science, engineering and health studies

Research Article

Science, Engineering and Health Studies
https://lio1.tci-thaijo.org/index.php/sehs
ISSN (Online): 2630-0087

Pain and psychological distress in chronic temporomandibular disorder patients: A systematic review

Zarina Zahari[*], *Hanani Kamaludin, Nurul Fatihah Husien, Maria Justine, Siew Kuan Chua and Norazlin Mohamad*

Centre of Physiotherapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam 42300, Malaysia

***Corresponding author**: Zarina Zahari zarinazahari@uitm.edu.my*

***Received**: 17 November 2020*
***Revised**: 9 March 2021*
***Accepted**: 12 April 2021*
***Published**: 30 November 2021*

***Citation**: Zahari, Z., Kamaludin, H., Husien, N. F., Justine, M., Chua, S. K., and Mohamad, N. (2021). Pain and psychological distress in chronic temporomandibular disorder patients: A systematic review. Science, Engineering and Health Studies, 15, 21050011.*

ABSTRACT

Temporomandibular disorder (TMD) may cause poor pain-related adjustment, which can lead to psychological distress, which in turn may affect quality of life and amplify and continue the pain cycle. This study aimed to determine the association between pain and psychological distress among chronic TMD patients. Electronic databases (i.e. MeSH, ScienceDirect, Google Scholar and EBSCO) available at the Universiti Teknologi MARA were used in the search strategy, and the PRISMA guideline was employed to report the search strategy. Inclusion was reserved to observational studies that evaluated psychological profiles and pain severity with validated outcome measures, and quality assessment was performed using the AXIS tool. A total of 190 studies were obtained via the search strategy; however, only 10 studies were eligible for review. Findings showed that pain severity was positively correlated with degree of psychological distress. Pain levels varied from mild to severe, and depression, stress, anxiety and somatization degrees varied from moderate to severe. In conclusion, pain severity influenced the degree of psychological distress among chronic TMD patients.

Keywords: temporomandibular disorder; pain; psychological distress

1. INTRODUCTION

Temporomandibular disorder (TMD) is a musculoskeletal restriction correlated with joints or intra articular disc temporomandibular joints and muscles surrounding the joints or with a combination of dysfunctions between muscle and joint structures, thereby causing a reduction in the range of motion of the mandible (Halmova et al., 2017).

The prevalence of TMD in the general population ranges from 2.6% to 11.3%, with females four times more at risk than males, owing to fluctuations in women's hormone levels, biological differences and their higher sensitivity to pain (Manfredini et al., 2010). The prevalence of TMD among Asian adolescents is high, with 61.4% of 620 subjects suffering from painful TMD and approximately 19.3%, 54.7% and 23.8% suffering from depression, anxiety and stress, respectively (Lei et al., 2016).

Furthermore, the aetiology of TMD is multifactorial, such as systemic disorders in the pain adaptation process, affecting local structures, such as masticatory structures, and parafunctions (Ohrbach et al., 2017). Moreover, psychological factors are associated with chronic orofacial pain and can affect the stages of TMD, namely,

predisposition, initiation and perpetuation (Monteiro et al., 2011).

Several studies found that most patients suffering from painful TMD demonstrate higher-level psychological distress compared with patients in the pain-free control group (Ferrando et al., 2004; Manfredini et al., 2009). Most chronic TMD patients exhibit poor pain-related adjustment, which can lead to psychological distress, such as anxiety, stress, depression and somatic symptoms. Psychological distress can deteriorate quality of life and amplify and continue the pain cycle (Fillingim et al., 2013; Manfredini et al., 2010).

The prevalence of psychosocial impairment is high among patients suffering from painful TMD (Canales et al., 2018). Moreover, despite the findings of several studies that emotional factors are associated with TMD (Manfredini et al., 2009; Canales et al., 2019; Pesqueira et al., 2010), the association between pain severity and psychological distress among chronic TMD patients has yet to be evaluated systematically. Thus, this study aimed to determine the association between pain severity and psychological distress among chronic TMD patients.

2. MATERIALS AND METHODS

2.1 Search strategy

A literature search of related studies was conducted using the search strategy steps. The population, intervention, comparison and outcomes (PICO) technique was used to define the objective of this study. This technique was employed to set the eligibility criteria for this study.

