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Association between chronic pain, depression, somatization and temporomandibular disorders in a southern brazilian population

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ABSTRACT. Introduction: Temporomandibular disorder (TMD) is defined as a set of pathological clinical conditions involving the masticatory muscles, the temporomandibular joint, or both, and the associated structures. It is often associated with chronic headaches, cervical pain, otologic symptoms and may be accompanied by some degree of physical or psychological disability in patients. Objective: To investigate the association of chronic pain-related disability, depression, and somatization with temporomandibular disorders. Methods: It was a transversal study with 275 patients evaluated using the RDC/TMD (Research Diagnostic Criteria for Temporomandibular Disorders). The variables of Axis I (myofascial pain, disc displacement and other joint conditions) and Axis II (chronic pain-related disability, depression and somatization) were crossed using Fischer's Exact Test ($p < 0.05$). Results: Statistically significant association was found among factors of chronic pain-related disability, depression and somatization with myofascial pain diagnosis ($p = 0.000$, $p = 0.001$, $p = 0.000$, respectively), as well as joint conditions (arthralgia, osteoarthritis and osteoarthrosis) ($p = 0.000$, $p = 0.008$, $p = 0.003$, respectively). Conclusion: There is a positive association between chronic pain, depression and somatization (Axis II variables) with and myofascial pain and other joint conditions (Axis I). Disc displacements were not associated to variables of Axis II.

Keywords: chronic pain; depression; somatization disorder; temporomandibular joint disorders.

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Introduction

Temporomandibular disorder (TMD) is defined as a set of pathological clinical conditions involving the masticatory muscles, the temporomandibular joint (TMJ), or both, and the associated structures (Okeson, 1996). It is often associated with chronic headaches and cervical pain, and may be accompanied by some degree of physical or psychological disability in patients (Ballegaard, Thede-Schmidt-Hansen, Svensson, & Jensen, 2008; Sharma, Gupta, Pal, & Jurel, 2011; Plesh, Noonan, Buchwald, Goldberg, & Afari, 2012)

TMD affects about 31% for adults/elderly and 11% for children/adolescents (Valesan et al., 2021), and is more prevalent in females (Bueno, Pereira, Pattussi, Grossi, & Grossi, 2018). Its etiology is complex and multifactorial, and includes factors such as micro and macro trauma, emotional stress, sources of deep pain stimulation, and muscle hyperactivity, among others (Dworkin & Massoth, 1994; Lee, Yeung, Wong, & McMillan, 2008; Sharma et al., 2011). It manifests mainly as pain in the TMJ region and in masticatory muscles, fatigue, limitation of or deviations in mandibular movements, joint noises and locking of the jaw (Okeson, 1996).

In addition to the physical signs and symptoms of TMD, there is a strong association between the degree of TMD-related pain and the presence of psychological changes (Dworkin & Massoth, 1994; Felício, Faria, Silva, Aquino, & Junqueira, 2004). These associated comorbidities may facilitate the chronification of pathological processes, thus worsening the prognosis (Manfredini, Winocur, Ahlberg, Guarda-Nardini, & Lobbezoo, 2010), and may be related to the process of central sensitization, leading to an increase in the perception of this pain(Arendt-Nielsen et al., 2018; Nazeri et al., 2018)

The most reliable diagnostic protocol used for TMD was RDC/TMD (Diagnostic Criteria for Research in Temporomandibular Disorder) until the year 2018, when DC/TMD (Diagnostic Criteria for Temporomandibular Disorder) (Dworkin & LeResche, 1992; Schiffman et al., 2014) was being the substitute gradually. These protocols proposes a double diagnosis, divided by axis. Axis I refers to the diagnosis of TMD (physical axis), and Axis II to the psychological state and inability to feel pain. Together, they provide a comprehensive and consistent evaluation.

The objective of this study was to determine whether there was an association between the variables of Axis I (myofascial pain, disc displacement and other joint conditions) and Axis II (disability related to chronic pain, depression and somatization) of the RDC/TMD in a population in southern Brazil. The hypothesis was that the variables of Axis II were positively associated with the diagnosis of TMD of Axis I.

