Association Between Chronic Tension-Type Headache Coexistent with Chronic Temporomandibular Disorder Pain and Limitations in Physical and Emotional Functioning: A Case-Control Study

Rüdiger Emshoff, MD, DMD
Associate Professor
Department of Oral and Maxillofacial Surgery
Medical University of Innsbruck
Innsbruck, Austria

Felix Bertram
Dental Student
Department of Prosthodontics
Philipps University
Marburg, Germany

Dagmar Schnabl, MD, DMD
Consultant
Department of Restorative and Prosthetic Dentistry
Medical University of Innsbruck
Innsbruck, Austria

Iris Emshoff, MD
Resident
Department of Anaesthesia and Intensive Care Medicine
Medical University of Innsbruck
Innsbruck, Austria

Correspondence to:
Dr Rüdiger Emshoff
University Clinic of Oral and Maxillofacial Surgery
Medical University of Innsbruck
Anichstraße 35
A-6020 Innsbruck, Austria
Business Fax: 0043 / 512 / 504 / 24371
Email: ruediger.emshoff@tirol-kliniken

Aims: To assess the association between chronic tension-type headache coexistent with chronic temporomandibular disorder (TMD) pain and severe limitations in physical and emotional functioning. **Methods:** Sample size estimation was used to determine that this case-control study should include 126 subjects. Subjects suffering from chronic TMD who were aged between 18 and 68 were recruited in routine clinical practice. Of the 126 included subjects, 63 had TMD pain associated with chronic tension-type headache (cases) and 63 had TMD pain without a history of tension-type headache (controls). Clinical diagnosis of TMD was made according to the Research Diagnostic Criteria for TMD (RDC/TMD) Axis I criteria, and clinical diagnosis of headache was made according to the International Classification of Headache (ICHD-II). RDC/TMD Axis II criteria were applied to record the scores from the Graded Chronic Pain Scale (GCPS) and the Symptoms Checklist-90-Revised Depression (SCL-DEP) and Somatization (SCL-SOM) scales. A logistic regression analysis was used to assess the relationship between TMD pain with chronic tension-type headache and high levels of depression and somatization severity as scored on the SCL-DEP and SCL-SOM scales, respectively, and high pain-related disability (GCPS grade III or IV). Data were adjusted to take into account age, gender, time since TMD pain onset, chronic TMD pain intensity, and characteristic pain intensity. **Results:** The presence of chronic tension-type headache was significantly associated with severe SCL-DEP (odds ratio [OR] = 7.2; $P < .001$), severe SCL-SOM (OR = 13.8; $P < .001$), and high pain-related disability (OR = 9.7; $P < .001$). **Conclusion:** This study provides evidence of associations between the clinical diagnosis of chronic tension-type headache coexistent with chronic TMD pain and key aspects of physical and emotional functioning reflected in severe depression, severe somatization, and high pain-related disability. *J Oral Facial Pain Headache 2017;31:55–60. doi: 10.11607/ofph.1654*

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Musculoskeletal pain is a common health problem associated with considerable disability and cost to society.[1,2] Temporomandibular disorders (TMD) include a number of clinical problems that involve the muscles of mastication, the temporomandibular joint (TMJ), and associated structures.[3] TMD are frequently associated with chronic pain and are a common problem within the community[4–7]; they are known to affect general health, psychological status, and social and economic well-being.[8,9]

Several studies have reported diagnostic and behavioral overlap between TMD, tension-type headache with TMD, and tension-type headache in the absence of TMD.[10–13] Diagnosis, treatment, and the primary mechanisms underlying the etiopathogenesis of chronic TMD pain in combination with tension-type headache remain elusive despite the recent increase in research on the topic. In the literature, genetic factors, affective disorders, and physical and psychological stressors are listed as factors linked to chronic TMD pain and tension-type headache.[1–3] High levels of depression, somatization, and pain-related

impairment have been associated with both conditions,[14–17] and the presence of headache associated with TMD may be an important factor in the strength of this association.[18–20]

To the knowledge of the authors, there have been no studies addressing the relationship between the Research Diagnostic Criteria for TMD (RDC/TMD) Axis II diagnoses and chronic tension-type headache coexistent with chronic TMD pain in a case-control approach using a multiple logistic regression model. In light of the fact that patients frequently present with a combination of muscular and articular pain disorders,[21,22] the purpose of the present case-control study was to assess the association between chronic tension-type headache coexistent with chronic TMD pain and severe limitations in physical and emotional functioning. This included the study of patients with a specific TMD diagnosis of arthralgia associated with myofascial pain.

