Migraine is the Most Prevalent Primary Headache in Individuals with Temporomandibular Disorders

Article in Journal of Orofacial Pain - June 2010

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Migraine is the Most Prevalent Primary Headache in Individuals with Temporomandibular Disorders

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Aims: To assess the prevalence of primary headaches (HA) in adults with temporomandibular disorders (TMD) who were assessed in a specialty orofacial pain clinic, as well as in controls without TMD. Methods: The sample consisted of 158 individuals with TMD seen at a university-based specialty clinic, as well as 68 controls. The Research Diagnostic Criteria for TMD were used to diagnose the TMD patients. HAs were assessed using a structured interview and classified according to the Second Edition of the International Classification for Headache Disorders. Data were analyzed by chi-square tests with a significance level of 5% and odds ratio (OR) tests with a 95% confidence interval (CI). Results: HAs occurred in 45.6% of the control group (30.9% had migraine and 14.7% had tension-type headache [TTH]) and in 85.5% of individuals with TMD. Among individuals with TMD, migraine was the most prevalent primary HA (55.3%), followed by TTH (30.2%); 14.5% had no HA. In contrast to controls, the odds ratio (OR) for HA in those with TMD was 7.05 (95% confidence interval [CI] = 3.65–13.61; \( P = .000 \)), for migraine, the OR was 2.76 (95% CI = 1.50–5.06; \( P = .001 \)), and for TTH, the OR was 2.51 (95% CI = 1.18–5.35; \( P = .014 \)). Myofascial pain/arthralgia was the most common TMD diagnosis (53.2%). The presence of HA or specific HAs was not associated with the time since the onset of TMD (\( P = .714 \)). However, migraine frequency was positively associated with TMD pain severity (\( P = .000 \)). Conclusion: TMD was associated with increased primary HA prevalence rates. Migraine was the most common primary HA diagnosis in individuals with TMD. J OROFAC PAIN 2010;24:287–292

Key words: facial pain, migraine, prevalence, temporomandibular joint, tension-type headache

Temporomandibular disorders (TMD) refer to a group of conditions characterized by a constellation of symptoms and signs, including: pain in the temporomandibular joint (TMJ), periauricular area, or muscles of mastication, TMJ sounds, and deviations or restriction in mandibular range of motion.\(^1\) TMD reflect the most common types of chronic orofacial pain referred to dentists.\(^2\)

Headache (HA) is a frequent symptom related to TMD. Patients with TMD often have headache as one of their main symptoms; sometimes HA is the only manifestation of TMD.\(^3–6\) According to the Second Edition of the International Classification of Headache Disorders (ICHD-II),\(^7\) HA syndromes are divided into (1) primary headache syndromes; (2) secondary headaches, and (3) cranial neuralgias, primary or central facial pain, and others. In primary
headaches, causal events are not identified, whereas
in “secondary” headaches, a cause (e.g., intracranial
tumors, infections) can be recognized and tem-
porarily related to headache onset.

Epidemiological studies have also suggested an
association between TMD and specific primary
HAs, such as migraine and tension-type headache
(IHTT). Indeed, individuals with TMD are 1.8
to 2 times more likely to have other primary HAs
as compared to controls. However, there is large
variability among results, and the nature of the
association is not clear. Clarifying this topic is of
clinical importance. If comorbidity between TMD
and a specific primary HA is established, diagnos-
ing one condition raises the suspicion that the other
may exist. Also, one (e.g., TMD) may make the
treatment of the second (e.g., migraine) more refrac-
tory. Alternatively, if both conditions are not
comorbid, the findings are of interest as well, since
migraine and TTH sufferers are often diagnosed as
having “TMD” or receive dental treatments in an
attempt to improve their HAs. Accordingly, the
aim of this case-control study was to assess the
prevalence of primary HAs in adults with TMD
who were assessed in a specialty orofacial pain
clinic, as well as in controls without TMD. It was
hypothesized that TMD patients would present
higher frequency of primary HAs.