Materials and methods

This cross-sectional observational study was approved by the research ethics committee Federal University of Santa Maria (UFSM) under number CAAE 4728.9415.0.000.5346. The study evaluated the clinical records of all the individuals seeking treatment in the TMD Extension Program of the dentistry course UFSM, from March 2015 to December 2018.

The inclusion criteria were patients over 18 years of age, who presented with any of the diagnostic conditions of Axis I of the RDC/TMD (myofascial pain, disc displacement or any joint condition). A total of 349 individuals sought treatment in the period under study. Of these, 74 met the exclusion criteria, because they had a history of facial and/or mandibular trauma (26), neuropathic pain, such as trigeminal neuralgia (5), were under 18 years of age (13), or did not fill out the questionnaires correctly (30), leaving a sample of 275 individuals.

For muscle palpation and TMJ examination during RDC/TMD clinical evaluation (axis I), calibration of the applied force was performed using the Force One Algometer (Wagner, FDIX model, USA). Axis II reveals the psychosocial condition and functional impairment of the patient that leads to the following diagnoses: chronic pain-related disability measured according to RDC/TMD, using the Graded Chronic Pain Scale (GCPS) (Von Korff, Dworkin, & LeResche, 1990; Dworkin & LeResche, 1992; Von Korff, Ormel, Keefe, & Dworkin,1992) (categorizing diagnoses as no pain, low disability, or high disability), depression and somatization, using the Symptom Checklist 90-R (SCL-90-R), SCL-DEP and SCL-SOM, respectively (categorizing patients as normal, moderate, or severe) (Dworkin & LeResche, 1992; Schmitz et al., 2000).

After the RDC/TMD was applied, diagnostics were obtained (Axis I and II) and the patients were invited to undergo the treatment recommended by the TMD extension program at the university (UFSM). Complementary exams such as computed tomography or magnetic resonance imaging were requested when a more accurate diagnosis was needed in cases of clinical doubt.

The data were tabulated and analyzed using the STATA 14 program (Stata Corporation, College Station, TX, USA). First, a descriptive analysis was performed to present the clinical, demographic and socioeconomic characteristics of the sample. The association between the variables of Axis I (myofascial pain, disc displacement and joint conditions) and Axis II (degrees of chronic pain-related disability, depression and somatization) was evaluated using Fischer's Exact Test, at a 5% significance level.

Results

Regarding demographic and socioeconomic characteristics of the sample, 73.82% of the patients were female, 85.35% were caucasian, 51.29% were unemployed, 56.30% were single, and 52.07% received until 3 Brazilian minimum wage (Table 1). The average age of the patients evaluated were 34.32 years (SD = 14.73).

In the data analysis of Axis I variables, 65.65% of the patients presented with myofascial pain, 33.33%, with some type of disc displacement and 45.38%, with some joint condition. Analyzing Axis II, 84.56% of the sample had some degree of chronic pain-related disability, 49.04% had some degree of depression, and 52.31%, with some degree of somatization (Table 1).

Chronic pain-related disability, regardless of its intensity, was observed in most of the patients, and demonstrated a statistically significant association with myofascial pain and joint conditions (arthralgia, osteoarthritis and osteoarthrosis) (Table 2). The degrees of depression and somatization were also associated with myofascial pain and joint conditions (Tables 3 and 4).

Table 1. Clinical, demographic and socioeconomic characteristics of the sample.

