chronic pain and central sensitization-type syndromes (Chen *et al*., 2013).

Behavioral factors such as abnormal head posture, and habitual repetitive movements, including teeth grinding and clenching of the teeth, lead to myofascial strain with decreased pain thresholds (Sharma *et al*., 2011). Myofascial strain occurs in the muscles of mastication because of chronic overuse secondary to bruxism (Ohlmann *et al*., 2020). An increase in metabolites and inflammation within the myofascial tissues may cause an increase in muscle tone and pain around the temporal and infratemporal regions (Martin *et al*., 2018; Choi *et al*., 2019).

Biomechanical strain and postural disturbances influence the articular and muscular structures of the TMJ (Choi *et al*., 2019). Thus, people with TMJD may have histories of poor head and neck posture with arthritic changes in the cervical spine (Choi *et al*., 2019). Myofascial pain can be demonstrated by trigger points, which are found to be more abundant in the muscles of mastication and cervical spine in patients with TMJD (Choi *et al*., 2019). Increased pain sensitivity in the muscles of the cervical spine in patients with TMJD is linked with decreased pain thresholds in the muscles of mastication (Choi *et al*., 2019).

Mastication involves sophisticated neural control and behavior controlled by the trigeminal system and its central projections (Chen *et al*., 2013). Physiological changes in the trigeminal subnucleus caudalis following increased excitability in the caudal medullary dorsal horn of the brainstem have been reported in TMJD (Duenes *et al*., 2010).

Damage of the soft tissue structures around the TMJ results in the stimulation of the free nerve endings by noxious substances causing pain (Merrill, 2007). The stimulation of free nerve endings results in the activation of afferent A-delta or C nerve fibers projecting to the trigeminal brainstem complex, leading to the release of inflammatory mediators that trigger central sensitization and persistent pain (Cornelison *et al*., 2016). Chronic pain from a TMJD can therefore perpetuate a central sensitization of the trigeminal complex by expanding nociceptive fields through glial cell activation and stimulation of neuroinflammatory mediators (Racich, 2018).

Research shows that muscle tension and stress are triggers for TMJD pain (Glaros *et al*., 2016). TMJD pain has been associated with stress, depression, sleep disturbances, and anxiety (Flor *et al*., 1991). To date, the pain mechanisms surrounding TMJD continue to be investigated and further impact of stress and stress-related behaviors are reported in the literature (Bond *et al*., 2020). This study sought to investigate the prevalence of TMJD, pain patterns in TMJD, the impact of stress on TMJD symptoms, and the relationship between stress-related behaviors and pain symptoms experienced in TMJD.

MATERIAL AND METHOD

Participants. Purposive sampling was used to recruit participants from the department of anatomy and physiology department, and pharmacology department. The primary supervisor sent out email invitations with an electronic web link to members of these departments through the University's database. The email included information about the study, ethical considerations, and informed consent. Members outside of these departments were excluded in this pilot study.

Ethical considerations. The study was approved by the Social Research Ethics Committee of the University under log 2019-096. Ethical considerations included ensuring anonymity, provision of available counseling services, and exclusion of any identifiable information.

Questionnaire and Data Collection. An ethically approved custom-designed anonymous questionnaire was developed to assess participants experience with TMJD symptoms. The questionnaire was developed using the Lime survey online tool which allowed for effective data collection. This questionnaire asked some demographic questions including biological sex, age, significant medical history, physical fitness, and dietary habits. The questionnaire further assessed patients' history of previous and current TMJD pain, the characteristics of the pain including onset, duration, nature, and complications experienced from the pain. Participants were asked about their health seeking behaviors regarding these pain symptoms, previous and current history of dental treatment, history and present experience of stress-related behaviors, and impact of stress on these symptoms. To quantify stress, the researchers used a standardized validated questionnaire on the perceived stress scale was used to assess participants perception of stress. This validated survey evaluates the degree to which events in a person's life are appraised as stressful (Cohen *et al*., 1983).

