Personality Traits and Anxiety in Patients With Temporomandibular Disorders

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Abstract

Background

Temporomandibular disorders have long been suggested to result from psychological factors. Recent studies, however, tend to consider TMD a chronic psychosomatic illness. The present study was designed to explore the association between TMD and personality profile. The Minnesota Multiphasic Personality Inventory-2-Reconstructed form was used to evaluate the association for the first time.

Methods

A total of 258 subjects were participated in this case-control study. TMD cases as detected by Helkimo index were questioned regarding their personality characteristics and anxiety levels using MMPI-2-RF and Spielberger state and trait anxiety inventory.

Results

Patients with TMD scored higher on all personality characteristics except for Aberrant Experiences. The psychological profile of TMD showed no significant difference between theoretical and experimental ideas of persecution means. Patients with TMD reported significantly higher mean levels of state and trait anxiety than controls. The most frequently found anxiety levels in TMD cases have been mild state and trait anxiety (77.5% versus 74.4%).

Conclusion

Personality characteristic scores were considerably higher in TMD patients. TMD cases detected by Helkimo index manifest both trait and state anxiety as common findings.

Background

Chronic pain is a complex phenomenon, involving both psychological and physical aspects. Chronic pain has been studied for a long time using various behavioral and personality inventories [1]. In particular, chronic pain is conceptualized as multidimensional with sensory, cognitive, and social influences. A psychometric instrument called Minnesota Multiphasic Personality Inventory was designed to differentiate between the psychological and physical causes of chronic pain by identifying the personality traits common to these individuals [2]. The updated version of the inventory, assesses the contemporary models of personality and psychopathology. Practitioners are likely to find this to be a useful tool in detecting individuals who pretend to have physical health problems [3].

The assumption that psychological factors can contribute to temporomandibular joint dysfunction has been developed during 1950s [4]. Since then, the influence of emotional traits on TMDs has received much attention [5]. Psychological functioning has been associated with the duration of TMD pain, as with other types of pain [6]. A comparison of TMD and control subjects by Ferrando et al. revealed
different psychological characteristics [7]. The TMD cases are typically more prone to stress despite being no more anxious than controls [8]. Even so, many TMD patients are not aware of their emotional states [9]. There is however a need to pay attention to the multiple aspects of TMD in order to ensure their quality of life and general health. [10].

The American researchers recently found that somatic symptoms are strongly related to TMD onset [11]. In addition, psychological factors have a more significant impact on TMJ pain that is muscular in origin [12, 13]. A pain measure for TMD patients developed by Martti Helkimo in 1974 is called an amnestic index [14, 15].

The use of various inventories to measure personality traits in these patients, including earlier forms of the MMPI, has been widely discussed. Orofacial pain has been discussed in terms of older versions of the inventory, that is, the MMPI and MMPI-2 [5]. In this study we apply MMPI-2-RF to assess personality traits in TMD cases for the first time. Additionally, Spielberger state and trait anxiety inventory was used in the present study to assess patients' anxiety.

**Methods**

A case-control study was conducted to assess the anxiety and personality traits of random outpatients visiting the Golestan University of Medical Sciences (GOUMS). The inclusion criteria were as follows:

I. Conscious participation in the study

II. Adults aged 18 years old or older (80 years at most), according to MMPI-2-RF manual

III. No systemic disease affecting the lower jaw (e.g. RA, Scleroderma, Sarcoidosis, Psoriasis, Behcet's disease)

IV. No previous trauma to the mandible

V. No previous orthodontic treatment

VI. No unilateral or bilateral loss of four posterior teeth

Cases of TMD were detected with Helkimo index (anamnestic component [AI] and clinical dysfunction component [Di]). Controls were also selected from GOUMS visitors who did not have TMD and were matched on the basis of their gender and age (5 years). A total of 129 individuals participated in each group. All methods were performed in accordance with the relevant guidelines and regulations. A number of variables were used to analyze this study, including the following: sex, age, educational level, personality traits (characteristics) based on the MMPI-2-RF, anxiety based on the Spielberger State - Trait Anxiety Inventory, and detection of TMD, based on the Helkimo index.

A Helkimo index (1974) identifies TMD, maximal mouth opening, jaw deviation, TMJ function, and TMJ/muscle pain. The severity of TMD is determined by the sum of the measurements of approximately...
MMPI-2-RF (2008) is a self-report inventory comprising 338 items designed to represent the clinically significant items in the MMPI-2. Six sets of scales are included in the test, including the validity, higher order, restricted clinical, specific problem, interest, and personality psychopathology five scales [3].