Variable	n (%)
AXIS I	
Myofascial pain	
Without	90 (34.35)
With	172 (65.65)
Disc displacement	
Without	174 (66.67)
With	87 (33.33)
Joint conditions	
Without	142 (54.62)
With	118 (45.38)
Gender	
Male	72 (26.18)
Female	203 (73.82)
Ethnicity	
Caucasian	233 (85.35)
Other	40 (14.65)
Employment	
Employee	132 (48.71)
Unemployed	139 (51.29)
Marital Status	
Single	152 (56.30)
Married /de facto marriage	90 (33.33)
Separated /divorced /widowed	28 (10.37)
Monthly income	
Up to 3 Brazilian minimum wages*	113 (52.07)
More than 3 Brazilian minimum wages	104 (47.93)
AXIS II	
Degree of chronic pain-related disability	
Painless	38 (15.45)
Low disability	170 (69.10)
High disability	38 (15.45)
Degree of depression	
Normal	133 (50.96)
Moderate	70 (26.82)
Severe	58 (22.22)
Degree of somatization	
Normal	124 (47.69)
Moderate	69 (26.54)
Severe	67 (25.77)

*Approximately USD 250/month at data gathering period.

Table 2. Prevalence of degree of chronic pain-related disability according to Graded Chronic Pain Scale (Axis II) crossed with diagnoses of Axis I, as per Fischer's Exact Test, with significance level of 5%.

	Degree of chronic pain-related disability- n (%)			
	Painless	Low Disability	High Disability	p-value
Myofascial pain				0.000*
With	33 (86.84)	36 (21.18)	9 (23.68)	
Without	5 (13.16)	134 (78.82)	29 (76.32)	
Disc displacement				0.108
With	31 (81.58)	110 (64.71)	24 (63.16)	
Without	7 (18.42)	60 (35.29)	14 (36.84)	
Joint conditions				0.000*
With	33 (86.84)	85 (50.00)	11 (28.95)	
Without	5 (13.16)	85 (50.00)	27 (71.05)	
Total	38 (15.45)	170 (69.11)	38 (15.45)	

Table 3. Prevalence of degree of depressionaccording to Symptoms Checklist-90 (Axis II) crossed with diagnoses of Axis I, as per Fischer's Exact Test, with significance level of 5%.

	Degree of depression - n (%)			
	Normal	Moderate	Severe	p-value
Myofascial pain				0.001*
With	55 (41.67)	25 (35.71)	9 (15.52)	
Without	77 (58.33)	45 (64.29)	49 (84.48)	
Disc displacement				0.166
With	94 (71.21)	40 (57.97)	38 (65.52)	
Without	38 (28.79)	29 (42.03)	20 (34.48)	
Joint conditions				0.008*
With	84 (64.12)	30 (43.48)	27 (46.55)	
Without	47 (35.88)	39 (56.52)	31 (53.45)	
Total	132 (50.77)	70 (26.92)	58 (22.31)	

Table 4. Prevalence of degree of somatization according to Symptoms Checklist-90 (Axis II) crossed with diagnoses of Axis I, as per Fischer's Exact Test, with significance level of 5%.

	Degree of Somatization - n (%)			
	Normal	Moderate	Severe	p-value
Myofascial pain				0.000*
With	53 (43.09)	26 (37.68)	10 (14.93)	
Without	70 (56.91)	43 (62.32)	57 (85.07)	
Disc displacement				0.762
With	83 (68.03)	46 (66.67)	42 (62.69)	
Without	39 (31.97)	23 (33.33)	25 (37.31)	
Joint conditions				0.003*
With	75 (61.98)	41 (59.42)	25 (37.31)	
Without	46 (38.02)	28 (40.58)	42 (62.69)	
Total	123 (47.49)	69 (26.64)	67 (25.87)	

Discussion

The results of the present study show a positive association between variables of Axis II (chronic pain-related disability, depression and somatization) and TMD of subtypes myofascial pain and joint conditions. The exception was disc displacement, which was not associated to Axis II variables, so the study hypothesis was partially accepted.

