Relationships Between Risk Factors and Treatment Outcome in a Group of Patients With Temporomandibular Disorders

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The aim of this study was to compare somatic complaints, anxiety, and pain related to temporomandibular disorders (TMD) in a group of TMD patients who had high scores for headache and muscle palpation compared with that of a group of TMD patients who had low or medium scores for headache and palpation before and 2 years after conservative TMD treatment, consisting of counseling, muscle exercises, and a stabilization splint. The high-score group consisted of 23 patients who had headaches several times a week or daily and had more than three muscles graded as severely tender to palpation. The low/medium-score group comprised 28 patients who had headaches hardly ever, once or twice a month, or several times a month, and with muscles graded as slightly or medium tender to palpation. The patients answered three questionnaires (McGill Pain Questionnaire [Norwegian version], a somatic complaints questionnaire, and the trait part of Spielberger Stait-Trait Anxiety Inventory) before and 2 years after treatment. The findings showed differences between the two groups concerning pain description, general muscle complaints, and anxiety both before and after the treatment, with the high-score group showing the highest values. In general, the treatment outcome had improved in the low/medium-score group but remained unchanged in the high-score group.

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Temporomandibular disorders (TMD) represents a collective term covering a number of clinical problems involving the masticatory musculature and/or the temporomandibular joints.[1] The cardinal signs and symptoms of TMD are pain and tenderness of the masticatory muscles and the temporomandibular joints, sounds in the joints, and limitation or disturbance of mandibular movements.[2] A symptom often associated with TMD is tension-type headache.[1,3] Factors responsible for the development of TMD are numerous and controversial. Muscle hyperactivity, trauma, emotional stress, and occlusion are factors suggested to be important. Thus, the etiology of many temporomandibular disorders is multifactorial and probably differs, depending on which specific diagnosis within the collective term *temporomandibular disorders* is considered.[4] To install adequate therapy, knowledge about and understanding of all the various contributing factors is important.

Approximately 75% of all patients with TMD improve from simple, conservative treatment such as counseling, muscle exercises, and flat occlusal splints.[5,6] Nevertheless, one of four patients with TMD does not improve either by nature or by conservative treatment. These patients represent the real therapeutic challenge and a problem to themselves as well as to society at large. Therefore, the identification of these patients at an early stage is desirable. It is possible that the conservative treatment provided is ineffective because the procedures do not address the actual causes of these patients' problems or address only part of them.[7] Anxiety and somatic complaints, in general, are found to be associated with this type of pain.[8]

Little is known about which signs or symptoms may be early indicators of poor treatment outcome. The question is whether quantitative and qualitative measures of TMD signs and symptoms are of importance in identifying patients in need of a more active treatment, such as behavioral and/or cognitive therapy in addition to the conservative TMD treatment.[9] Muscle tenderness is the most common sign found in patients with TMD[1] and was found by Magnusson[3] to have a distinct relationship to headache. Therefore, it was decided from a clinical point of view to focus on these signs and symptoms with the aim to compare reports of TMD-related pain, somatic complaints, and anxiety in a group of patients with TMD and high scores for tension-type headache and muscle palpation with those of a group of patients with TMD and low/medium scores for tension-type headache and palpation before and 2 years after treatment, which consisted of counseling, muscle relaxation exercises, and a stabilization splint.

Materials and Methods

A total of 103 consecutive patients with TMD (79 women and 24 men with a mean age of 38 years) were referred to or applied for treatment at the Department of Prosthetic Dentistry and Stomatognathic Physiology, University of Oslo, Oslo, Norway. No specific inclusion or exclusion criteria were used. The patients were interviewed and subjected to routine methods of functional examination of the masticatory system.[10] Only the patients' subjective descriptions of tension-type headache and the findings from muscle palpation are evaluated in this study. The reported frequencies of tension-type headache were selected from five levels[3]: 1, hardly ever; 2, once or twice a month; 3, several times a month; 4, several times a week; and 5, daily. The muscle tenderness was graded into three categories modified from Helkimo.[10] The criteria for categorization were: 1, slight tenderness; 2, medium tenderness with a palpebral reflex; and 3, severe tenderness represented by a withdrawal reflex. All masticatory muscles and muscles in the neck and the shoulders were palpated, 26 sites in all.