RESULTS

Out of the 92 electronic surveys sent to the staff at the Pharmacology, Physiology, and Anatomy departments, there were 40 responses (43 % response rate). Of these, nine participants were aware they suffered from TMJD while the other 31 participants weren't. There were five female and four male participants that had TMJD. Ages ranged from 24 years to 56 years old. The distribution of frequencies of TMJD symptoms and the prevalence of symptoms in this study population are shown in Table I below.

Participants without TMJD. Four out of the five (80 %) of participants without TMJD responded positively to the question: "Do you experience intermittent jaw pain?" with one describing their pain as constant. Approximately ten percent of participants reported experiencing fatigue associated with symptoms and suffering headaches in the morning. Fourteen percent of participants (1/7) experienced pain in the morning. Participants in this group did not report any episode of jaw swelling, dizziness, or seeking medical advice for TMJD symptoms. Of the seven responses to experiencing clicking, popping, or other noises on one side of the jaw, nearly half (42.86 %) reported experiencing this unilaterally and 14 % experienced this on both sides of the jaw. Also, 36 % of participants (4/11 responses) reported experiencing clicking sounds when chewing food. However, none of the 14 participants who responded to the question, "Experienced difficulty chewing" had any such experience.

Thirty-eight percent of participants (6/16) and 31 % (5/16) were positive for an awareness of clenching of teeth and teeth grinding, while 29 % (4/14) indicated experiencing a sensation of fullness or pressure in the ears. Twenty-two percent of participants (4/18) reported having suffered a blow to the jaw, and 11 % (2/18) had whiplash injuries in the past. Twenty percent (1/5) and twenty-five percent (1/4) of participants received extensive dental work and orthodontic treatment, respectively. Thirty-six percent of participants (4/11) indicated feeling under mental stress, while twenty-three (3/13) experienced sleep disturbances. Eighteen percent of participants (2/11) experienced increased jaw pain during times of stress.

Participants with TMJD. Nine participants from the 40 responses indicated they had TMJD. More than half of the participants (56 %) experienced a sudden onset of TMJD symptoms, and nearly half (44 %) reported suffering from TMJD symptoms at least monthly. A third of the participants reported feeling under mental stress, with 44 % also reporting increased pain during stress. Four out of nine participants (44 %) described the pain they felt as dull or aching, while 33 % described the pain as locking. Twenty-two percent (2/9) described experiencing constant pain, and 78 % percent (7/9) described the pain as intermittent. Only one out of eight responses attributed their TMJ pain to a single incident. In 63 % of participants (6/8), pain was experienced in the morning, while 11 % reported suffering headaches in the morning. Most participants (78 %) rated their perception of pain between 0 and 1. Forty-four percent (4 out of 9 responses) reported their worst pain as 4/10 on the pain scale. Two participants rated their worst pain as 5/10 and another two as 6/10. One participant rated their pain as 2/10 during an episode.

A third of the participants (33 %) reported experiencing locking of the jaw, with 22 % indicating they experienced jaw swelling. There were 44 % positive responses concerning sleep disturbances. A quarter of participants (25 %) reported a traumatic experience from a whiplash injury in the past and 13 % reported experiencing a blow to the jaw. Thirty-eight percent of participants received extensive dental work, while 33 % either sought or had received orthodontic treatment already for their pain. Most participants (78 %) experienced clicking when chewing food, with approximately half (44 %) encountering difficulties with chewing. Seventy-five percent of participants with TMJD experienced clicking, popping, or other noises unilaterally, while 25 % experienced this bilaterally. Most participants reported an awareness of teeth clenching (67 %), teeth grinding (55 %), restrictions in the range of joint movement (55 %), and a sense of fullness or pressure in the ears (55 %). Twenty-two percent experienced fatigue associated with their symptoms, sought medical advice and responded positively to the need to change their diet. Fewer participants (11 %) reported experiencing dizziness.

Table I. Frequency and percentage of TMJD-positive symptoms.