The Spielberger State-Trait Anxiety Inventory (1970) consists of two sets of twenty items, which provide scores that indicate both the level of anxiety the subject has at present (state) and the extent to which the person is prone to experience anxiety (trait) [8]. The sample size required for the current study was determined based on a study conducted by Meldolesi. et al [9]. It was determined that 129 subjects for each group, resulting in a total of 258 subjects, was required to achieve a CI level of 0.95, 80 percent power for analysis, and minimal error.

**Statistical Analyses**

SPSS version 18 was used for describing the means, standard deviation, ranking means, frequency, and percentage. Participants were assessed using MMPI-2-RF and Spielberger State - Trait Anxiety Inventory. An independent t-test or non-parametric Mann-Whitney test was used to compare anxiety levels and personal characteristics. A Chi-square test was used to test qualitative variables such as ranking means for anxiety levels. All analyses were considered significant at the level of 0.05.

**Results**

A total of 258 individuals participated in the study. Among the subjects were 130 men (50.38%) and 128 women (49.62%). The TMD group consisted of 65 men (50.38%) and 64 women (49.61%). In the healthy control group, the gender distribution was the same. The age range was 21 to 25 years (28.98 ± 7.01). The case group's age was 28.98 ± 6.93 years compared to 28.98 ± 7.25 years in the control group. A non-parametric Mann-Whitney test showed no significant difference between TMD and control group. In terms of education level, 63.8 % of control and 71.3 % of patient groups had a bachelor's degree or higher. According to the chi-square test, the difference in educational level - including those with less than a bachelor's degree - was non-significant.

The proportions of TMD patients with relatively mild, relatively severe, and mild traits of anxiety were 77.5 %, 19.4 %, and 3.1 %, respectively. Similarly, 74.4 %, 22.5 %, and 3.1 % of the TMD cases also had state anxiety that was relatively mild, relatively severe, and mild, respectively. TMD patients showed significantly higher means of both trait and state anxiety compared with controls (P-value < 0.0001).

In regards to the three facets; Difficulty Identifying Feelings, Difficulty Describing Feelings and Externally Oriented Thinking of personality characteristics, there is a significant difference between the experimental and theoretical means in TMD case (P-value < 0.0001; one sample t-test). Experimental means are lower than theoretical means in the present study. In other words, three facets are below the expected level or average. Other personality characteristics, with the exception of persecution ideas, have experimental
means significantly less than theoretical means, as shown in Table 1. Therefore, ideas of persecution are about average, while other characteristics are below average.

Personality features such as DIF, EOT, demoralization, somatic complaints, low positive emotions, antisocial behavior, ideas of persecution and dysfunctional negative emotions, are more pronounced among TMD groups than those of controls (Table 2 and 3).

According to the Helkimo index, anamnestic evaluations of TMD subjects revealed that 58.91 %, 24.8 %, and 41.86 % of them experienced joint sound, pain, and fatigue (Table 4). Within the Clinical dysfunction component, 58.13 % had limited mouth opening, 22.48 % had locked mandibles, and 24.80 % had jaw deviation. (Table 4).

There was mild, moderate, and severe dysfunction in 23.64 %, 20.54 %, and 5.81 % of the TMD subjects, respectively. Among the subjects, the majority (61.24%) were symptom-free, followed by 18.21% with mild symptoms, and 22.09% with severe symptoms. (Table 5).

**Discussion**

TMJ literature indicates increased levels of stress and anxiety in TMD cases. According to the Spielberger State Trait Anxiety Inventory, TMD patients showed a markedly greater anxiety level compared with control participants in the present study. Our study was consistent with a study by Vojdani and her colleagues that demonstrated higher levels of state and trait anxiety in TMD patients than in healthy controls [16].

As a result of such components as personality characteristics, our study also reported significantly higher scores in TMD patients than in controls. Tables 4 and 5 listed three facets and personality characteristics that were more prevalent in the TMD group than in the control group. These are DIF and EOT, demoralization, somatic complaints, low positive emotions, antisocial behavior, ideas of persecution and dysfunctional negative emotions. The results may not be compared to previous research, as MMPI-2-RF has not been used for TMD. The Spielberger anxiety inventory and MMPI-2-RF findings of the present study can be understood in light of Aurebach's comments that TMD cases are more likely to be exposed to stressful experiences in their lives. [13].

With respect to personal characteristics such as EOT, cynicism and aberrant experiences in TMD and control groups, there was no significant differences between ranking means. In line with this, McNeil et al. found no difference between TMD and the control group in terms of those characteristics [17]. In our study, however, we found that the ranking means for difficulty describing feelings and hypomanic activation were higher for controls than for TMD patients (Tables 2 and 3).