In addition to the clinical examination, the patients were requested to complete three questionnaires. The first was the Norwegian version of the McGill Pain Questionnaire (MPQ) used to assess qualitative aspects of the patients' TMD-related pain.[11,12] On the MPQ, the patients described pain in the face/jaw region by selecting adjective descriptions from 18 categories of sensory, affective, and evaluative pain. The affective and evaluative dimensions were combined and dealt with as one, named *emotional pain*. A six-point scale, the Present Pain Intensity (PPI) included in the MPQ questionnaire, was used as a quantitative measure of pain.

The second questionnaire, a Somatic Complaints Questionnaire (SCQ), contained 27 items to assess the patients' somatic complaints.[13,14] Two subscales were generated: a muscle pain index comprising pain in the neck, the back, the arms, and the shoulders; and a miscellaneous symptoms scale including all other items except muscle pain.

The third questionnaire evaluated the patients' anxiety level by using the trait part of Spielberger State-Trait Anxiety Inventory (STAI).[15]

All subjects received the same type of treatment (counseling, muscle relaxation exercises, and splint therapy [Michigan type]) in the course of four visits. After 2 years, the patients were again requested to complete the same three questionnaires. At this stage of the investigation, 51 patients participated. Only these 51 patients have been evaluated in this study. The subjects were categorized into two groups on the basis of their reported tension-type headache and muscle tenderness scores. The high-score group contained 23 individuals with headache scores 4 and 5 and with more than three muscles graded as 3. The low/medium-score group consisted of 28 patients with headache scores lower than 4 and less than four muscles graded as 3.

Mean values and 95% confidence intervals of the means of the PPI, MPQ, SCQ and STAI scores were estimated and compared. Differences between the high-score and the low/medium-score groups were tested using the nonparametric Mann-Whitney *U* test. Differences between the initial scores and the scores after 2 years in the two separate groups were tested using two-sided paired *t* tests.

Results

The findings are presented in Table 1. The PPI scores for the two groups were statistically different both before and 2 years after treatment (P = .01 and P = .003, respectively). Neither group showed any improvement in PPI scores at the 2-year posttreatment stage.

The sensory and emotional parts of the MPQ were statistically similar in the two groups before treatment but differed at the posttreatment stage (P < .001 and P = .002). In the low/medium-score group, an improvement was noted (P < .001) in contrast to the high-score group, in which no improvement was recorded.

As for the report on general muscle pain, the SCQ scores for the two groups differed both before (P < .001) and 2 years after treatment (P = .02) . However, no improvement was reported in either group at the 2-year posttreatment stage.

There was no statistically significant difference in the report of miscellaneous symptoms before treatment. At the 2-year posttreatment stage, a statistical difference at P = .04 was noted. There were no statistically significant differences between the group scores from start to the 2-year posttreatment observation.

There was a statistically significant difference in anxiety scores between the groups before and after treatment (P = .008 and P < .001, respectively). In the low/medium-score group, there was a reduction in scores from start to 2 years after treatment (P = .05). No reduction was recorded in the high-score group.

Table 1 Mean Scores and 95% Confidence Intervals of the Two Patient Groups Before Treatment, and 2 Years After Treatment*