Materials and Methods

Subjects

The study groups, selected over a period of approximately 3 years, comprised 63 consecutive patients with unilateral or bilateral chronic TMD and with chronic tension-type headache (cases) and 63 consecutive chronic TMD patients without a history of headache (controls). Patients with chronic TMD pain who were referred for treatment by their general dental or medical practitioner were eligible for the study. The subjects were told about the study procedure and informed consent was obtained. The study followed the Declaration of Helsinki on medical protocol and ethics and was given approval in accordance with the guidelines of the local ethical committee.

The criteria for including a chronic TMD pain patient were: *(1)* the presence of a TMD diagnosis of arthralgia associated with myofascial pain assigned according to the RDC/TMD[23]; *(2)* pain lasting > 6 months and ≤ 5 years; *(3)* a pretreatment visual analog scale (VAS) pain intensity score > 30 mm, (on a 100-mm VAS); *(4)* aged between 18 and 70 years; *(5)* being ambulatory and able to be treated as an outpatient; and *(6)* being available for the study schedule. Criteria for excluding a chronic TMD pain patient were: *(1)* acute pain; *(2)* the presence of RDC/TMD diagnosis characterized by limited mouth opening (ie, myofascial pain with limited mouth opening [pain-free unassisted opening < 40 mm and passive stretch ≥ 5 mm] or disc displacement without reduction [unassisted opening ≤ 35 mm and passive stretch ≥ 4 mm])[23]; *(3)* presence of associated headaches not classified as chronic tension-type headache according to the criteria of the International Classification of Headache (ICHD-II)[24]; *(4)* pain attributable to a neck pain condition; *(5)* acute infection or other significant disease of the teeth, ears, eyes, nose, or throat; *(6)* debilitating physical or mental illness; *(7)* presence of a collagen vascular disease; *(8)* history of trauma; and *(9)* inability to speak or write in German. Chronic tension-type headache patients were identified according to the criteria of the ICHD-II;[24] these criteria were assessed by one investigator (R.E.) with specific training in headache medicine.

The evaluation consisted of the collection of basic demographic information, subject self-report measures, and the patient's medical history, followed by a physical examination.[23] Each subject completed a pain rating to assess the mean perceived severity of pain over the last 7 days by using a 100-mm VAS ranging from 0 (no pain) to 100 (very severe pain). This scale has been used extensively in randomized trials[25,26] and has shown good construct validity in comparison with other pain measures.[27,28]

The severity of chronic pain was assessed by the Graded Chronic Pain Scale (GCPS) from the RDC/TMD Axis II. The scoring criteria allowed categorization of pain patients into five chronic pain grades: 0 = no disability; 1 = low disability and low pain intensity; 2 = low disability and high pain intensity; 3 = high, moderately limiting disability; and 4 = high, severely limiting disability.[23] RDC/TMD Axis II depression and somatization levels were assessed by using the Symptoms Checklist-90-Revised Depression (SCL-DEP) and Somatization (SCL-SOM) scales. The calculated mean scale scores allowed patients to be rated as having normal, moderate, or severe levels according to the SCL-DEP and SCL-SOM.[23]

Data Analyses

The sample size needed was calculated to be 126 subjects (63 cases [TMD pain associated with tension-type headache] and 63 controls [TMD without tension-type headache]) based on the following assumptions: the prevalence of severe depression and high pain-related impairment would be 40.4% and 54.5%, respectively, among TMD patients with chronic tension-type headache, and 21.4% and 16.9%, respectively, among chronic TMD pain patients without headache,[10,15] with an alpha error of .05 and a statistical power of 80%. For sample size estimation, the G*Power software (version 3.1) was applied.