P: chronic TMD patients aged 17 years or above,

I: not applicable,

C: not applicable,

O: pain severity measurements (graded chronic pain scale [GCPS] and visual analogue scale [VAS]) and psychological profile measurements (symptoms checklist 90R [SCL-90R]).

The electronic search for the period of 2000–2019 was performed at the Universiti Teknologi MARA (UiTM) on the following health science databases: Google Scholar, ScienceDirect, MeSH and EBSCO. The keywords were 'psychological distress', 'depression', 'anxiety', 'stress', 'emotional stress', 'somatization', 'temporomandibular disorder', 'orofacial pain' and 'myofascial pain'. The search was limited to studies with a cross-sectional design on pain with psychological distress among the chronic TMD patients included based on the listed inclusion criteria. The National Health and Medical Research Council (NHMRC) hierarchy level of evidence was used to classify the level of evidence of each included study.

2.2 Study selection

2.2.1 Inclusion criteria

In this study, cross-sectional studies that identified pain with psychological distress among chronic TMD patients were included. This design was chosen, as it observes association or relationship between variables. The TMD population must be diagnosed according to the research diagnostic criteria for TMD (RDC/TMD) or any clinical diagnoses related to TMD. Whilst psychological distress and other related outcomes were measured using the SCL-90R, pain-related disability and other related outcomes were evaluated with the GCPS.

2.2.2 Exclusion criteria

The exclusion criteria included paediatric patients, non-English articles and abstracts not related to the title of this systematic review.

2.2.3 Research tools: critical appraisal instruments

The AXIS tool was used to assess the quality and risk of bias of the included studies, which is suitable across disciplines for cross-sectional studies, systematic reviews, guidelines and clinical decision making (Downes et al., 2016). A total of five domains were included, that is, the study introduction, methods, results and discussion and 20 items from the AXIS tool. Each item included three responses ('yes', 'no' and 'I don't know'), increasing the score by one for each 'yes' answer. Each study was given a score ranging from 0 to 20. Based on these scores, each study was categorized into three groups (good: >15 points, fair: 10-15 points and poor: <10 points).

2.2.4 Risk of bias assessment

The AXIS tool was used by two independent reviewers (i.e., Z.Z. and C.S.K.) to analyze the risk of bias of the included studies. The quality of the studies was analyzed based on the methods and results of the study. The risk of bias of each study was rated as follows: high risk of bias, some concerns and low risk of bias. Disagreements on the risk assessment ratings were resolved by a consensus. When consensus could not be reached, a third independent researcher (i.e., N.M.) was consulted to resolve differences and make the final decision.

2.2.5 Data extraction

Data on the study design, sample size, inclusion criteria, exclusion criteria, outcome measures, results and conclusion of each selected study were extracted and demonstrated in (Table 1).

Evidence was collected, analyzed and interpreted following several steps. Firstly, the articles were downloaded from the online databases and graded using the guidelines of the NHMRC evidence hierarchy. During the literature search, 10 articles were found on the aforementioned databases. Secondly, the articles were critically appraised using the AXIS tool. Thirdly, the data with an AXIS score were analyzed using SPSS version 20. Descriptive analysis was conducted to determine the mean, median, minimum and maximum scores, standard deviation and variance of the articles.

3. RESULTS

3.1 Selection process of eligible studies

A total of 190 articles were identified from the four databases; however, only 10 studies met the eligibility criteria and thus were selected for the analysis. The PRISMA flow diagram was used to present the selection process for the studies as illustrated in (Figure 1).

3.2 Articles supporting the association between pain and psychological distress in chronic TMD patients

The 10 articles included in this study were cross-sectional studies. Each of the selected articles in this study supported or proposed the association between pain severity and degree of psychological distress, such as anxiety, depression,

somatization and stress, among chronic TMD patients. Chronic TMD with low disability but high pain intensity measured by the GCPS had a significant correlation with degree of depression and somatization quantified using the SCL-90R (Manfredini et al., 2010a; Fillingim et al., 2013; Manfredini et al., 2010b).

Moreover, two studies reported the positive correlation between anxiety level and chronic pain degree (Monteiro et al., 2011; Pesqueira et al., 2010), whereas one study (Jo et al., 2016) reported the significant association between severity of depression and pain intensity. In addition, one study (Manfredini et al., 2010) proposed the significant correlation between somatization, depression and stress levels and pain intensity. A positive correlation existed between pain severity and depression and anxiety level (Madland et al., 2000). Furthermore, increased TMD pain intensity was associated with high levels of depression, somatization, stress and anxiety (Su et al., 2017).