	Low/medium-score group		High-score group	
	Initial	2 years	Initial	2 years
Present pain intensity	2.4 (1.9–2.9)	1.8 (1.3–2.2)	3.3 (2.7–3.9)	2.8 (2.2–3.5)
	P = .06		P = .09	
	P = .01			
		P = .003		
Sensory TMD pain (MPQ)	18.0 (11.9–22.9)	5.9 (3.2–8.5)	20.4 (14.1–26.3)	21.9 (15.5–28.3)
	P < .001		P = .66	
	P = .39			
		P < .001		
Emotional TMD pain (MPQ)	10.7 (8.1–13.3)	4.7 (2.5–6.9)	10.6 (7.4–14.4)	12.7 (7.9–17.5)
	P < .001		P = .30	
	P = .85			
		P = .002		
General muscle pain (SCQ)	2.9 (1.8–4.1)	3.6 (2.1–4.6)	6.0 (5.3–7.5)	5.7 (4.5–6.9)
	P = .24		P = .51	
	P < .001			
		P = .02		
Miscellaneous symptoms (SCQ)	4.4 (2.4–6.2)	4.3 (2.4–5.4)	6.4 (3.9–8.0)	7.7 (4.2–9.9)
	P = .80		P = .23	
	P = .15			
		P = .04		
Spielberger trait anxiety (STAI)	37.6 (32.9–42.2)	32.8 (28.3–37.2)	48.7 (43–54.6)	46.5 (40.6–51.4)
	P = .05		P = .25	
	P = .008			
		P < .001		

*Frequency of tension-type headache and the number of muscles graded as severely tender at palpation were statistically different for the high-score group (n = 23) compared to the low/medium-score group (n = 28). P values are based on two-tailed paired t tests within groups and on the Mann-Whitney U test between groups.

Discussion

The patients with TMD in the present study should be representative as clinical subjects, since sex differences and mean age of the patients are in line with other investigations.[1] At the follow-up stage, only 51 patients responded. Questionnaires were sent to only 96 people because the remaining seven patients had entered the investigation so recently that 2 years since treatment had not yet elapsed. Because of missing data, two people had to be excluded. Fifteen questionnaires were returned labeled "address unknown." New addresses were obtained for 14 people, but recalls did not result in more answers. This shows the difficulties involved in obtaining replies to this kind of questionnaire a second time, and the low response may have influenced the findings. The high-score group had the most dropouts. The reasons for this are unknown.

The reliability of muscle palpation, which is considered a simple and subjective means of examination, will always be a subject of discussion. It is questioned whether objective intraobserver and interobserver tests in this field are possible to perform. The patient's responses to muscle palpation are not so stable as has been generally assumed. The responses, according to Dworkin et al,[16] may show variability not only in the long term, but also over shorter periods. The use of a pressure threshold meter (PTM) may be more reliable than the use of finger pressure when recording pain in muscles. However, List et al[17] showed a statistically significant correlation between PTM values and finger palpation scores. On these grounds, it was felt acceptable to rely on finger palpation. Based on clinical experience, it was decided that only patients with more than three muscles graded as 3 on palpation should be placed in the high-score group. Even healthy individuals may be expected to have as many as three of 26 muscles characterized as being severely tender to palpation.

The reliability of the MPQ has been tested by Love et al,[18] who found strong test-retest reliability coefficients for the MPQ rating indexes. The validity of the three-dimensional framework of the MPQ has been reviewed.[19] The distinction between sensory and affective dimensions is accepted, but there is still debate about the rationale of separating the affective and evaluative dimensions.[20] The somatic complaints were assessed using the SCQ. The reliability and validity have been discussed in several Scandinavian studies.[13,14] In addition, the STAI has been used in various contexts and has acceptable reliability and validity.[21]

When using psychologic tests, in this case, the STAI, it is important to establish a proper relation of confidence with the patient before administration of the tests. The patients in this study were treated at the student clinic where the recording of the case history is considered most important in dealing with these patients. The questionnaires were handed out after this procedure. Only one person, a man, refused to complete the questionnaire.

No distinction was made between different diagnoses. Laskin and Greene[22] have argued that arthrogenous TMD consists of a cluster of organic disorders and that myogenous TMD is a psychophysiologic disorder. Headache and the report of psychosocial factors are claimed to occur more frequently in a group of with patients with myogenous TMD than in other diagnostic groups.[23] However, De Leeuw[24] did not find patients with myogenous TMD to differ in psychosocial variables from patients with arthrogenous TMD. Clinical experience has shown that joint and muscle disorders coexist and influence each other.[25] Consequently, the value of dividing the patients into different diagnostic subgroups before analyzing the relationship among TMD pain, somatic complaints, and anxiety is limited.[8]