Materials and Methods

This was a case-control study where the presence
and frequency of HAs were compared in individu-
als with TMD (cases) and without TMD (controls). The
study was approved by the Research Ethic
Committee, Araraquara Dental School (UNESP—
Univ Estadual Paulista, Brazil) (proc: 33/06). Patient
consent forms were obtained.

Inclusion/Exclusion Criteria

Cases were identified among individuals seeking
treatment because of facial pain at the TMD and
Orofacial Pain Clinic at Araraquara Dental School
(UNESP—Univ Estadual Paulista, Brazil). They
included individuals consecutively diagnosed as
having chronic TMD with pain according to the
Research Diagnostic Criteria for TMD (RDC/
TMD) Axis I. Following the criteria established by
the International Association for the Study of
Pain (IASP), the presence of TMD for more than
6 months was considered chronic. Exclusion crite-
ria included: acute pain; isolated Axis I group II
(disc displacements); osteoarthrosis without other
TMD manifestations; odontalgia; neuropathy,
intracranial lesions; any chronic pain syndrome (other
than headaches), including fibromyalgia or arthri-
sis; and impairments in cognition or language.
Individuals of the control group had no TMD and
were selected among patients seeking routine dental
care treatment at the same university. Among the
235 examined individuals (cases and controls), nine
were excluded because of exclusion criteria.
Overall, no individuals refused to participate in the
study. Since the questionnaires applied are part of
the routine examination in the Orofacial Pain
Clinic, all patients agreed that data collected would
be used for this research. While the control group
was composed of non-TMD patients recruited from
other clinics, the authors attribute their high
response rate to the noninvasive procedures that
were applied in a single session.

Assessments

All individuals were evaluated by one trained
experimenter, according to standardized methods
of assessment, as noted below:

Orofacial Pain Clinic Protocol. All participants
were interviewed and systematically examined for
cervical, cranial, facial, dental, and other oral
structures. Objectives were to obtain: (1) the chief
complaint; (2) TMD diagnosis and TMJ pain char-
acteristics (location, intensity, quality, duration,
exacerbating factors); (3) HA and extracephalic
pain; and (4) the medical history. The American
Academy of Orofacial Pain (A AOP) diagnostic cri-
teria were applied for the differential diagnoses
with other conditions that may mimic TMD. In
those with a confirmed TMD diagnoses, the classi-
fication was made according to the RDC/TMD cri-
teria, Portuguese version.

RDC/TMD. TMD were classified using the
RDC/TMD. The RDC/TMD questionnaires were
filled in by the patients; a single investigator (dentist
with experience in diagnosing TMD) was present to
help in case of any doubts, but did not help with the
patients’ responses. The clinical examination was
made by one trained experimenter who had gradu-
ated in dentistry and had experience in the diagnosis
of TMD. Based on the Axis I of the RDC/TMD,
patients were stratified as a function of their TMD
status into: no TMD (controls); TMD with myofas-
cial pain; TMD with TMJ arthralgia (without osteoarthrosis); and TMD with myofascial pain and
TMJ arthralgia.

The Axis II of the RDC/TMD assesses, among
other domains, severity of TMD chronic pain
(Grade 0 to IV), psychological symptoms and
depression, and other nonspecific physical symptoms. It also asks about limitations related to mandibular functioning. Based on responses, severity of TMD chronic pain was graded as: Grade 0 (no chronic TMD pain in the prior 6 months); Grade I (Low Disability-Low Intensity Pain); Grade II (Low Disability-High Intensity Pain); Grade III (High Disability-Moderately Limiting); and Grade IV (High Disability-Severely Limiting).

**ICHD-II Based Questionnaire.** The HA questionnaire consisted of 26 questions assessing the distinguishing features required for the diagnosis of the most common primary HAs. Questions focused on characteristics of pain (eg, throbbing, in pressure), severity of pain (mild, moderate, or severe), location (strictly unilateral, bilateral, etc), frequency of HA attacks, duration of HA attacks, associated symptoms (nausea, photophobia, and phonophobia), and precipitating factors. The questions were based on the International Classification for Headache Disorders (ICHD-II)\(^7\) and applied by one investigator with specific training in HA medicine.\(^{20,21}\) Based on this questionnaire, all primary HA diagnoses could be screened: (1) migraine, (2) TTHs, (3) cluster HAs and other trigeminal autonomic cephalalgias, and (4) other primary HA.