The sample was composed of a significantly larger number of female than male patients, similar to the comparative numbers found in the literature (Bueno et al., 2018). Some of the reasons why women prevailed over men is that women are more sensitive not only to pain, but also to depression and anxiety; moreover, they experience hormonal changes, and are more concerned about health, hence, seek treatment more often than men (Von Korff et al., 1990; Nazeri et al, 2018). According to Brazilian National Institute of Geography and Statistics, in 45% of Brazilian households, those who head and support the family are exclusively women, who accumulate roles as caretakers and educators, which probably generates physical and mental overload in this part of the population. The average age of the patients evaluated were 34.32 years (SD = 14.73), which is similar to the age range found in other studies (Nazeri et al., 2018).

RDC/TMD was used as a diagnostic tool in this research to observe the data of a given population in a standardized manner that allows it to be compared with different populations in other regions of the world (Manfredini, Landi, Di Poggio, Dell'osso, & Bosco, 2003; Vedolin, Lobato, Conti, & Lauris, 2009; Arendt-Nielsen et al., 2018). The most current diagnostic method, the DC/TMD (Schiffman et al., 2014), was validated for use in Portuguese only in August 2019. The migration to DC/TMD, which presents some modifications that facilitate logistics for the dentist, such as the report of familiar pain and muscle palpation only of the TMJ, masseter and temporalis muscles, should occur naturally, but does not invalidate the results of this study.

The biobehavioral screening instruments of the RDC/TMD Axis II were evaluated herein. The variables of chronic pain-related disabilityand of depression are clinically relevant and have acceptable psychometric properties. Thus, they are valid and useful as instruments to identify high degrees of suffering, pain and disability in patients with different diagnoses of TMD (Ohrbach et al., 2010). Axis I and II are complementary, and are meant to offer the professional or researcher a more complete diagnosis of the patient, taking into

account all physical and psycho-emotional aspects that may interfere with the patient's ability to deal with pain, especially in chronic conditions, such as the case of most TMD patients.

The sample evaluated in the present study included patients with some TMD diagnosed by RDC/TMD Axis I. Of these, 49.04% presented an indicator of moderate to severe depression, 52.31% had moderate to severe somatization, and 84.56% had some degree of chronic pain-related disability, in accordance with other populations previously investigated (Lee et al., 2008; Rehm et al., 2019). Yap, Tan, Chua and Tan (2002) also found an association among patients with TMD with indicators of depression and a considerable degree of somatization(Yap et al., 2002). Rehm and collaborators (2019) compared the prevalence of depression and somatization in patients with TMD and healthy control patients, and found significantly higher levels of depression and somatization in these patients, compared with the control group subjects (Rehm et al., 2019). This relationship between worse psychological state of patients and diagnosis of myofascial pain is a common finding in the literature (Eversole, Stone, Matheson, & Kapla, 1985; McCreary, Clark, Merril, Flack, & Oakley, 1991; Dahlström, 1993; Manfredini, Bandettini di Poggio, Cantini, Dell'osso, & Bosco, 2004; Trivedi, 2004; Manfredini, Ahlberg, Winocur, Guarda-Nardini, & Lobbezoo, 2011; Miettinen, Lahti, & Sipilä, 2012; Kindler et al., 2012; Dıraçoğlu, et al., 2016). It suggests that depression and anxiety can contribute to myofascial pain and migraine, by interacting with the pain modulating networks and lowering the threshold of pain or altering the perception of pain in patients suffering from anxiety or depression, albeit the exact mechanism is not yet clear (Sharma et al., 2011). Joint pain is a diagnosis also associated with depression, and it is thought that there is a relationship of mutual amplification, i.e., the greater the pain, the more severe the depression (Miettinen et al., 2012), a finding which is in line with those of this study.

Somatization, which is characterized by the physical expression of a psychological condition, and which usually manifests as pain (Trivedi, 2004; Miettinen et al., 2012) was evaluated by the presence of non-specific physical symptoms. In this study, most patients diagnosed with severe and moderate somatization presented with myofascial pain and other joint conditions, as found in previous studies in also Brazil and Singapure populations (Manfredini et al., 2003; Ohrbach et al., 2010).