The findings of the present study show that patients with frequent headaches and with more than three muscles with severe tenderness on palpation report less reduction on both sensory and emotional TMD pain after conservative treatment than do the other patients with low scores on these parameters. Anxiety and general muscle complaints characterize the high-score group. This is in contrast to what was found by De Leeuw et al.[24] According to the test manual,[15] the anxiety score in our high-score group is approximately on a level with anxiety patients in general, while the score in the low/medium-score group is on a level with working adults. Previous investigators[7] have suggested that pretreatment anxiety and somatization are predictive of a poor treatment response. However, whether the higher frequency in reports of general muscle pain in the high-score group may be interpreted as somatization is difficult to answer. Neither group reported reduction of the somatic complaints after treatment. Consequently, the treatment had no general somatic effect.

Anxiety seems to be an important factor in the perception or experience of pain. Thorough information and counseling of the patient should be an essential part of the treatment of all patients with chronic pain. The present findings show that the

anxiety level in the patients of the high-score group remained unchanged. This may indicate that the information and counseling offered does not improve this parameter. Therefore, other types of treatment should probably be resorted to at an early stage. Oakley et al[9] reported improvement in mood, especially anxiety, after a cognitive-behavioral treatment approach for a group of patients with TMD with poor treatment response to conventional dental/physical medical treatment. The authors stated that "although patients did not report significant improvements in their pain ratings, they still reported significant improvements in their 'suffering.'" "Suffering" is defined as the negative emotional states that occur in response to or in anticipation of nociception.[26] With a reduction in anxiety, the pain seems to be better tolerated, and thereby, the quality of life is improved, which is an important aim in the treatment of all patients with chronic pain. For a patient with acute pain, the doctor is the most important one of the two; only the doctor may, for instance, prescribe the correct drug to relieve the acute pain. However, to combat chronic pain, it is important to make the patient take the responsibility for the treatment both physically and mentally.

Our findings demonstrate that the anxiety level is higher in patients reporting severe tenderness on palpation than in patients reporting less pain. Muscle pain may be an expression of muscle tension, or in physiotherapeutic terms, muscle stiffness.[27] Our findings are thus in accordance with the claims that muscles with a high degree of stiffness are to be found in patients who depress their feelings.[28]

General muscle complaints occurred more often in the high-score group, which may suggest a relationship between temporomandibular disorders and the body as a whole, since investigations have shown an association between TMD and head posture, hampered respiration, and general muscle stiffness.[27] Whether general muscle complaints or disorders are a consequence or a cause of TMD is not known. However, clinical experience has shown that function or dysfunction of any part of the motor system may influence the whole motor system. Consequently, the orofacial system should be evaluated in relation to the body as a whole.[29]

Since our patients with a high frequency of headaches and muscles with strong tenderness on palpation according to McGill Pain Questionnaire seem to have a poor treatment outcome in line with what was found by Lobbezoo-Scholte,[23] a more comprehensive treatment in addition to a conservative one should be implemented. A cognitive-behavioral approach may be advantageous.[9] Another method is psychomotor therapy, a Norwegian type of psychosomatic physiotherapy, which has been shown to be promising in the treatment of patients with chronic pain.[30] Further research is needed to elucidate the effect of these methods in the treatment of TMD.