Responses	TMJD Positive Symptoms	Frequency	Percentage (%)
9	Unilateral clicking and popping sounds	6	75
8	Bilateral clicking and popping sounds	2	25
9	Aural fullness	5	55.6
9	Pain in TMJ	9	100
9	Difficulty chewing	4	44.4
9	Jaw locking	3	33.3
9	Restriction of jaw movement	5	55.6
9	Clicking sounds with eating	7	77.8

Perceived stress. A summary of participants' perceived stress scales is shown in Table II below.

Table II. Perceived stress scale responses between TMJD and non-TMJD participants.

Scale Range	Perceived Stress	Those With TMJD	Those Without TMJD
0-13	Low	37.5 %	33.33 %
14-26	Moderate	50.00 %	53.33 %
27-40	High	12.50 %	13.33 %

Half of the participants from each group reported experiencing a moderate perception of stress, while one and two participants reported a high perception of stress for TMJD and non-TMJD, respectively. The comparison between these two groups and their perceptions of stress is shown in Figure 1.

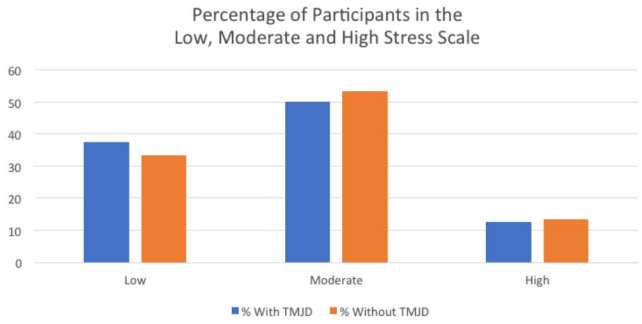

Fig. 1. Graphical representation of differences in perceived stress between TMJD and non-TMJD groups.

Participants in both the TMJD and non-TMJD group reported some similar experiences including clicking and popping sounds, intermittent pain, constant pain, clenching of teeth, teeth grinding, fullness in the ears, and a history of orthodontic work among others (Table III). However, participants in the non-TMJD group did not report experiencing other common symptoms, including restriction in jaw movement, difficulty chewing, jaw swelling, or locking pains in the jaw.

Table III. Comparison of positive responses from participants with and without TMJD.

Questionnaire Summary	Percentage without TMJD	Percentage with TMJD
Eat a balanced diet	100.00	88.89
Consider yourself happy	92.31	88.89
Exercise regularly	89.66	88.89
Experience intermittent pain	80.00	77.78
Experience clicking, popping, or other noises on one side	42.86	75.00
Awareness of clenching teeth	37.50	66.67
Experience clicking when chewing food	36.36	77.78
Feeling under mental stress	36.36	33.33
Aware of teeth grinding	31.25	55.56
Experience a sense of fullness or pressure in the ears	28.57	55.56
Received orthodontic treatment	25.00	33.33
Suffer from sleep disturbances	23.08	44.44
Received a blow to the jaw	22.22	12.50
Sought orthodontic treatment	21.43	33.33
Experience constant pain	20.00	22.22
Received extensive dental work	20.00	37.50
Pain increase at times of stress	18.18	44.44
Experienced locking	16.67	33.33
Experience clicking, popping, or other noises on both sides	14.29	25.00
Feel pain in the morning	14.29	62.50
Experienced whiplash in the past	11.11	25.00
Suffer from headaches in the morning	10.00	11.11
Experience fatigue associated with symptoms	9.09	22.22
Attribute pain to any one incident	0.00	12.50
Experienced a sudden onset of TMJD symptom	0.00	55.56
Experience restricted range of joint movement	0.00	55.56
Describe the pain as dull or aching	0.00	44.44
Suffer from TMJD symptoms at least monthly	0.00	44.44
Difficulty chewing	0.00	44.44
Experience swelling of the jaw	0.00	22.22
Sought medical advice	0.00	22.22
Experience dizziness	0.00	11.11
Ever suffered from TMJ Pain	0.00	100.00
Identify a need to modify diet	0.00	22.22
Describe the pain as locking	0.00	33.33