**Data Analysis**

According to prior reports, power analyses suggested a sample of 68 controls and 136 TMD patients (randomized at a 1:2 ratio). Descriptive statistics were used to characterize the sample. Participants were stratified by gender and HA status, and contrasts were performed in cases versus controls. Specific HA subtypes (migraine and TTH) were also contrasted. Finally, the sample was stratified according to the grade of TMD chronic pain in order to study a possible association with HA diagnoses. For comparison of proportions, the chi-square test was performed and the significance level adopted was 5%. Also, odds ratio (OR) tests, with 95% confidence interval (CI), were used to study associations between TMD and primary HA overall, as well as specific primary HAs. Statistical analyses were performed using Stata (version 10) and SPSS (version 15.0 for Windows).

**Results**

The sample consisted of 158 individuals with TMD and 68 without TMD (controls). In those with TMD, 133 (84.2%) were women and 25 (15.8%) were men; mean age was 40.1 (18 to 76) and 41.7 (18 to 62) years old, respectively. The control group comprised 52 (76.5%) women and 16 (23.5%) men, with mean age of 38.4 (18 to 69) and 36.8 (18 to 62) years, respectively. There were no significant differences between groups for gender (\(P = .233\)) or age (\(P = .213\)).

From the total sample, 167 (73.9%) individuals presented HA. HA was more common in the TMD group than in the control group (85.5% versus 45.6%, respectively). Migraine was the most common HA subtype in individuals with TMD and in controls (55.3% versus 30.9%), followed by TTH (32.2% versus 14.7%). Other types of HAs were seen in six individuals with TMD, but not in controls. One had HA attributed to rhinosinusitis, four presented HA attributed to neck disorders, and one was classified as presenting HA attributed to other facial or cranial structures.\(^7\) Those individuals were excluded from the analyses since they presented secondary HAs.

After stratifying the subjects by gender, primary HAs were found to be more common in women compared to men (77.7% versus 56.1%, respectively, \(P = .008\)), while TMD was not (71.0% versus 61.0%, respectively, \(P = .280\)).

Overall, HAs were more common in TMD relative to controls. Any HA was seen in 85.5% (\(n = 130\)) of those with TMD versus 45.6% (\(n = 31\)) of controls. For migraine, rates were 55.3% versus 30.9%; for TTH, rates were 30.2% versus 14.7% (\(P = .000\)). Also, as compared to controls, individuals with TMD presented higher risk for any HA (OR = 7.05; 95% CI = 3.65–13.61), for migraine (OR = 2.76; 95% CI = 1.50–5.0), and for TTH (OR = 2.51; 95% CI = 1.18–5.35) (Table 1).

In individuals with TMD, myofascial pain/arthralgia was the most common diagnosis, presented in 53.2% (\(n = 117\)) of the sample, followed by myofascial pain (\(n = 29\); 13.2%) and arthralgia only (\(n = 6\); 2.7%).

Among individuals with myofascial pain, 51.7% had migraine, 34.5% had TTH, and 13.8% had no HAs. In those with arthralgia, 50% were also diagnosed with migraine, 33.3% with TTH, and 16.7% with no HA. Among the myofascial pain/arthralgia group, migraine was found in 56.4%, TTH in 29.1%, and 14.5% had no HA (Table 2).

Onset of TMD pain was compared among individuals with no HA, migraine, or TTH. Individuals with migraine presented a longer but nonsignificant duration of TMD (mean of 89.3 months) than individuals with TTH (78.8 months) or no HA (72.8 months) (ANOVA, \(P = .714\)).

Table 3 displays HA diagnoses as a function of the grade of TMD. Frequency of migraine attacks...
increased as a function of TMD chronic pain ($P < .0001$). Migraine was diagnosed in 31.7% of the controls, in 48.6% of individuals with grade I or II of TMD pain, and in 63.9% of individuals with more severe chronic pain. For TTH, the figures were 14.3%, 34.3%, and 25%, respectively. Ten individuals were excluded from this analysis because of incomplete responses.