4. DISCUSSION

4.1 Relationship between pain and psychological distress among chronic TMD patients

To the best of our knowledge, this study is the first to systematically review the association between pain severity and psychological distress among chronic TMD patients. This current study is related to the research of Patil et al. (2016), which showed that chronic orofacial pain is associated with high levels of stress and depression. All the chronic TMD patients were diagnosed with the same tool, namely, the RDC/TMD. Patil et al. (2016) used outcome measures similar to another review to measure pain intensity, that is, the VAS and Beck's depression inventory (BDI), and the stress symptom rating scale to evaluate patients' psychological profiles (Jo et al., 2019). The development process of central sensitization in chronic TMD pain causes plastic changes at either the spinal or supraspinal level and can lead to the modification of the pain modulation descending pathway, thereby enhancing pain intensity and disability (Staud, 2011).

Moreover, psychological distress may enhance masticatory muscles, such as masseter muscle activation and constant contract, thereby amplifying pain severity in TMD patients compared with healthy patients (Tsai et al., 2002).

The association between depression and stress and pain severity was determined by Sruthi et al. (2018). However, the study did not support the association between anxiety level and pain intensity. Moreover, the study used one tool to measure psychological factors, that is, a 42-item questionnaire (i.e., DASS-42), and a numerical rating scale to evaluate degree of stress, depression and anxiety and pain intensity. These studies showed that the use of different assessment tools of psychometric scales may influence the results of a study.

In chronic TMD patients, stress can affect not only psychological aspects but also several symptoms in various systems, including the masticatory motor system (Berger et al., 2015; Lorduy et al., 2013). Stress is also correlated with specific physiological modifications and affected by the development of somatic diseases. Meanwhile, depressed patients demonstrate increased pain intensity and functional limitations owing to neurobiological factors, as the same neurotransmitters are involved in pain transmission and mood control (Goesling et al., 2013).