DISCUSSION

The findings of this pilot study show some similarities in the symptoms experienced by both people with TMJD and those without. The prevalence of TMJD at the study site was 22.5 %, similar to that reported by Valesan *et al*. (2021). Consistent with the literature, TMJD was more common in females (56 %) than males (44 %) (Slade *et al*., 2013). Women are more likely to progress from acute TMJ to chronic TMJ (Garofalo *et al*., 1998). TMJD is associated with age, and in women, it is high among those between 35-44 years (Slade *et al*., 2013). In this study, the women who presented with TMJD were aged 24-56 years.

Both TMJD and non-TMJD participants responded positively to experiencing intermittent or constant pain around the TMJ. The percentage response rate for intermittent and constant pain was similar in both non-TMJD and TMJD groups respectively (80 % vs 78 %, and 20 % vs 22 %). These findings are consistent with the literature on presentations of TMJD (Campbell *et al*., 1982; Pow *et al*., 2001). The most frequent characteristic of pain described by participants in this study was a dull and aching pain pattern. Dull aching pain as described could suggest a more chronic onset due to hypertonicity and myofascial strain of the muscles of mastication, chronic biomechanical strain of the joint capsule, or degenerative changes in the articular disc of the TMJ (Martin *et al*., 2018). In chronic painful conditions, pain is predominantly mediated by inflammatory and nociceptive mechanisms, however, central sensitization also contributes to the pain complex (Guler *et al*., 2020). The 44 % of participants who reported suffering TMJD pains monthly, and the 56 % who reported symptoms in the morning could reflect chronic TMJD.

The pain levels of most participants with TMJD were not extreme, with the highest being 6/10 on the pain scale for one participant. High-impact chronic pain is associated with TMJD and interferes with activities or causes a severe restriction in one's participation in work (Von Korff *et al*., 1993). It may be possible that participants who described their TMJ pain as locking and those who experienced restriction in movements at the TMJ could have experienced some interferences in their activities of daily living. Pain associated with TMJD could range from none to high-impact chronic pain, thus, it is not unexpected in this population that most of the participants reported their pain levels as very low (Bond *et al*., 2020).

Some participants described experiencing an increase in pain during moments of stress as reported in the literature. Stress-related behaviors, such as teeth grinding and clenching of the jaw muscles, have a negative impact on TMJD (Martins *et al*., 2010). In this study, most participants with TMJD reported an awareness of clenching their jaw muscles and grinding their teeth, with symptoms increasing during stress.

Masticatory myofascial pain is induced by repeated teeth clenching (Benoliel & Sharav, 2008). Myofascial strain occurs in the muscles of mastication following chronic overuse secondary to bruxism, and patients with sleep bruxism normally report orofacial pain, jaw locking, and masticatory muscle pain (Martins *et al*., 2010). Thus, chronic TMJD pain may be more evident after rest from the night or from active teeth grinding throughout the night (Ohlmann *et al*., 2020). This could be the underlying experience of participants who reported pain episodes in the morning.

In most participants, pain was felt in the temporal and mandibular regions in this study. TMJD pain can be felt elsewhere due to referred pain or myofascial strain pain patterns from the muscles and soft tissues that control the movement of the TMJ (Bond *et al*., 2020). Glaros *et al*. (2016), described muscle pain as the most common symptom of TMJD, with typical myofascial pain felt in the temporal and infratemporal regions. Pain from TMJD is also felt in the ear because of the proximity of the structures (Anagnostopoulou *et al*., 2008). Responses from this pilot study showed 55.6 % and 28 % of participants experienced a sensation of fullness or pressure in the ears in the TMJD and non-TMJD groups, respectively. In the latter group, this could be from other causes, such as Meniere's disease (Levo *et al*., 2014).