TMD patients and dysfunctional patients with higher levels of emotional problems show significant improvement when offered treatments such as stress management/biofeedback and intraoral appliances. This clearly shows that psychological factors have a significant effect on TMD [18, 19].
Similarly, Tversky and Reade provided supportive psychotherapy to TMD patients rather than occlusal splints and anti-depressants [20]. According to Blackburn et al., cognitive therapy was superior to drug treatment [21].

Additionally, our study did not differentiate between sample means of psychological profiles, such as anxiety and personality characteristics, according to the level of education. We may announce that education levels did not affect anxiety and personality characteristics. In a study by Adriani and colleagues, there was no difference between graduate students seeking a master's or a doctorate degree regarding anxiety levels or emotional stress; our results appear to be comparable [22]. Despite this, graduates from community colleges were more likely to experience anxiety than graduates from universities [23]. TMD patients may be caused to engage in pain-evoking behaviors as a result of adjunctive behaviors, such as uncertainty in their illness [24, 25].

**Limitation**

As MMPI2-RF is a lengthy questionnaire, sufficient time and effort was required for patient cooperation.

**Conclusion**

Based on the results of this study, there are significant differences between the means of State/Trait anxiety in TMD patients and controls. Trait anxiety and state anxiety are common findings in TMD cases detected by the Helkimo index. TMD patients' personality characteristic scores tend to be significantly higher than those of controls.

**Abbreviations**

TMD: Temporomandibular disorders; TMJ: Temporomandibular joint; MMPI-2-RF: Minnesota Multiphasic Personality Inventory-2-Reconstructed form; MMPI: Minnesota Multiphasic Personality Inventory; STAI: Spielberger State - Trait Anxiety Inventory; DIF: Difficulty Identifying Feelings; DDF: Difficulty Describing Feelings; EOT: Externally Oriented Thinking.

**Declarations**

**Ethics approval and consent to participate**

This research was approved by the Ethical Committee of Golestan University of Medical Sciences, Iran (IR.GOUMS.1397.022), which was performed in accordance with the current and seventh edition of the Declaration of Helsinki. Written consent was obtained from participants after they were informed about the study.

**Consent for publication**
Not applicable

**Availability of data and materials**

The datasets generated and/or analysed during the current study are not publicly available due to confidentiality of information, but are available from the corresponding author on reasonable request.

**Competing interests**

The authors declare that they have no competing interests.

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**Authors' contributions**

NM assisted in Conceptualization, Methodology, Supervision, Original draft preparation, Review and editing. RBOD assisted in Data collection, Original draft preparation, Review and editing. MAV assisted in Methodology, Data Analysis, Original draft preparation, Review and editing. AH assisted in Data collection, Original draft preparation. All authors have read and approved the final manuscript.

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**References**

1. Merrill RL, Goodman D. Chronic Orofacial Pain and Behavioral Medicine. Oral Maxillofac Surg Clin North Am. 2016;28(3):247-60.

2. Naylor B, Boag S, Gustin SM. New evidence for a pain personality? A critical review of the last 120 years of pain and personality. Scand J Pain. 2017;17:58-67.

3. Sellbom M, Wygant D, Bagby M. Utility of the MMPI-2-RF in detecting non-credible somatic complaints. Psychiatry Res. 2012;197(3):295-301.
4. Rothwell PS. Personality and temporomandibular joint dysfunction. Oral Surgery, Oral Medicine, Oral Pathology. 1972;34(5):734-42.

5. Mongini F, Rota E, Evangelista A, Ciccone G, Milani C, Ugolini A, et al. Personality profiles and subjective perception of pain in head pain patients. Pain. 2009;144(1-2):125-9.

6. Gatchel RJ, Garofalo JP, Ellis E, Holt C. Major psychological disorders in acute and chronic TMD: an initial examination. J Am Dent Assoc. 1996;127(9):1365-70, 72, 74.

7. Ferrando M, Andreu Y, Galdon MJ, Dura E, Poveda R, Bagan JV. Psychological variables and temporomandibular disorders: distress, coping, and personality. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2004;98(2):153-60.

8. Southwell J, Deary I, Geissler P. Personality and anxiety in temporomandibular joint syndrome patients. Journal of oral rehabilitation. 1990;17(3):239-43.

9. Meldolesi G, Picardi A, Accivile E, Toraldo di Francia R, Biondi M. Personality and psychopathology in patients with temporomandibular joint pain-dysfunction syndrome. A controlled investigation. Psychother Psychosom. 2000;69(6):322-8.