Some of the strong points of this study include: 1) the large number of patients in the sample, 2) the use of the RDC/TMD, an internationally validated questionnaire, which allows comparisons to be made with other studies, and 3) the use of a reference center for performing TMD treatment, considered a large teaching center in the region.

The limitations include the use of a convenience sample, which requires caution so as not to extrapolate the results, and the transversal analysis, which cannot establish an effect-cause relationship. It is advisable that future research use random samples and longitudinal evaluations in order to obtain more robust conclusions.

Even though no cause-effect relationship can be established, a positive association was found between variables of Axis I and II of RDC/TMD. It seems advisable that patients should be encouraged to seek early professional help for the multidisciplinary approach therapy for better global healing. Cognitive-behavioral therapy has demonstrated important therapeutic effects on TMD (Rudy, Turk, Kubinski, & Zaki, 1995; Wright et al., 2004) and conventional treatment for pain relief may be limited in some these cases (Sheng, Liu, Wang, Cui, & Zhang, 2017). Patients who actively participate in their own healing process, through self-care, show improvement more quickly, altering their overall perception of pain (Pimentel, Bonotto, & Hilgenberg-Sydney, 2018).

Conclusion

It can be concluded that myofascial pain and joint conditions(variables of Axis I) present a positive association with chronic pain-related disability, depression, and somatization (variables of Axis II). The disc displacement diagnoses had no association with Axis II.

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References

Arendt-Nielsen, L., Morlion, B., Perrot, S., Dahan, A., Dickenson, A., Kress, H. G., ... & Mohr Drewes, A. (2018). Assessment and manifestation of central sensitisation across different chronic pain conditions. *European Journal of Pain*, *22*(2), 216-241. DOI: https://doi.org/10.1002/ejp.1140

Ballegaard, V., Thede-Schmidt-Hansen, P., Svensson, P., & Jensen, R. (2008). Are headache and temporomandibular disorders related? A blinded study. *Cephalalgia*, *28*(8), 832-841. DOI: https://doi.org/10.1111/j.1468-2982.2008.01597.x

Bueno, C. H., Pereira, D. D., Pattussi, M. P., Grossi, P. K., & Grossi, M. L. (2018). Gender differences in temporomandibular disorders in adult populational studies: a systematic review and meta-analysis. *Journal of Oral Rehabilitation*, *45*(9), 720-729. DOI: https://doi.org/10.1111/joor.12661

Dahlström, L. (1993). Psychometrics in temporomandibular disorders. An overview. *Acta Odontologica Scandinavica*, *51*(6), 339-352. DOI: https://doi.org/10.3109/00016359309040585

Dıraçoğlu, D., Yıldırım, N. K., Saral, İ., Özkan, M., Karan, A., Özkan, S., & Aksoy, C. (2016). Temporomandibular dysfunction and risk factors for anxiety and depression. *Journal of Back and Musculoskeletal Rehabilitation*, *29*(3), 487-491. DOI: https://doi.org/10.3233/BMR-150644

Dworkin, S. F., & LeResche, L. (1992). Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *Journal of Craniomandibular Disorders: Facial & Oral Pain*, *6*(4), 301-355.

Dworkin, S. F., & Massoth, D. L. (1994). Temporomandibular disorders and chronic pain: disease or illness?. *The Journal of Prosthetic Dentistry*, *72*(1), 29-38. DOI: https://doi.org/10.1016/0022-3913(94)90213-5

Eversole, L. R., Stone, C. E., Matheson, D., & Kaplan, H. (1985). Psychometric profiles and facial pain. *Oral Surgery, Oral Medicine, and Oral Pathology*, *60*(3), 269-274. DOI: https://doi.org/10.1016/0030-4220(85)90310-x

Felício, C. M., Faria, T. G., Silva, M. A. M. R., Aquino, A. M. C. M., & Junqueira, C. A. (2004). Temporomandibular disorder: relationship between otologic and orofacial symptoms. *Revista Brasileira de Otorrinolaringologia, 70*(6), 786-793. DOI: https://doi.org/10.1590/S0034-72992004000600014