Aural fullness has been reported in TMJD (Riga *et al*., 2010). Lam *et al*. (2001), reported TMJD significantly correlated with aural health and aural symptoms impacted the quality of life of patients. Inflammation and swelling of the TMJ have a compressive effect directly on the structures of the ear, leading to a sense of fullness or pressure within the Eustachian tube (Newman *et al*., 2020). The position of the mandible and TMJ, the retrusion of the mandibular condyles, and spasms of nearby muscles, including tensor tympani and stapedius, malleolar ligaments, are among other causes of aural symptoms experienced in TMJD (Cox *et al*., 2008). TMJD has been associated with other otological symptoms, such as tinnitus and vertigo/dizziness (Manfredini *et al*., 2004). Eleven percent of this study's participants with TMJD reported experiencing dizziness.

Forty-four percent of participants in this study with TMJD experienced sleep disturbances with symptoms, as reported in the literature (Rai & Kaur, 2013). Sleep disorders

and nocturnal teeth grinding cause repetitive strain-type injury to soft tissues involved in mastication (Boggero & King, 2019). Insomnia, prolonged sleep latency, and poor sleep quality have been described in people with TMJD (Boggero & King, 2019). Sleep disorders and nocturnal teeth grinding cause repetitive strain-type injury to soft tissues involved in mastication (Boggero & King, 2019). The presence of comorbidities, such as sleep disturbances, emotional disorders, and other unexplained physical symptoms, most likely excludes the cause of TMJD as local (Bond *et al.*, 2020). A localized TMJD is usually attributable to a single event such as trauma, dental event, or recent injury, and may present acutely involving a particular part of the masticatory system (Bond *et al*., 2020). Participants who reported sleep disturbances with TMJD may experience this as part of a chronic presentation or a multisystem disorder (Bond *et al.*, 2020).

A very small number of participants in this study indicated a history of trauma to the jaw and attributed their pain to a particular incident. A third of the participants with TMJD reported receiving extensive dental work and orthodontic treatment. The presence of histories such as trauma, dental work, or a blow to the jaw that leads to a sudden change in the masticatory pattern suggests localized TMJD (Bond *et al*., 2020). Further investigations would be needed to find out whether participants experienced their TMJD symptoms after these interventions and whether they attribute their pain to dental or orthodontic treatment received. However, it is noteworthy that symptoms suggestive of both localized and chronic TMJD pain were identified in this study population.

A few participants in both groups reported experiencing headaches in the morning. The prevalence of headaches in this study population is closer to the minimum prevalence reported by Ciancaglini & Radaelli (2001). TMJD can manifest as a single isolated event or as part of a multi-system presentation (Bond *et al.,* 2020). However, it may also overlap with other preexisting medical conditions, including headaches, fibromyalgia, or lumbosacral pain (Bond *et al*., 2020). Myofascial pain in the masticatory muscles causes secondary headaches among people with TMJD (Schiffman *et al*., 2012).

Similar to reports in the literature, participants in this study also reported experiencing clicking and popping sounds, teeth grinding, and teeth clenching (Pow *et al*., 2001). More participants 55.6 % in the TMJD reported an awareness of teeth grinding. Both TMJD and non-TMJD groups reported experiencing popping or clicking sounds, although the percentage was higher in the TMJD group. Clicking and popping sounds may indicate articular disc displacement (Bond *et al*., 2020). Articular disc displacement is common in TMJD and may be associated with whiplash injury (Lee *et al*., 2018). A few participants with TMJD in this study reported experiencing whiplash injuries in the past. Clicking or popping sounds may be heard during the opening or closing of a displaced TMJ (Bond *et al*., 2020). However, similar sounds may accompany the reduction of the articular disc to its normal position (Bond *et al*., 2020), as identified in this study, even among participants without TMJD who experienced clicking or popping sounds.

The investigators explored premorbid predictors of future TMJD onset, as described by Fillingim *et al.* (2013). The future onset of TMJD can be predicted by clinical and health variables, psychological, and pain sensitivity variables (Fillingim *et al*., 2013). A history of jaw injury, sleep disturbance, perceived stress, and somatic are strong predictors of future onset TMJD (Fillingim *et al*., 2013). Participants in this study without TMJD who reported a history of jaw injury (22 %), sleep disturbance (23 %), and increased perceived stress may be at risk of TMJD in the future.

