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Development of Temporomandibular Disorders is associated with greater bodily pain experience

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Abstract

Objectives—The aim of this study is to examine the difference in the report of bodily pain experienced by subjects who develop temporomandibular disorders (TMD) and by those who do not develop TMD over a 3 year observation period.

Methods—This is a 3 year prospective study of 266 females aged 18–34 years initially free of TMD pain. All subjects completed the Symptom Report Questionnaire (SRQ) at baseline and yearly intervals, and at the time they developed TMD (if applicable). The SRQ is a self-report instrument evaluating the extent and location of pain experienced in the prior 6 months. Statistical analysis was carried out using repeated measures ANOVA.

Results—Over the 3 year period, 16 subjects developed TMD based on the Research Diagnostic Criteria for TMD. Subjects who developed TMD reported more headaches ($P=0.0089$), muscle soreness or pain ($P=0.005$), joint soreness or pain ($P=0.0012$), back pain ($P=0.0001$), chest pain ($P=0.0004$), abdominal pain ($P=0.0021$), and menstrual pain ($P=0.0036$) than subjects who did not develop TMD at both the baseline and final visits. Subjects who developed TMD also reported significantly more headache ($P=0.0006$), muscle soreness or pain ($P=0.0059$), and other pains ($P=0.0188$) when they were diagnosed with TMD compared to the baseline visit.

Discussion—The development of TMD was accompanied by increases in headaches, muscle soreness or pain, and other pains that were not observed in the subjects who did not develop TMD. Subjects who developed TMD also report higher experience of joint, back, chest and menstrual pain at baseline.

Keywords

widespread pain; temporomandibular disorders

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Introduction

Chronic pain is rarely present in a single body site. Three distinct patterns of pain distribution, namely, localized, regional, and widespread pain has been described¹². Heterogeneous pain symptoms are believed to share common neurophysiologic, psychological, and behavioral mechanisms independent of specific differences in peripheral injury or disease³. Epidemiological and clinical trials have also provided consistent evidence that regional and widespread chronic pain conditions should be considered as part of a “continuum” rather than distinct entities with distinct etiologies¹⁴. Therefore, it is likely that there are some areas of shared risk exposure for all these pain conditions, implying that perhaps the face may be just one body region involved in a more widespread pain syndrome⁵. Various studies have since reported that facial pain is comorbid with widespread bodily pain⁶⁷⁵⁸⁹.

Temporomandibular disorders (TMD) is a collective term used to describe a number of related disorders involving the temporomandibular joints, masticatory muscles, and related structures¹⁰. Emerging evidence suggests a significant overlap between TMD states and pain conditions in other parts of the body, such as headaches, and neck, shoulder, and back pain²¹¹²⁵¹³. Studies have also reported comorbidity between TMD and fibromyalgia¹⁴¹⁵, and that these two conditions seemed to have in common numerous clinical symptoms, such as generalized pain sensitivity⁴. Therefore, TMD may represent one manifestation of a more global pain sensitivity disorder⁴. In addition, co-occurring pain conditions in TMD patients may potentially influence the course of pain and associated psychological disturbance and psychosocial dysfunction in these patients¹⁶¹⁷.

Widespread pain has been cited as one of the risk factors for the persistence of TMD pain⁷. Subjects with chronic TMD reported a greater number of body sites with pain than subjects with remitted or recurrent TMD¹⁸. Furthermore, subjects with frequent headaches or pain in other parts of the body had a threefold increase in risk of having TMD⁵. In women without dysfunctional TMD pain at baseline, widespread pain was a risk factor for the development of dysfunctional TMD pain¹⁹. Widespread pain was also highly associated with the risk of developing pain-related disability in female TMD patients¹⁹. Recent studies have shown that widespread pain is also a risk factor for the development or onset of TMD pain. Von Korff et al reported that the presence of a pain condition at baseline was a more consistent predictor of subsequent risks of developing TMD than was the severity or chronicity of depressive symptoms²⁰. In a prospective study, LeResche et al²¹ reported that the probability of developing TMD in early adolescence increased with the report of other pain conditions at baseline.

Associations reported by cross-sectional studies are not necessarily risk factors. They could be a consequence of having symptoms²². Longitudinal studies are more useful in examining the risk factors that are predictive of the onset of TMD¹³⁴. However, few longitudinal studies have employed frequent follow ups in assessing the onset of pain conditions. The aim of this study was to examine the difference in the report of bodily pain experienced by subjects who develop TMD and by those who do not develop TMD over a 3 year observation period. This will allow further understanding of the temporal relationship linking the development of various pain symptoms.