References

1. American Academy of Orofacial Pain. McNeill C (ed). Temporomandibular Disorders: Guidelines for Classification, Assessment, and Management. Chicago: Quintessence, 1993:11,20,22.
2. Carlsson GE, DeBoever JA. Epidemiology. In: Zarb GA, Carlsson GE, Sessle BJ, Mohl ND (eds). Temporomandibular Joint and Masticatory Muscle Disorders. Copenhagen: Munksgaard, 1994:159–170.
3. Magnusson T. Mandibular Dysfunction and Recurrent Headache [thesis]. Göteborg, Sweden: University of Göteborg, 1981:87,335.
4. DeBoever JA, Carlsson GE. Etiology and differential diagnosis. In: Zarb GA, Carlsson GE, Sessle BJ, Mohl ND (eds). Temporomandibular Joint and Masticatory Muscle Disorders. Copenhagen: Munksgaard, 1994:171–187.
5. Wedel A, Carlsson GE. Factors influencing the outcome of treatment in patients referred to a temporomandibular joint clinic. J Prosthet Dent 1985;54:420–426.
6. Mejersjö C, Carlsson GE. Long-term results of treatment for temporomandibular joint pain-dysfunction. J Prosthet Dent 1982;49:809–815.
7. McCreary CP, Clark GT, Oakley ME, Flack V. Predicting response to treatment for temporomandibular disorders. J Craniomandib Disord Facial Oral Pain 1992;6:161–170.
8. Vassend O, Krogstad BS, Dahl BL. Negative affectivity, somatic complaints, and symptoms of temporomandibular disorders. J Psychosom Res 1995;39:889–899.
9. Oakley ME, McCreary GT, Clark GL, Holston S, Glover D, Kashima K. A cognitive-behavioral approach to temporomandibular dysfunction treatment failures: A controlled comparison. J Orofacial Pain 1994;8:397–401.
10. Helkimo M. Studies on function and dysfunction of the masticatory system. II. Index for anamnestic and clinical dysfunction and occlusal state. Swed Dent J 1974;67:101–121.
11. Melzack R. The McGill Pain Questionnaire: Major properties and scoring methods. Pain 1975;1:279–299.
12. Strand LI. The development of a Norwegian pain questionnaire [thesis]. Boston: Massachusetts General Hospital Institute of Health Profession, 1987.
13. Ursin H, Endresen IM, Ursin G. Psychological factors and self-reports of muscle pain. Eur J Appl Physiol 1988;57:282–290.
14. Endresen IM, Ellertsen B, Endresen C, Hjelmen AM, Matre R, Ursin H. Stress at work and psychological and immunological parameters in a group of Norwegian female bank employees. Work Stress 1991;5:217–227.
15. Spielberger S, Goursuch RL, Tushene R. State-Trait Anxiety Inventory Manual. Palo Alto, CA: Consulting Psychology Press, 1983.

16. Dworkin SF, LeResche L, DeRouen T. Reliability of clinical measurements in temporomandibular disorders. Clin J Pain 1988;4:89–99.
17. List T, Helkimo M, Falk G. Reliability and validity of a pressure threshold meter in recording tenderness in the masseter muscle and the anterior temporalis muscle. J Craniomand Pract 1989;7:223–229.
18. Love A, Leboeuf DC, Crisp TC. Chiropractic chronic low back pain sufferers and self-report assessment methods. Part 1. A reliability study of the visual analogue scale, the Pain Drawing and the McGill Pain Questionnaire. J Manipulative Psychol Ther 1989;12:21–25.
19. Reading AE. Testing pain mechanism in persons in pain. In: Wall R, Melzack R (eds). The Textbook of Pain. Edinburgh: Livingstone Churchill, 1989:269–280.
20. Melzack RM, Katz J. The McGill Pain Questionnaire. Appraisal and current status. In: Turck DC, Melzack R (eds). Handbook of Pain Assessment. New York: Guildford Press, 1992:152–168.
21. Dahlström L. Psychometrics in temporomandibular disorders. An overview. Acta Odontol Scand 1993;51:339–352.
22. Laskin DM, Greene CS. Diagnostic methods for temporomandibular disorders. What we have learned in two decades. Anesth Prog 1990;37:66–71.
23. Lobbezoo-Scholte AM. Diagnostic Subgroups of Craniomandibular Disorders [thesis]. Utrecht, The Netherlands: University of Utrecht, 1993:19,21.
24. De Leeuw JRJ. Psychosocial Aspects and Symptom Characteristics of Craniomandibular Dysfunction [thesis]. Utrecht, The Netherlands: University of Utrecht, 1993: 53,105.
25. Schiffman EL, Fricton JR, Haley DP, Shapiro BL. The prevalence and treatment needs of subjects with temporomandibular disorders. J Am Dent Assoc 1990;120: 295–303.
26. Fordyce WE. Pain and suffering. A reappraisal. Am Psychol 1988:43:276–283.
27. Krogstad BS. Myofunctional Aspects of Craniomandibular Disorders [thesis]. Oslo, Norway: University of Oslo, 1992.
28. Reich W. Character Analysis. New York: Orgona Institute Press, 1949.
29. Janda V. Some aspects of extracranial causes of facial pain. J Prosthet Dent 1985;56:484–487.
30. Thornquist E, Bunkan BH. What is psychomotor therapy? Oslo, Norway: Norwegian University Press, 1991: 24–35.