10. Resende CMBMd, Alves ACdM, Coelho LT, Alchieri JC, Roncalli ÂG, Barbosa GAS. Quality of life and general health in patients with temporomandibular disorders. Brazilian Oral Research. 2013;27:116-21.

11. Fillingim RB, Ohrbach R, Greenspan JD, Knott C, Diatchenko L, Dubner R, et al. Psychological factors associated with development of TMD: the OPPERA prospective cohort study. J Pain. 2013;14(12 Suppl):T75-90.

12. Scholte AM, Steenks MH, Bosman F. Characteristics and treatment outcome of diagnostic subgroups of CMD patients: retrospective study. Community Dentistry and Oral Epidemiology. 1993;21(4):215-20.

13. Auerbach SM, Laskin DM, Frantsve LM, Orr T. Depression, pain, exposure to stressful life events, and long-term outcomes in temporomandibular disorder patients. J Oral Maxillofac Surg. 2001;59(6):628-33; discussion 34.

14. Helkimo M. Studies on function and dysfunction of the masticatory system. Acta Odontologica Scandinavica. 1974;32(4):255-67.

15. Rani S, Pawah S, Gola S, Bakshi M. Analysis of Helkimo index for temporomandibular disorder diagnosis in the dental students of Faridabad city: A cross-sectional study. J Indian Prosthodont Soc. 2017;17(1):48-52.

16. Vojdani M, Dehbozorgi G, Mohammadzadeh S, A. AJ. Comparison of anxiety and depression in patients with temporomandibular disorders and healthy individuals. Journal of Islamic Dental Association of IRAN. 2007 19(1):90.
17. McNeill C. Current Controversies in Temporomandibular Disorders. 2nd ed. Illinois: Quintessence Publishing Co Inc., U.S. (1676); 1992.

18. Rudy TE, Turk DC, Kubinski JA, Zaki HS. Differential treatment responses of TMD patients as a function of psychological characteristics. Pain. 1995;61(1):103-12.

19. Turk DC, Zaki HS, Rudy TE. Effects of intraoral appliance and biofeedback/stress management alone and in combination in treating pain and depression in patients with temporomandibular disorders. J Prosthet Dent. 1993;70(2):158-64.

20. Tversky J, Reade PC, Gerschman JA, Holwill BJ, Wright J. Role of depressive illness in the outcome of treatment of temporomandibular joint pain-dysfunction syndrome. Oral Surg Oral Med Oral Pathol. 1991;71(6):696-9.

21. Blackburn IM, Bishop S, Glen Al, Whalley LJ, Christie JE. The efficacy of cognitive therapy in depression: a treatment trial using cognitive therapy and pharmacotherapy, each alone and in combination. Br J Psychiatry. 1981;139:181-9.

22. Rezaei Adryani M, Azadi A, Ahmadi F, Azimi AV. Comparison level of stress, anxiety, depression and quality of life in dormitory resident students. Iranian Journal of Nursing Research. 2007;4(2):31-8.

23. Norouzinia R, Aghabarari M, Karimi M, Sabzmakan L, Mirkarimi M, Khorasani M. Survey of Anxiety Levels and Its Relation to Students Demographic of Alborz University of Medical Sciences. Alborz University Medical Journal. 2012;1(4):200-6.

24. Glaros AG, Lumley MA. Alexithymia and pain in temporomandibular disorder. J Psychosom Res. 2005;59(2):85-8.

25. Yang D-y, Ye J-j, Zhou F, Li J-j, Huang Q-y, Wan L-h. Relationship between uncertainty in illness, mood state and coping style in patients with temporomandibular disorders. International Journal of Nursing Sciences. 2015;2(4):361-5.

Tables

Table 1. Evaluation of Personality Characteristic Scores in TMD cases
| Personality Characteristic Scores | Theoretical Mean | Experimental Mean | P-value |
|-----------------------------------|------------------|------------------|---------|
| Demoralization                    | 65               | 59.18            | < 0.0001|
| Somatic Complaints                | 65               | 58.89            | < 0.0001|
| Low Positive Emotions             | 65               | 58.79            | < 0.0001|
| Cynicism                          | 65               | 59.43            | < 0.0001|
| Ideas of Persecution              | 65               | 63.15            | 0.146   |
| Dysfunctional Negative Emotions   | 65               | 59.12            | < 0.0001|
| Aberrant Experiences              | 65               | 58.49            | < 0.0001|
| Hypomanic Activation              | 65               | 51.03            | < 0.0001|
| Antisocial Behavior               | 65               | 49.02            | < 0.0001|