Limitations of study. Self-reported questionnaires introduced limitations to the study due to reporter bias. The participant's perception of stress and their pain ratings were subjective and could have caused bias. The sensitive questions being asked might have made some participants uncomfortable and caused incomplete data sets as most participants did not complete the questionnaire. Another limitation was the small sample size of participants, which hindered statistical analysis. Participants were only recruited from the anatomy and physiology, and pharmacology departments. Further studies with a larger sample size and opening recruitment to the other departments would enable a more varied and generalizable response.

CONCLUSION

The findings of this pilot study align with previous findings in the literature concerning the symptoms and prevalence of both symptoms and TMJD (Ciancaglini & Radaelli, 2001; Valesan *et al.*, 2021). This study showed that participants without TMJD experienced some similar symptoms to those with TMJD, although the percentage occurrence was smaller. Most of these symptoms experienced by the non-TMJD group were high predictors of future onset TMJD (Fillingim *et al*., 2013). It is therefore important to identify such people who may be at a higher risk of developing TMJD for early investigations and possible interventional therapy.

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FREYNE, B.; BOADUM, O.; LONE, M. & BALTA, J. Y. Patrones de dolor de la disfunción de la articulación temporomandibular e implicaciones de los comportamientos relacionados con el estrés: un estudio piloto. *Int. J. Morphol., 42(1)*:1-8, 2024.

RESUMEN: La disfunción de la articulación temporomandibular interfiere con la calidad de vida y las actividades de la vida diaria entre los pacientes. Los síntomas de la disfunción temporomandibular, incluidos el dolor y los chasquidos, empeoran durante los eventos estresantes, y los pacientes informan un aumento del dolor alrededor de la articulación temporomandibular. Los comportamientos relacionados con el estrés, como apretar y rechinar los dientes, suelen aumentar durante el estrés. La prevalencia de la disfunción temporomandibular y los comportamientos relacionados con el estrés se informa de manera diferente en la literatura. El estrés en la educación superior es común. El propósito de este estudio piloto fue investigar la prevalencia de la disfunción de la articulación temporomandibular y los comportamientos relacionados con el estrés entre los miembros del personal de una universidad local. El objetivo del estudio además fue explorar los patrones de dolor descritos por personas que experimentan disfunción de la articulación temporomandibular y la relación entre los comportamientos relacionados con el estrés y los síntomas de dolor experimentados. Además, en este estudio piloto se investigó el impacto del estrés en los síntomas que experimentan las personas con disfunción temporomandibular.

PALABRAS CLAVE: Articulación temporomandibular; Disfunción de la articulación temporomandibular; Estrés; Dolor; sensibilización central; Apretar los dientes.

REFERENCES

Alomar, X.; Medrano, J. F.; Cabratosa, J.; Clavero, J. A.; Lorente, M.; Serra, I.; Monill, J. M. & Salvador, A. Anatomy of the temporomandibular joint. *Semin. Ultrasound CT MR, 28(3)*:170-83, 2007.

Anagnostopoulou, S.; Venieratos, D. & Antonopoulou, M. Temporomandibular joint and correlated fissures: anatomical and clinical consideration. *Cranio, 26(2)*:88-95, 2008.

Benoliel, R. & Sharav, Y. *Masticatory myofascial pain, and tension-type and chronic daily headache*. Amsterdam, Elsevier, 2008. pp.109-48.

Boggero, I. A. & King, C. R. (302) Prediction of experimental pain outcomes by subjective and objective measures of sleep in temporomandibular joint disorder. *J. Pain, 20(4 Suppl.)*:S49-S50, 2019.

Bond, C.; Mackey, S.; English, R.; Liverman, T. & Yost, O. (Eds.). *Temporomandibular Disorders: Priorities for Research and Care*. Washington D.C., National Academies Press, 2020.