Kindler, S., Samietz, S., Houshmand, M., Grabe, H. J., Bernhardt, O., Biffar, R., ... Schwahn, C. (2012). Depressive and anxiety symptoms as risk factors for temporomandibular joint pain: a prospective cohort study in the general population. *The Journal of Pain*, *13*(12), 1188-1197. DOI: https://doi.org/10.1016/j.jpain.2012.09.004

Lee, L. T., Yeung, R. W., Wong, M. C., & McMillan, A. S. (2008). Diagnostic sub-types, psychological distress and psychosocial dysfunction in southern Chinese people with temporomandibular disorders. *Journal of Oral Rehabilitation*, *35*(3), 184-190. DOI: https://doi.org/10.1111/j.1365-2842.2007.01792.x

Manfredini, D., Ahlberg, J., Winocur, E., Guarda-Nardini, L., & Lobbezoo, F. (2011). Correlation of RDC/TMD axis I diagnoses and axis II pain-related disability. A multicenter study. *Clinical Oral Investigations*, *15*(5), 749-756. DOI: https://doi.org/10.1007/s00784-010-0444-4

Manfredini, D., Bandettini di Poggio, A., Cantini, E., Dell'Osso, L., & Bosco, M. (2004). Mood and anxiety psychopathology and temporomandibular disorder: a spectrum approach. *Journal of Oral Rehabilitation*, *31*(10), 933-940. DOI: https://doi.org/10.1111/j.1365-2842.2004.01335.x

Manfredini, D., Landi, N., Bandettini Di Poggio, A., Dell'Osso, L., & Bosco, M. (2003). A critical review on the importance of psychological factors in temporomandibular disorders. *Minerva Stomatologica*, *52*(6), 321-330.

Manfredini, D., Winocur, E., Ahlberg, J., Guarda-Nardini, L., & Lobbezoo, F. (2010). Psychosocial impairment in temporomandibular disorders patients. RDC/TMD axis II findings from a multicentre study. *Journal of Dentistry*, *38*(10), 765-772. DOI: https://doi.org/10.1016/j.jdent.2010.06.007

McCreary, C. P., Clark, G. T., Merril, R. L., Flack, V., & Oakley, M. E. (1991). Psychological distress and diagnostic subgroups of temporomandibular disorder patients. *Pain*, *44*(1), 29-34. DOI: https://doi.org/10.1016/0304-3959(91)90143-L

Miettinen, O., Lahti, S., & Sipilä, K. (2012). Psychosocial aspects of temporomandibular disorders and oral health-related quality-of-life. *Acta Odontologica Scandinavica*, *70*(4), 331-336. DOI: https://doi.org/10.3109/00016357.2011.654241

Nazeri, M., Ghahrechahi, H. R., Pourzare, A., Abareghi, F., Samiee-Rad, S., Shabani, M., ... Abazarpour, R. (2018). Role of anxiety and depression in association with migraine and myofascial pain temporomandibular disorder. *Indian Journal of Dental Research, 29*(5), 583-587. DOI: https://doi.org/10.4103/0970-9290.244932

Ohrbach, R., Turner, J. A., Sherman, J. J., Mancl, L. A., Truelove, E. L., Schiffman, E. L., & Dworkin, S. F. (2010). The research diagnostic criteria for temporomandibular disorders. IV: evaluation of psychometric properties of the Axis II measures. *Journal of Orofacial Pain*, *24*(1), 48-62.

Okeson, J. P. (1996). Orofacial pain: guidelines for assessment, diagnosis, and management. Chicago, IL: Quintenssence.

Pimentel, G., Bonotto, D., Hilgenberg-Sydney, P. B. (2018). Self-care, education, and awareness of the patient with temporomandibular disorder: a systematic review. *Brazilian Journal of Pain, 1*(3), 263-269. DOI: https://doi.org/10.5935/2595-0118.20180050

Plesh, O., Noonan, C., Buchwald, D. S., Goldberg, J., & Afari, N. (2012). Temporomandibular disorder-type pain and migraine headache in women: a preliminary twin study. *Journal of Orofacial Pain*, *26*(2), 91-98.