**Table 2.** Comparison of Personality Characteristic Scores in TMD cases / controls
| Personality Characteristic Scores | Case                      | Control                   | Statistics            |
|-----------------------------------|---------------------------|---------------------------|-----------------------|
|                                   | Mean          | Std. Dev. | Ranking Mean | Mean           | Std. Dev. | Ranking Mean | Mann-Whitney U P-value |
| Demoralization                    | 59.18         | 6.63      | 151.80      | 54.36          | 6.01      | 107.20      | 5443.500 < 0.0001      |
| Somatic Complaints               | 58.89         | 8.58      | 154.21      | 52.99          | 9.05      | 104.79      | 5132.500 < 0.0001      |
| Low Positive Emotions            | 58.79         | 9.66      | 144.49      | 54.58          | 8.13      | 114.51      | 6387.000 0.001         |
| Cynicism                         | 59.43         | 7.60      | 137.92      | 58.23          | 5.50      | 121.08      | 7234.000 0.050         |
| Ideas of Persecution             | 63.15         | 13.25     | 143.78      | 59.48          | 4.37      | 115.22      | 6478.500 0.002         |
| Dysfunctional Negative Emotions  | 59.12         | 8.22      | 138.74      | 56.65          | 6.54      | 120.26      | 7129.000 0.045         |
| Aberrant Experiences             | 58.49         | 10.64     | 124.61      | 59.15          | 7.04      | 134.39      | 7690.000 0.287         |
| Hypomanic Activation             | 51.03         | 7.83      | 111.43      | 54.17          | 5.10      | 147.57      | 5989.000 < 0.0001      |
| Antisocial Behavior              | 49.02         | 7.16      | 146.02      | 45.91          | 4.73      | 112.98      | 6189.500 < 0.0001      |

Table 3. Comparison of Three Facet* Scores in TMD cases / controls
### Studied Groups

| Score                              | Case       | Control     | Statistics |
|------------------------------------|------------|-------------|------------|
|                                    | Mean       | Std. Dev.   | Ranking Mean | Mean       | Std. Dev. | Ranking Mean | Mann-Whitney U P-value |
| Difficulty Identifying Feelings (DIF) | 56.86      | 8.08        | 157.99      | 50.48      | 5.40      | 101.01      | 4645.500 < 0.0001 |
| Difficulty Describing Feelings (DDF)  | 51.31      | 7.30        | 113.72      | 54.04      | 4.73      | 145.28      | 6285.000 0.001   |
| Externally Oriented Thinking (EOT)   | 59.51      | 12.66       | 135.27      | 57.15      | 5.70      | 123.73      | 7576.000 0.204  |

* DIF, DDF and EOT are also considered as Personal Characteristics

**Table 4.** Prevalence of signs and symptoms among TMD cases

| INDEX                        | Men         | Women        | Total        |
|------------------------------|-------------|--------------|--------------|
|                              | Number (%) | Number (%)   | Number (%)   |
| Anamnestic Component         |             |              |              |
| TMJ Sound                    | 38 (50%)   | 38 (50%)     | 76 (58.91%)  |
| TMJ Pain                     | 16 (50%)   | 16 (50%)     | 32 (24.80%)  |
| TMJ Fatigue                  | 27 (50%)   | 27 (50%)     | 54 (41.86%)  |
| Clinical Dysfunction         |             |              |              |
| Limited Mouth Opening        | 37 (49%)   | 38 (51%)     | 75 (58.13%)  |
| Locked Mandible              | 12 (41.37%)| 17 (58.62%)  | 29 (22.48%)  |
| Jaw Deviation                | 19 (59.37%)| 13 (40.63%)  | 32 (24.80%)  |
### Table 5. Evaluation of TMD severity by Helkimo index

| INDEX                  | Men       | Woman     | Total     |
|------------------------|-----------|-----------|-----------|
|                        | Number (%)| Number (%)| Number (%)|
| **Anamnestic Index**   |           |           |           |
| Ai 0 (free of symptoms)| 77 (50%)  | 77 (50%)  | 154 (61.24%) |
| Ai I (mild symptoms)   | 24 (51.07%)| 23 (48.93%)| 47 (18.21%)  |
| Ai II (severe symptoms)| 29 (50.88%)| 28 (49.12%)| 57 (22.09%)  |
| **Dysfunction Component** | | | |
| Di 0 (no dysfunction)  | 65 (50.39%)| 64 (49.61%)| 129 (50%)   |
| Di I (mild dysfunction)| 32 (46.52%)| 29 (47.54%)| 61 (23.64%) |
| Di II (moderate dysfunction) | 27 (50.97%)| 26 (49.05%)| 53 (20.54%) |
| Di III (severe dysfunction)| 6 (40%)  | 9 (60%)   | 15 (5.81%)  |