Campbell, C.; Loft, G. H.; Davis, H. R. & Hart, D. L. TMJ symptoms and referred pain patterns. *J. Prosthet. Dent., 47(4)*:430-3, 1982.

Chen, Y.; Williams, S. G.; McNulty, A. L.; Hong, J.; Lee, S.; Rothfusz, N. E.; Parekh, P. K.; Moore, C.; Gereau, R. W.; Taylor, A. B.; *et al*. Temporomandibular joint pain: a critical role for Trpv4 in the trigeminal ganglion. *Pain, 154(8)*:1295-304, 2013.

Choi, H. G.; Lee, J. M. & Kang, J. Relationship among cervical spine degeneration, head and neck postures, and myofascial pain in masticatory and cervical muscles in elderly with temporomandibular disorder. *Arch. Gerontol. Geriatr., 81*:119-28, 2019.

Ciancaglini, R. & Radaelli, G. The relationship between headache and symptoms of temporomandibular disorder in the general population. *J. Dent., 29(2)*:93-8, 2001.

Cohen, S.; Kamarck, T. & Mermelstein, R. A global measure of perceived stress. *J. Health Soc. Behav., 24(4)*:385-96, 1983.

Cornelison, L. E.; Hawkins, J. L. & Durham, P. L. Elevated levels of calcitonin gene-related peptide in upper spinal cord promotes sensitization of primary trigeminal nociceptive neurons. *Neuroscience, 339*:491-501, 2016.

Cox, K. W. Temporomandibular Disorder and New Aural Symptoms. *Arch. Otolaryngol. Head Neck Surg., 134(4)*:389, 2008.

Duenes, S. L.; Thompson, R.; Chang, Z.; Okamoto, K. & Bereiter, D. A. Psychophysical stress increases the expression of phospho-CREB, Fos protein and neurokinin-1 receptors in superficial laminae of trigeminal subnucleus caudalis in female rats. *Neurosci. Lett., 486(3)*:207-10, 2010.

Flor, H.; Birbaumer, N.; Schulte, W. & Roos, R. Stress-related electromyographic responses in patients with chronic temporomandibular pain. *Pain, 46(2)*:145-52, 1991

Garofalo, J. P.; Gatchel, R. J.; Wesley, A. L. & Ellis, E. Predicting chronicity in acute temporomandibular joint disorders using the research diagnostic criteria. *J. Am. Dent. Assoc., 129(4)*:438-47, 1998.

Glaros, A. G.; Marszalek, J. M. & Williams, K. B. Longitudinal Multilevel Modeling of Facial Pain, Muscle Tension, and Stress. *J. Dent. Res., 95(4)*:416-22, 2016.

Guler, M. O.; Celik, O. & Ayhan, F. The important role of central sensitization in chronic musculoskeletal pain seen in different rheumatic diseases. *Clin. Rheumatol., 39(1)*:269-74, 2020.

Ingawalé, S. M. & Goswami, T. Temporomandibular joint: disorders, treatments, and biomechanics. *Ann. Biomed. Eng., 37(5)*:976-96, 2009.

Lam, D.; Lawrence, H. P. & Tenenbaum, H. C. Aural symptoms in temporomandibular disorder patients attending a craniofacial pain unit. *J. Orofac. Pain, 15(2)*:146-57, 2001

LeResche, L. Epidemiology of temporomandibular disorders: implications for the investigation of etiologic factors. *Crit. Rev. Oral Biol. Med., 8(3)*:291-305, 1997.

Levo, H.; Kentala, E.; Rasku, J. & Pyykkö, I. Aural fullness in Meniere's disease. *Audiol. Neuro-Otol., 19(6)*:395-9, 2014.

Manfredini, D.; Di Poggio, A. B.; Romagnoli, M.; Dell'Osso, L. & Bosco, M. Mood spectrum in patients with different painful temporomandibular disorders. *Cranio, 22(3)*:234-40, 2004.