**Discussion**

This study was carried out because of the relative paucity of information about the potential comorbidity between TMD and primary HAs. The most important findings were: (1) most patients who sought specialty care for TMD treatment had HA; (2) migraine was the most common HA in individuals with TMD; and (3) there was an association between TMD severity and primary HA frequency.

As expected, most of the sample was composed of middle-aged women since TMD is two to five times more common in women than in men, mostly in the third to fifth decades of life.$^{2,13}$ HAs, especially migraine, are also more common in women aged between 20 to 50 years.$^{28-30}$ Current evidence supports the existence of gender differences in pain response. Most pain conditions are more common in women (eg, TMD, fibromyalgia, migraine). Furthermore, women tend to characterize their pain as more intense, frequent, and continuous than men.$^{13,31,32}$ This could explain the higher frequency of women than men seeking care for TMD treatment observed in the present sample (85% women and 15% men).

The prevalence of HA in individuals with TMD (85.5%) in the present study was aligned with the reported overall prevalence of HA (70 to 85%).$^{13,17}$ However, ORs were increased for any HA, and the prevalences of migraine and TTH were higher in TMD individuals versus controls. The data corroborate previous finds that primary HA and TMD are comorbid.$^{9,12,15,17}$ The ORs were higher than previously reported,$^{9,15}$ probably because the sample was composed of patients presenting chronic TMD from a tertiary clinic.
The present results are in accordance with the literature. HA is almost two times more frequent in TMD patients than in the general population, especially if the sample is selected from specialty centers. Similarly, there are commonly reported signs and symptoms of TMD in HA populations, strongly correlated with the frequency and intensity of HA crises. Also, it was verified that patients with primary HA experience worsening and/or first onset of pain when TMD is present, with different degrees of severity and frequency of involvement.

The association noted between TMD and primary HAs could be explained by two different but nonmutually-exclusive hypotheses. First, continuous stimulation of the trigeminal subnucleus caudalis (which might occur in individuals with TMD) could influence the frequency and intensity of primary HAs. Accordingly, in migraineurs, TMD may act as a perpetuating, aggravating, and/or triggering factor. Similarly, in TTH patients, TMD may predispose patients to changes in nociceptive pathways in the brain, especially in those related to the pericranial and masticatory muscles.

Alternatively, the very areas involved with HA onset (in the brain) may explain peripheral symptoms. After activation of areas responsible for HA onset, central sensitization of the trigeminal subnucleus caudalis may happen. A hallmark of trigeminal central sensitization is cutaneous allodynia in the trigeminal nerve distribution. Accordingly, TMJ pain may reflect a lower peripheral threshold as a result of such central changes and central sensitization associated with primary HAs could predispose patients to generalized pain (head, face, and neck), which might explain the high frequency of myofascial pain/arthralgia combined diagnoses evident in the present sample.

In the present study, the frequency of migraine attacks increased as a function of TMD chronic pain, and these data are also consistent with the literature. A previous study demonstrated that 78.5% of TMD patients present low disability. Studies have shown that 78.5% of TMD patients present low disability. However, when HAs are considered, more than 31% of patients with migraine may report high disability. Additionally, it was verified that TMD patients presented more HA and more related disability, suggesting that coexisting HA and TMD may lead to higher incapacitation.

When interpreting the present results, some aspects deserve caution. First, this study used a case-control design, which can assess causality. However, since the chronology of symptoms was not assessed, only the association of symptoms, not causal effects, was reported. Also, the TMD sample was composed of patients seeking treatment for facial pain, so the results are not representative of the general population. Nonetheless, similar findings were observed in a recent population-based study. Finally, the sample size limited multivariate analyses.

In conclusion, TMD were found to be associated with increased primary HA prevalence rates. Migraine was the most common primary HA in individuals with TMD. Populational and longitudinal studies need to investigate putative mechanisms for this comorbidity.

Acknowledgments

The authors thank the State of São Paulo Research Foundation–FAPESP (06/02848-3) and the National Council for Scientific and Technological Development–CNPq (133352/2007-2) for the financial assistance provided.

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