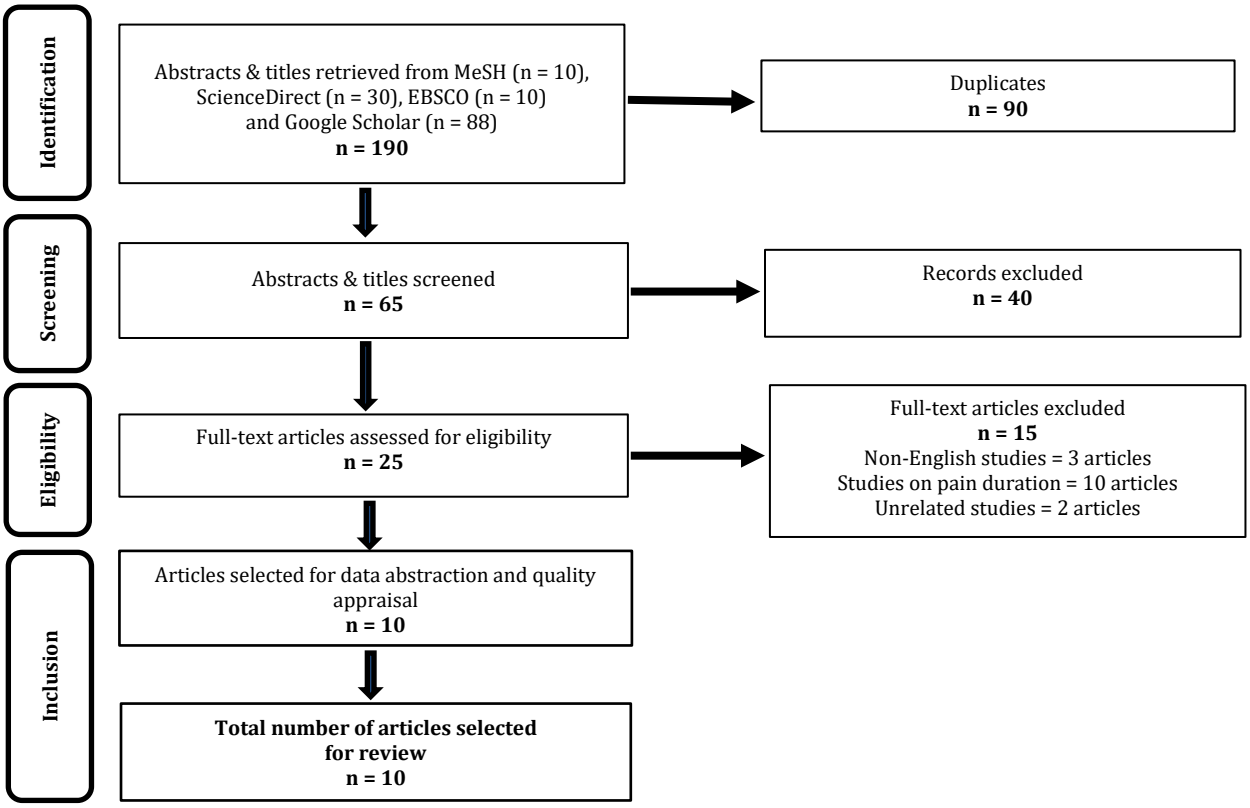

Figure 1: PRISMA flow diagram of search strategy

Table 1: Data extracted from selected articles

Author	Study design	N	Inclusion criteria	Exclusion criteria	Outcome measures	Results	Conclusions	AXIS score	Quality
Canales et al., 2019	Cross-sectional study	N = 691	Age: 18–61 years; Pain related to TMD	Age: < 18 years; presence of polyarthritis	GCPS and SCL-90R	High pain-related disability with severe/moderate depression and somatisation	↑ intensity pain and moderate somatisation and depression	11/20	Fair
Manfredini et al., 2010a	Cross-sectional study	N = 111	TMD pain lasting > 6/12	Patients diagnosed with otolaryngeal or neurologic	GCPS and SCL-90R	Severe/moderate somatisation with a score of 47.7% and depression with a score of 39.6%; GCPS ↓ disability & intensity ↑	Significant correlation: chronic pain with somatisation level	12/20	Fair
Manfredini et al., 2010b	Cross-sectional study	N = 1149	TMD pain patients	N/A	GCPS and SCL-90R	↑ pain-related disability; severe depression and somatisation was 16.9%, 21.4% and 28.5%	Related: depression and somatisation with pain severity	14/20	Fair
Monteiro et al., 2011	Cross-sectional study	N = 150	Age: 17–30 years; university students in Brazil	Patients diagnosed with psychosis or dementia	RDC/TMD and Spielberger's Inventory of Anxiety	48.6% with moderate anxiety; Intensity pain: degree 1: 85.7%	Related: trait anxiety with chronic orofacial pain	14/20	Fair
Jasim et al., 2013	Cross-sectional study	N = 78	Ch.: > 6/12 Ac: < 10 days	Patients with systemic inflammatory disease	GCPS, PSS-14 and SCL-90R	Acute & chronic, ↑ intensity of pain; chronic pain ↑ score of perceived stress scale	Psychological distress correlation: chronic with ↑ intensity pain	15/20	Fair
Su et al., 2017	Cross-sectional study	N = 320	Age: > 18 years; diagnosed with TMD	N/A	CPI Scale, GAD-7 and PHQ-15	51.3% with ↑ intensity pain; ↑ pain intensity associated with severe anxiety, somatisation and depression	Depression: predictor of pain disability Somatisation: predictor of pain intensity	15/20	Fair
Jo et al., 2016	Cross-sectional study	N = 52	Females aged between 20 and 40 years	Patients with neurological deficits	CPI scale and BDI II	CPI significantly associated with BDI-II subscale score	Related: pain intensity and chronic TMD	13/20	Fair
Guarda-Nardini et al., 2012	Cross-sectional study	N = 110	Patients diagnosed with TMD	Patients diagnosed with systemic disorders	VAS, HDS, HARS and SCL-90R	Correlation analysis: VAS scores significantly related to HARS	Relationship: ↑ intensity pain with depression, anxiety and somatisation	13/20	Fair
Pesqueira et al., 2010	Cross-sectional study	N = 150	Age: 17–3 years; university students	N/A	PRDC/TMD, AXIS and Spielberger's Inventory of Anxiety	Association between degree of chronic TMD and state of anxiety ($p = 0.008$; $p<0.05$)	High degree of chronic TMD has positive association with anxiety	11/20	Fair
Madland et al., 2000	Cross-sectional study	N = 80	Patients with facial arthromyalgia	Patients with psychiatric illness	CSQ, McGill Pain PHAD and OHIP	Significant correlations ($P<0.01$): anxiety and depression scores (HAD) and pain	Anxiety is associated with pain and 'psychological' pain beliefs	14/20	Fair