Rehm, D., Progiante, P. S., Pattussi, M. P., Pellizzer, E. P., Grossi, P. K., & Grossi, M. L. (2019). Depression and somatization in patients with temporomandibular disorders in a population-based cross-sectional study in southern Brazil. *The International Journal of Prosthodontics*, *32*(3), 248-250. DOI: https://doi.org/10.11607/ijp.6209

Rudy, T. E., Turk, D. C., Kubinski, J. A., & Zaki, H. S. (1995). Differential treatment responses of TMD patients as a function of psychological characteristics. *Pain*, *61*(1), 103-112. DOI: https://doi.org/10.1016/0304-3959(94)00151-4

Schiffman, E., Ohrbach, R., Truelove, E., Look, J., Anderson, G., Goulet, J. P., ... Dworkin, S. F.(2014). Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the international RDC/TMD consortium network* and orofacial pain special interest group†. *Journal of Oral & Facial Pain and Headache*, *28*(1), 6-27. https://doi.org/10.11607/jop.1151

Schmitz, N., Hartkamp, N., Kiuse, J., Franke, G. H., Reister, G., & Tress, W. (2000). The symptom check-list-90-R (SCL-90-R): a German validation study. *Quality of Life Research*, *9*(2), 185-193. DOI: https://doi.org/10.1023/a:1008931926181

Sharma, S., Gupta, D. S., Pal, U. S., & Jurel, S. K. (2011). Etiological factors of temporomandibular joint disorders. *National Journal of Maxillofacial Surgery*, *2*(2), 116-119. DOI: https://doi.org/10.4103/0975-5950.94463

Sheng, J., Liu, S., Wang, Y., Cui, R., & Zhang, X. (2017). The link between depression and chronic pain: neural mechanisms in the brain. *Neural Plasticity*, *2017*(1), 9724371. DOI: https://doi.org/10.1155/2017/9724371

Trivedi M. H. (2004). The link between depression and physical symptoms. *The Primary Care Companion to the Journal of Clinical Psychiatry*, *6*(Suppl 1), 12-16.

Valesan, L. F., Da-Cas, C. D., Réus, J. C., Denardin, A., Garanhani, R. R., Bonotto, D., ... Souza, B. (2021). Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. *Clinical Oral Investigations*, *25*(2), 441-453. DOI: https://doi.org/10.1007/s00784-020-03710-w

Vedolin, G. M., Lobato, V. V., Conti, P. C., & Lauris, J. R. (2009). The impact of stress and anxiety on the pressure pain threshold of myofascial pain patients. *Journal of Oral Rehabilitation*, *36*(5), 313-321. DOI: https://doi.org/10.1111/j.1365-2842.2008.01932.x

Von Korff, M., Dworkin, S. F., & Le Resche, L. (1990). Graded chronic pain status: an epidemiologic evaluation. *Pain*, *40*(3), 279-291. DOI: https://doi.org/10.1016/0304-3959(90)91125-3

Von Korff, M., Ormel, J., Keefe, F. J., & Dworkin, S. F. (1992). Grading the severity of chronic pain. *Pain*, *50*(2), 133-149. DOI: https://doi.org/10.1016/0304-3959(92)90154-4

Wright, A. R., Gatchel, R. J., Wildenstein, L., Riggs, R., Buschang, P., & Ellis, E. (2004). Biopsychosocial differences between high-risk and low-risk patients with acute TMD-related pain. *Journal of the American Dental Association*, *135*(4), 474-483. DOI: https://doi.org/10.14219/jada.archive.2004.0213

Yap, A. U., Tan, K. B., Chua, E. K., & Tan, H. H. (2002). Depression and somatization in patients with temporomandibular disorders. *The Journal of Prosthetic Dentistry*, *88*(5), 479-484. DOI: https://doi.org/10.1067/mpr.2002.129375