Materials and Methods

This is a 3 year prospective study of 266 females aged 18–34 years initially free of TMD pain. Subjects were recruited by advertisements placed in local newspapers for a study designed to examine the relationship between pain sensitivity and the development of TMD. During the

study visits (at baseline and at yearly intervals for 3 years), subjects completed questionnaires which identified self-reported facial pain and TMD symptoms and underwent a physical examination of the head and neck conducted according to the RDC for TMD²³. Individuals were excluded if they had a history of TMD or were diagnosed with TMD at the baseline examination. In addition to these study visits, online health surveys, which included questions on facial pain and TMD symptoms, were completed by the participants every 3 months over the 3 year period. Following each survey, participants who responded positively to key questions about facial pain and TMD symptoms were recalled for a re-examination according to the RDC protocol. New cases of TMD were defined according to the RDC for Group I Myofascial Pain and/or Group III Arthralgia, both of which included reported pain and pain on palpation²³. New cases were confirmed independently by two examiners.

All subjects completed the Symptom Report Questionnaire (SRQ) (Figure 1) at baseline and yearly intervals, and at the time they developed TMD (if applicable). The SRQ is a self-report instrument evaluating the extent and location of pain experienced in the prior 6 months. Statistical analysis was carried out using repeated measures ANOVA.

Results

Over the 3 year period, 16 subjects (6%) developed TMD (based on the RDC for TMD²³). The participation rate at subsequent yearly follow-up was 69.9% (186 subjects), 55.3% (147 subjects), and 71.1% (189 subjects) at the first, second, and third years respectively.

Subjects who developed TMD reported more headaches ($P=0.0089$), muscle soreness or pain ($P=0.005$), joint soreness or pain ($P=0.0012$), back pain ($P=0.0001$), chest pain ($P=0.0004$), abdominal pain ($P=0.0021$), and menstrual pain ($P=0.0036$) than subjects who did not develop TMD at both the baseline and the final visits (Figure 2).

Subjects who developed TMD reported significantly more headache ($P=0.0006$), muscle soreness or pain ($P=0.0059$), and other pains ($P=0.0188$) when they were diagnosed with TMD compared to the baseline visit (Figure 3).

Discussion

In this study, the 3-year cumulative incidence rate of TMD was 6%. This is similar to previous report of 3-year TMD onset rate of 6.5%²⁰. Similarly, the onset rate of widespread pain in longitudinal studies involving subjects with no initial pain was estimated to be between 2% to 10%^{24,25}, while the point prevalence of chronic widespread pain in a general population sample was about 11.2%²⁶. The pain conditions examined by previous studies included headaches, back pain, chest pain, joint pain, and abdominal pain^{20,21}. In this study we included muscle soreness or pain, pelvic pain, and menstrual pain. Menstrual pain reported by all subjects in this study seemed to decrease over the observation period. One possible reason for this is that the experience of menstrual pain at baseline was considerably higher than the experience of the other pains, such as chest or pelvic pain. Therefore this may reflect a reduction in extent of menstrual pain experienced.

Von Korff et al²⁰ and LeResche et al²¹ reported that widespread pain is a risk factor associated with the onset of TMD. In this study subjects who developed TMD reported higher experience of joint, back, chest and menstrual pain at baseline compared to those subjects who did not develop TMD. Similarly, Korszun et al reported that 67% of their cohort of TMD subjects reported an onset of generalized pain symptoms before the onset of facial pain¹⁵. Bergman et al also reported that the development of CWP from no chronic pain or chronic regional pain over a 3-year follow-up period was predicted by the number of painful regions at baseline²⁷.