Resumen

Relaciones entre los Factores de Riesgo y el Resultado del Tratamiento en un Grupo de Pacientes con Desórdenes Temporomandibulares

El propósito de este estudio fue el de comparar las quejas somáticas, la ansiedad y el dolor relacionado a los desórdenes temporomandibulares (DTM) en un grupo de pacientes con DTM quienes padecian de cefaleas y eran sensibles a la palpación muscular en una proporción alta, en comparación con aquellos de un grupo de pacientes con DTM cuya proporción era baja o mediana en cuanto a las cefaleas y la palpación; antes y 2 años después del tratamiento conservativo de sus DTM. Tal tratamiento consistió de consejería, ejercicios musculares, y estabilización de férulas. El grupo con los resultados mas prominentes consistió de 23 pacientes que padecían cefaleas varias veces a la semana o diariamente y que tenian mas de tres músculos altamente sensibles a la palpación. El grupo con los resultados bajos/medios estaba constituido por 28 pacientes que casi no tenían cefaleas, una o dos veces al mes, o varias veces al mes, y con músculos ligera o medianamente sensibles a la palpación. Los pacientes respondieron tres cuestionarios (Cuestionario de Dolor de McGill [Versión Noriega], un cuestionario de quejas somáticas, y la característica particular del Inventario de Ansiedad de Spilberger) antes y 2 años después del tratamiento. Los hallazgos indicaron diferencias entre los dos grupos en lo relacionado a la descripción del dolor, quejas musculares generales, y ansiedad antes y después del tratamiento, teniendo en cuenta que el grupo con los resultados altos mostraba los valores mas elevados. En general, el resultado del tratamiento había mejorado en el grupo con los resultados bajos/medianos, pero no cambió en el grupo que tenia resultados elevados.

Zusammenfassung

Beziehungen zwischen Risikofaktoren und Behandlungsresultat bei einer Gruppe von Patienten mit Myoarthropathien (MAP)

Das Ziel dieser Studie war der Vergleich von somatischen Beschwerden, Angstgefühlen und Schmerzen im Zusammenhang mit Myoarthropathien bei einer Gruppe von MAP-Patienten mit einem gehäuften Auftreten von Kopfschmerzen und Druckdolenzen der Muskulatur und einer Gruppe von MAP-Patienten mit wenig Kopfschmerzen und Palpationsschmerzen vor und 2 Jahre nach einer konservativen Behandlung, welche Aufklärung, Muskelübungen und eine Aufbissschiene beinhaltete. Die erste Gruppe bestand aus 23 Patienten, welche mehrere Male pro Woche oder täglich Kopfschmerzen aufwiesen und mehr als 3 stark druckdolente Muskeln zeigten. Die Gruppe mit geringen Beschwerden bestand aus 28 Patienten, welche kaum je bis mehrere Male pro Monat Kopfschmerzen hatten und nur leicht druckschmerzhafte Muskeln aufwiesen. Die Patienten füllten vor und 2 Jahre nach der Behandlung 3 Fragebogen aus (McGill Pain Questionnaire [Norwegische Version], einen Fragebogen für somatische Beschwerden und einen Teil des "Spielberger Anxiety Inventory"). Die Resultate zeigten Unterschiede zwischen den zwei Gruppen betreffend Schmerzbeschreibung, genereller Muskelbeschwerden und Angstgefühlen vor und nach der Behandlung, wobei die erste Gruppe die höchsten Werte aufwies. Generell hatte sich das Behandlungsergebnis bei der Gruppe mit geringen Beschwerden verbessert, während es bei der anderen Gruppe gleich geblieben war.