4.2 Methodological considerations

Studies investigating pain and psychological distress among chronic TMD patients are lacking. Most of the unselected studies conducted research among university students, whose pain levels were not in the chronic stage, and evaluated pain based on certain areas, such as muscle pain, rather than intensity. Thus, only 10 studies met the inclusion criteria, which made drawing firm conclusion about the correlation between pain and psychological distress difficult. All the reviewed articles included in this study are cross-sectional studies, which have a low hierarchy of evidence level. Cross-sectional studies should explore the relationships between variables observed in specific times and populations and measure exposure and results simultaneously. Hence, such a study design would be easy to conduct within a short period and relatively fast, as it measures variables simultaneously.

4.3 Strengths and limitations

This study describes the search strategy using the PRISMA guideline. All the selected studies are of fair quality (with scores ranging from 10 to 15), with a heterogenous cross-sectional design. The combination of various databases available at the UiTM enabled the retrieval of relevant articles related to the topic and objective of this study. However, this study has several limitations. Firstly, each reviewed article evaluated different types of psychological distress and used various psychometric scales, which made recognizing the type of psychological distress suffered by patients with TMD difficult. Secondly, limited evidence was presented to evaluate the correlation between pain and psychological distress among chronic TMD patients.

4.4 Application in clinical practice

This study demonstrates that pain intensity can influence the prevalence of psychological distress among patients with chronic TMD. Thus, it can provide insights to practitioners for evaluating psychological factors with pain intensity. As the complexity of psychological aspects increases, multidisciplinary teams can benefit from the management of chronic TMD.

5. CONCLUSION

This study showed that pain severity was associated with psychological distress among patients with chronic TMD. Evaluating psychological profiles to assess pain severity among such patients is essential. Further research on TMD with high quality and degree of evidence should be conducted to provide superior conclusive outcomes.

REFERENCES

Berger, M., Oleszek-Listopad, J., Marczak, M., and Szymanska, J. (2015). Psychological aspects of temporomandibular disorders – literature review. *Current Issues in Pharmacy and Medical Sciences*, 28(1), 55-59.

Canales, G. D., Guarda-Nardini, L., Rizzatti-Barbosa, C. M., Conti, P. C., and Manfredini, D. (2019). Distribution of depression, somatization and pain-related impairment in patients with chronic temporomandibular disorders. *Journal of Applied Oral Science*, 27, e20180210.

Canales, G. D., Câmara-Souza, M. B., Muñoz Lora, V. R., Guarda-Nardini, L., Conti, P. C., Rodrigues Garcia, R. M., Del Bel Cury, A. A., and Manfredini, D. (2018). Prevalence of psychosocial impairment in temporomandibular disorder patients: A systematic review. *Journal of Oral Rehabilitation*, 45(11), 881-889.

Downes, M. J., Brennan, M. L., Williams, H. C., and Dean, R. S. (2016). Development of a critical appraisal tool to assess the quality of cross-sectional studies (AXIS). *BMJ Open*, 6, e011458.

Fillingim, R. B., Ohrbach, R., Greenspan, J. D., Knott, C., Diatchenko, L., Dubner, R., and Maixner, W. (2013). Psychological factors associated with development of TMD: The OPPERA prospective cohort study. *The Journal of Pain*, 14(12), T75-T90.

Ferrando, M., Andreu, Y., José Galdón, M., Durá, E., Poveda, R., and Vincente Bagán, J. (2004). Psychological variables and temporomandibular disorders: Distress, coping, and personality. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*, 98(2), 153-160.

Goesling, J., Clauw, D. J., and Hassett, A. L. (2013). Pain and depression: An integrative review of neurobiological and psychological factors. *Current Psychiatry Reports*, 15(12), 421.

Guarda-Nardini, L., Pavan, C., Arveda, N., Ferronato, G., and Manfredini, D. (2012). Psychometric features of temporomandibular disorders patients in relation to pain diffusion, location, intensity and duration. *Journal of Oral Rehabilitation*, 39(10), 737-743.