The chi-square test was used to compare the proportion of subjects with RDC/TMD Axis II diagnoses in the two groups. To control for potential confounders, a multivariate logistic regression was performed to estimate the association between RDC/TMD Axis II diagnoses and chronic tension-type headache coexistent with chronic TMD pain. Based on previous

Table 1 Sample Characteristics

Variable	Chronic TMD pain patients with chronic tension-type headache (n = 63)	Chronic TMD pain patients without chronic tension-type headache (n = 63)	*P* value
Age (y) (Mean [SD])	36.3 (14.0)	35.6 (13.1)	.354[a]
Gender (n [% female])	62 (98.4)	56 (88.9)	.028[b]
Time since TMD pain onset (mo) (Mean [SD])	24.7 (39.2)	25.5 (37.8)	.908[a]
Chronic TMD pain intensity (mm on 100-mm VAS) (Mean [SD])	49.2 (20.7)	46.1 (22.9)	.430[a]
Time since tension-type headache onset (mo) (Mean [SD])	30.3 (19.8)	–	–
Chronic tension-type headache intensity (mm on 100-mm VAS) (Mean [SD])	36.7 (9.0)	–	–
Chronic tension-type headache frequency (d/mo) (Mean [SD])	19.4 (3.5)	–	–
Severe depression (SCL-DEP) (n [%])	32 (50.8)	9 (14.3)	< .001[b]
Severe somatization (SCL-SOM) (n [%])	39 (61.9)	8 (12.7)	< .001[b]
GCPS grade III (n [%])	12 (19.1)	2 (3.2)	.005[b]
GCPS grade IV (n [%])	18 (28.6)	5 (7.9)	.003[b]
GCPS grade III or IV (n [%])	30 (47.6)	7 (11.1)	< .001[b]

TMD = temporomandibular disorder; VAS = visual analog scale; SCL-DEP = Symptoms Checklist-90-R Depression scale; SCL-SOM = Symptoms Checklist-90-R Somatization scale; GCPS = Graded Chronic Pain Scale.
[a]Based on analysis of variance; [b]Based on chi-square test.

studies, the variables adjusted for were age (years), gender, time since TMD pain onset, TMD pain intensity, and characteristic pain intensity.[10,15] Significance was set at $P < .05$. PASW 22.0 (SPSS Statistics, IBM) package was used for the statistical analysis.

Results

In the 63 TMD patients with chronic tension-type headache, the mean age was 36.3 years, and 98.4% were women. In the 63 TMD subjects without chronic tension-type headache, the mean age was 35.6 years, and 88.9% were women. Gender was the only demographic factor that was significantly different ($P = .028$) between the two groups (Table 1).

Of the 63 TMD pain patients with chronic tension-type headache, the mean time since TMD pain onset was 24.7 months, and the mean TMD pain intensity was 49.2 mm on the VAS. The mean time since their headache onset was 30.3 months, the mean pain intensity of their headache was 36.7 mm, and their mean headache frequency was 19.4 days/month. Of the 63 TMD patients without chronic tension-type headache, the mean time since TMD pain onset was 25.5 ± 37.8 months, and the mean TMD pain intensity was 46.1 ± 22.9 mm. There were no statistically significant differences between the two groups in these two measures (Table 1).

Severe depression, severe somatization, and high pain-related disability were found in 50.8%, 61.9%, and 47.6% of the TMD pain patients with chronic tension-type headache, respectively; and in 14.3%, 12.7%, and 11.1% of the TMD patients without headache, respectively. Significant differences between the distributions across the two groups were found for severe depression ($P < .001$), severe somatization ($P < .001$), and high pain-related disability ($P < .001$) (Table 1). The presence of chronic tension-type headache was significantly associated with severe depression, severe somatization, and high pain-related disability ($P < .001$) (Table 2).

Table 2 Results of Regression Analysis of TMD Patients With and Without Chronic Tension-Type Headache

	Adjusted analysis	
	OR (95% CI)	*P* value
Severe depression (SCL-DEP)	7.24 (2.66–19.73)	< .001
Severe somatization (SCL-SOM)	13.78 (4.82–39.42)	< .001
Graded Chronic Pain Scale grade III or IV	9.70 (3.26–28.30)	< .001

OR = odds ratio; 95% CI = confidence interval; SCL-DEP = Symptom Checklist-90-Revised Depression scale; SCL-SOM = Symptoms Checklist-90-Revised Somatization scale.