Various other psychological and social risk factors have also been identified as risk factors for the future development of CWP, including greater impairment of general health status, sleep disturbance, fatigue, and high psychological distress^{28 29 30 31 32 33}. Paralleling the development of CWP, co-occurring physical symptoms, often referred to as somatization symptoms, function as potential significant prognosticators of the future clinical course in these patients^{34 16}. However, the most important clinical risk factor for chronic pain at a specific site appears to be pain³⁵. Von Korff et al reported that the presence of a pain condition at baseline was a more consistent predictor of subsequent risks of developing a new pain condition than was the severity of chronicity of depressive symptoms²⁰. In fact, the presence of one pain condition at baseline has been shown to be associated with a 4 times increased risk of developing TMD²⁰. These findings are in agreement with various case-control studies which have suggested that it seems inappropriate to consider TMD in isolation⁵. Rather, regional and widespread chronic pain conditions represent “overlapping” conditions, and should be considered as part of a “continuum” than distinct entities with distinct etiologies¹⁴. That being said, there are also other risk factors unique to the development of TMD such as bruxism, history of facial trauma, and third-molar extraction^{5 36}, which may not present as significant risk factors for the development of pain in other areas of the body.

In this study the onset of TMD was accompanied by increases in headache, muscle, and other pains which were not reported in the group that did not develop TMD. Macfarlane et al reported that subjects with headaches had a threefold increase in risk of having TMD. However, having pain in parts of the body other than the head also lead to a threefold increase in risk of having TMD⁵. Their data suggested that perhaps TMD and headache may share common etiological factors, rather than that pain at one specific site altered the risk of developing pain at another specific site. On the contrary, Von Korff et al studied the onset rates of back pain, headaches, chest pain, abdominal pain, and TMD, and found that the risk of onset of TMD was not significantly increased by the presence of any specific pain condition²⁰.

From a clinical perspective, the occurrence of TMD with widespread body pain may impact the management of such patients. Raphael et al reported that TMD patients with widespread pain did not improve with occlusal splint therapy compared to those with just local pain³⁷. Future studies need to address the impact of widespread body pain on the prognosis of the various treatment modalities for TMD.

Our study had several strengths. The participation rate at subsequent follow-up was moderately high. We used reliable criterion-based examination (RDC for TMD) for the diagnosis of TMD for all subjects²³. Self-reported facial pain symptoms were obtained quarterly and this has been recommended to be a reasonably accurate recall period reducing response bias^{20 32 38}. The longitudinal design employed in this study allowed us to investigate the temporal relationship sequence linking the development of various pain symptoms, namely that widespread pain was reportedly present prior to the onset of TMD, and that the onset of TMD accompanied by reportedly greater experience of widespread pain.

Several limitations of this study also deserve mention. Males were excluded in this study because the female gender has been reported to be a TMD risk factor³⁹. Future studies need to investigate the relationship between widespread pain and the development of TMD in men. Our reliance on self-reported body pain symptoms based on a questionnaire (SRQ) is subject to recall bias⁴⁰. Alternative methods of data collection, such as using daily diary, will avoid such bias. Moreover, although three monthly symptom report has been previously recommended^{20 32}, our subjects reported body pain symptoms experienced over the last six months. It has also been argued that the location and extent of chronic body pain are best determined by physical examination by a qualified practitioner. However, since pain is a subjective experience, the practitioner would still have to rely on patient self-report. Finally,

this study examined only the pain experience associated with the onset of TMD. It is our intention to continue to track these subjects to determine chronicity.

Conclusions

In this 3 year prospective study of 266 females aged 18–34 years initially free of TMD pain, 16 subjects (6%) developed TMD. The development of TMD was accompanied by increases in headaches, muscle soreness or pain, and other pains that were not observed in the subjects who did not develop TMD. Subjects who developed TMD also report higher experience of joint, back, chest and menstrual pain at baseline compared to those subjects who did not develop TMD.

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Over the last 6 months, how much have you experienced:

	Not at all	A little bit	A moderate amount	Quite a bit	An extreme amount
a. Headaches b. Muscle soreness or pain c. Joint soreness or pain d. Back pain e. Chest pain f. Pelvic pain g. Abdominal pain h. Menstrual pain i. Other pain (please explain)					

Figure 1.
Symptom Report Questionnaire.

Figure 2.

Pain reported by subjects over a 3 year observation period. The SRQ score '0.5' codes for 'not at all'; '1.0' codes for 'a little bit'; '1.5' codes for 'a moderate amount'; '2.0' codes for 'quite a bit'; and '2.5' codes for 'an extreme amount'.

Figure 3.

Pain reported by subjects who developed TMD (at study baseline and at TMD onset) and by subjects who did not develop TMD (at study baseline and at final visit). The SRQ score '0.5' codes for 'not at all'; '1.0' codes for 'a little bit'; '1.5' codes for 'a moderate amount'; '2.0' codes for 'quite a bit'; and '2.5' codes for 'an extreme amount'.