Halmova, K., Holly, D., and Stanko, P. (2017). The influence of cranio-cervical rehabilitation in patients with myofascial temporomandibular pain disorders. *Bratislava Medical Journal*, 118(11), 710-713.

Jasim, H., Louca, S., Christidis, N., and Ernberg, M. (2013). Salivary cortisol and psychological factors in women with chronic and acute oro-facial pain. *Journal of Oral Rehabilitation*, 41(2), 122-132.

Jo, K. B., Lee, Y. J., Lee, I. G., Lee, S. C., Park, J. Y., and Ahn, R. S. (2016). Association of pain intensity, pain-related disability, and depression with hypothalamus–pituitary–adrenal axis function in female patients with chronic temporomandibular disorders. *Psychoneuroendocrinology*, 69, 106-115.

Lei, J., Fu, J., Yap, A. U., and Fu, K. (2016). Temporomandibular disorders symptoms in Asian adolescents and their association with sleep quality and psychological distress. *The Journal of Craniomandibular & Sleep Practice*, 34(4), 242-249.

Lorduy, K. M., Liegey-Dougall, A., Haggard, R., Sanders, C. N., and Gatchel, R. J. (2013). The Prevalence of comorbid symptoms of central sensitization syndrome among three different groups of temporomandibular disorder patients. *Pain Practice*, 13(8), 604-613.

Madland, G., Feinmann, C., and Newman, S. (2000). Factors associated with anxiety and depression in facial arthromyalgia. *Pain*, 84(2), 225-232.

Manfredini, D., Borella, L., Favero, L., Ferronato, G., and Guarda-Nardini, L. (2010a). Chronic pain severity and depression/somatization levels in TMD patients. *The International Journal of Prosthodontics*, 23(6), 529-534.

Manfredini, D., Marini, M., Pavan, C., Pavan, L., and Guarda-nardini, L. (2009). Psychosocial profiles of painful TMD patients. *Journal of Oral Rehabilitation*, 36(3), 193-198.

Manfredini, D., Winocur, E., Ahlberg, J., Guarda-Nardini, L., and Lobbezoo, F. (2010b). Psychosocial impairment in temporomandibular disorders patients. RDC/TMD axis II findings from a multicentre study. *Journal of Dentistry*, 38(10), 765-772.

Monteiro, D. R., Zuim, P. R., Pesqueira, A. A., Ribeiro, P. D., and Garcia, A. R. (2011). Relationship between anxiety and chronic orofacial pain of temporomandibular disorder in a group of university students. *Journal of Prosthodontic Research*, 55(3), 154-158.

Ohrbach, R., and Durham, J. (2017). Biopsychosocial aspects of orofacial pain. *Contemporary Oral Medicine*, 1-21.

Patil, D., Dheer, D., Puri, G., Konidena, A., Dixit, A., and Gupta, R. (2016). Psychological appraisal in temporomandibular disorders: A cross-sectional study. *Indian Journal of Pain*, 30(1), 13-18.

Pesqueira, A. A., Zuim, R. J., Monteiro, D. R., Prado Ribeiro, P. D., and Garcia, A. R. (2010). Relationship between psychological factors and symptoms of TMD in university undergraduate students. *Acta Odontologica Latinoamericana*, 23(3), 180-187.

Su, N., Lobbezoo, F., Van Wijk, A., Van der Heijden, G. J., and Visscher, C. M. (2017). Associations of pain intensity and pain-related disability with psychological and socio-demographic factors in patients with temporomandibular disorders: a cross-sectional study at a specialised dental clinic. *Journal of Oral Rehabilitation*, 44(3), 187-196.

Sruthi, S., Jimsha, V. K., Srinivasan, S. V., and Daniel, J. M. (2018). Prevalence of depression, anxiety and stress in chronic temporomandibular joint disorders patients. *Journal of Depression and Anxiety*, 7(4), 1000322.

Staud, R. (2011). Evidence for shared pain mechanisms in osteoarthritis, low back pain, and fibromyalgia. *Current Rheumatology Reports*, 13(6), 513-520.

Tsai, C., Chou, S., Gale, E. N., & Mccall, W. D. (2002). Human masticatory muscle activity and jaw position under experimental stress. *Journal of Oral Rehabilitation*, 29(1), 44-51.