Discussion

The use of a set of standardized domains should be considered in the assessment of clinical trials to

permit meaningful comparisons of patient-centered effects across chronic pain conditions such as TMD and headache.[29–31] In the present study, the GCPS was used to quantify physical functioning and the SCL-90-R (SCL-DEP and SCL-SOM) was used to quantify emotional functioning. These constructs are commonly applied in chronic TMD and headache research.[18,20,32,33]

Tension-type headaches are very commonly reported in studies of TMD patients.[34,35] Chronic tension-type headache is a serious condition with considerable impact on the quality of life and disability of affected individuals.[24,36,37] It is therefore not surprising that the present study showed chronic TMD pain patients who were affected by chronic tension-type headache had high rates of high pain-related disability (47.6%). These results are comparable with the observations of other studies reporting that high pain-related disability was found in 34.4% of TMD subjects affected by coexistent chronic temple headache.[20] In TMD pain subjects with infrequent episodic headache, frequent episodic headache, or without coexistent headache, the reported frequencies were 2.4%, 9.7%, and 12.2%, respectively.[20] These observations suggest that the degree of pain-related disability is strongly linked to the coexistence of chronic tension-type headache in TMD patients.

Emotional functioning is often linked to symptoms of distress and psychiatric disorders. In epidemiologic and clinical studies, variation in emotional function has been linked to the severity of both TMD[38,39] and headache.[40,41] The results of the present study showed chronic TMD pain patients affected by chronic tension-type headache had significantly higher rates of severe depression and somatization, according to scores on the SCL-DEP and SCL-SOM, compared to chronic TMD pain patients without chronic tension-type headache. These data correspond to the reports of other studies reporting a significantly higher prevalence of moderate to severe depression in headache patients with coexistent TMD (70.9%) compared to those without coexistent TMD (34.1%).[18] These observations indicate that depression and somatization comorbidities are important factors in clinical populations with coexistent TMD and headache. These results may be regarded as comparable to those of a previous study reporting that the occurrence of depression, as assessed with the SCL-90-R, in TMD pain patients was significantly associated with increased headache frequency.[20] These findings support the concept that the frequency of headache has an impact on emotional functioning.[36,41,42]

TMD have been suggested to be comorbid with chronic tension-type headache,[11] and have been described to be more common in chronic tension-type headache patients than in chronic migraine patients.[43] It has been hypothesized that chronic tension-type headache is associated with facilitation (ie, central sensitization) of neurons in the trigeminal subnucleus caudalis, leading to cutaneus allodynia in the trigeminal nerve distribution—ie, pain in the preauricular region may reflect a lower mechanical threshold as a result of such central changes.[22,44] This is of importance, as central sensitization coexistent with chronic tension-type headache may be associated with severe limitations in physical and emotional functioning.

The present study needs to be evaluated in the context of some strengths and limitations. Major strengths of the study included the use of standardized instruments,[23] specific diagnostic criteria,[23,24] and a predetermined sample size, as well as the fact that this was a controlled study in a clinically relevant population.

However, the study had four limitations. First, clinical neurologic examinations and diagnostic diaries were not applied to ensure diagnostic accuracy and to rule out other secondary headaches; however, the ICHD-II criteria (headache frequency, headache duration, headache quality, and absence or limited presence of nausea/vomiting, photophobia, and phonophobia[24]) were applied by one investigator with specific training in headache medicine, improving the reliability of the collected data. Further prospective studies should include headache diaries to evaluate differences in the limitations to physical and emotional functioning between TMD patients with and without specific subtypes of tension-type headache.

Second, this was a case-control study, so causal relations are impossible to ascertain. A well-controlled incidence study may clarify etiologic factors contributing to chronic tension-type headache coexistent with chronic TMD pain in relation to the development of psychosocial dysfunction, depression, and somatization.

A third limitation relates to the fact that the study group represented a specific subtype of TMD and headache patients referred to a tertiary TMD center; ie, the findings are not representative of TMD and headache in the general population. In addition, patients with RDC/TMD diagnoses characterized by limited mouth opening, a common feature in TMD patients, were excluded in this study. That said, including patients with these additional diagnoses would have severely limited the generalizability of study results to the average case mix of TMD pain conditions.[45]

Finally, the lack of a control sample without TMD or headache, and the lack of a study sample with other concomitant TMD and comorbid pain conditions, raise important lines of inquiry that warrant further investigation.

Conclusions

The present study has provided perspectives on the contribution of chronic tension-type headache associated with TMD pain to the presence of high pain-related disability, severe depression, and severe somatization. Based on this study, chronic tension-type headache coexistent with TMD pain has to be considered a dominant factor in the definition of these comorbid disorders, contributing significantly to the change in risk of having severe limitations in physical and emotional functioning. This observation underlines the suggestions that being affected by concurrent pain conditions may predict levels of psychosocial dysfunction, depression, and somatization,[19] and that the number of pain conditions is more closely linked to the degree of psychiatric disturbance than to the severity of the pain.[3]

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