Martin, K.; Kawalec, A. & Prendergast, K. The use of masseteric botulinum toxin in the management of myofascial TMJD: a service review. *Br. J. Oral. Maxillofac. Surg., 56(10)*:e51-e52, 2018.

Martins, R. J.; Garbin, C. a. S.; Garcia, A. R.; Garbin, A. J. Í. & Miguel, N. Stress levels and quality of sleep in subjects with temporomandibular joint dysfunction. *Rev. Odonto Cienc., 25(1)*:32-6, 2010.

Newman, A.; Omrani, K.; Higgins, T. L.; Ting, J. Y.; Walgama, E. & Wu, A. W. The prevalence of eustachian tube dysfunction symptoms in temporomandibular joint disorder patients. *Laryngoscope, 130(4)*:E233-E236, 2020.

Ohlmann, B.; Waldecker, M.; Leckel, M.; Bömicke, W.; Behnisch, R.; Rammelsberg, P. & Schmitter, M. Correlations between sleep bruxism and temporomandibular disorders. *J. Clin. Med., 9(2)*:611, 2020.

Pow, E. H.; Leung, K. C. & McMillan, A. S. Prevalence of symptoms associated with temporomandibular disorders in Hong Kong Chinese. *J. Orofac. Pain, 15(3)*:228-34, 2001

Racich, M. J. Occlusion, temporomandibular disorders, and orofacial pain: An evidence-based overview and update with recommendations. *J. Prosthet. Dent., 120(5)*:678-85, 2018.

Rai, B. & Kaur, J. Association between stress, sleep quality, and temporomandibular joint dysfunction: simulated mars mission. *Oman Med. J., 28(3)*:216-9, 2013.

Riga, M.; Xenellis, J.; Peraki, E.; Ferekidou, E. & Korres, S. Aural symptoms in patients with temporomandibular joint disorders: multiple frequency tympanometry provides objective evidence of changes in middle ear impedance. *Otol. Neurotol., 31(9)*:1359-64, 2010.

Schiffman, E. L.; Ohrbach, R.; List, T.; Anderson, G. P.; Jensen, R.; John, M. T.; Nixdorf, D. R.; Goulet, J.; Kang, W.; Truelove, E.; *et al*. Diagnostic criteria for headache attributed to temporomandibular disorders. *Cephalalgia, 32(9)*:683-92, 2012.

Sharma, S.; Gupta, D. B.; Pal, U. S. & Jurel, S. K. Etiological factors of temporomandibular joint disorders. *Natl. J. Maxillofac Surg., 2(2)*:116-9, 2011.

Slade, G. D.; Fillingim, R. B.; Sanders, A. E.; Bair, E.; Greenspan, J. D.; Ohrbach, R.; Dubner, R.; Diatchenko, L.; Smith, S. B.; Knott, C.; *et al*. Summary of findings from the OPPERA prospective cohort study of incidence of first-onset temporomandibular disorder: implications and future directions. *J. Pain, 14(12)*:T116-T124, 2013.

Slade, G. D.; Ohrbach, R.; Greenspan, J. D.; Fillingim, R. B.; Bair, E.; Sanders, A. R.; Dubner, R.; Diatchenko, L.; Meloto, C. B.; Smith, S. M.; *et al*. Painful temporomandibular disorder. *J. Dent. Res., 95(10)*:1084-92, 2016.

Solano, Y. H. & Molina, Y. A. Trastorno de la personalidad y disfunción de la articulación temporomandibular. *Rev. Cuba. Estomatol., 56(2)*:149-61, 2019.

Valesan, L. F.; Da-Cas, C. D.; Réus, J. C.; Denardin, A. C. S.; Garanhani, R. R.; Bonotto, D. M.; Januzzi, E. & De Souza, B. D. M. Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. *Clin. Oral Investig., 25(2)*:441-53, 2021.

Wieckiewicz, M.; Boening, K. W.; Wiland, P.; Shiau, Y. & Paradowska-Stolarz, A. Reported concepts for the treatment modalities and pain management of temporomandibular disorders. *J. Headache Pain, 16*:106, 2015.

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