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Clinical Findings and Pain Symptoms as Potential Risk Factors for Chronic TMD: Descriptive Data and Empirically Identified Domains from the OPPERA Case-Control Study

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Abstract: **Clinical characteristics might be associated with temporomandibular disorders (TMD) because they are antecedent risk factors that increase the likelihood of a healthy person developing the condition or because they represent signs or symptoms of either subclinical or overt TMD. In this baseline case-control study of the multisite Orofacial Pain: Prospective Evaluation and Risk Assessment (OPPERA) project, 1,633 controls and 185 cases with chronic, painful TMD completed questionnaires and received clinical examinations. Odds ratios measuring association between each clinical factor and TMD were computed, with adjustment for study-site as well as age, sex, and race/ethnicity. Compared to controls, TMD cases reported more trauma, greater parafunction, more headaches and other pain disorders, more functional limitation in using the jaw, more nonpain symptoms in the facial area, more temporomandibular joint noises and jaw locking, more neural or sensory medical conditions, and worse overall medical status. They also exhibited on examination reduced jaw mobility, more joint noises, and a greater number of painful masticatory, cervical, and body muscles upon palpation. The results indicated that TMD cases differ substantially from controls across almost all variables assessed. Future analyses of follow-up data will determine whether these clinical characteristics predict increased risk for developing first-onset pain-related TMD**

Perspective: ***Clinical findings from OPPERA's baseline case-control study indicate significant differences between chronic TMD cases and controls with respect to trauma history, parafunction, other pain disorders, health status, and clinical examination data. Future analyses will examine their contribution to TMD onset.***

Key words: *TMD, chronic pain, trauma, parafunction, comorbid disorders, medical history, examination, pain.*

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Temporomandibular disorders (TMD), a set of conditions affecting the masticatory muscles or joints and exhibiting pain as their primary characteristic, have historically been attributed to mechanisms related to dental or structural abnormalities, but with considerable controversy and little solid evidence.[12-14,34,89,90] Numerous psychological and behavioral factors are well-established influences upon a wide range of pain conditions including TMD pain.[20,22-27,42,66,83,91,100] Genetics and sensory processing also contribute to the etiology of TMD and other forms of chronic pain.[17-19,54,79] The abundance of data in support of psychological, genetic, and sensory processing factors within TMDs stands in sharp contrast to the far fewer reports of associations between TMD and factors which can be readily identified during clinical assessment, such as trauma, oral behaviors, and masticatory system status.

The scientific rationale for the project Orofacial Pain: Prosepctive Evaluation and Risk Assessment (OPPERA) is depicted in a heuristic model[53] in which clinical characteristics range from historical experiences (eg, trauma due to injury occurring before onset of TMD) to clinical manifestations that might represent signs or symptoms of subclinical TMD (eg, slightly limited jaw opening). Other relevant clinical characteristics form part of the case-classification for TMD (eg, orofacial pain during jaw movement) or represent consequences of experiencing the condition (eg, restriction in daily activities due to facial pain). However, for many other characteristics commonly assessed in clinical settings, it is far from clear whether they are an antecedent that increases the likelihood of developing the condition or are a consequence of the condition iteself. For example, parafunctional jaw behaviors are very likely both a cause and a consequence of TMD.[57]

In this paper, the term "risk factor" is used broadly to represent both etiologic events or experiences prior to onset of TMD as well as contributory events or experiences that occur in parallel with the onset of TMD or exacerbation of TMD symptoms. Despite the advances in the recognized factors of genetics, sensory processing, psychology, and behavior as contributing to TMD pain, no single risk factor for developing TMD has been identified as a necessary or sufficient cause. Hence, there is no causal smoking gun for TMD and, given the complexity of the conditions, it seems unlikely that one will emerge. Instead, multiple factors affect the masticatory system and pain perception, either as independent or interacting causal influences. This is consistent with virtually all major chronic diseases where the view of a multifactorial "web of causation" has long been used as a metaphor to describe the interplay of multiple risk factors on the occurrence of disease.[45]

Plausible risk factors for TMD which might be sufficient, either alone or more likely in combination, include: trauma, parafunction, other pain conditions or functional disorders, self-reported history of pain symptoms, pain reported in response to examination procedures, anthropometric variables, and health status. Many, if not most, of these proposed risk factors have been at least mentioned in the literature; but as of 1991, almost nothing was known about these factors in terms of their potential causal role for TMDs[89] and, to date, only modest progress has occurred.[80,87,98]

This paper reports findings from the OPPERA baseline case-control study, a component study examining chronic TMD within OPPERA. The aim of this paper was to characterize univariate differences in these clinical risk factors between people classified with chronic TMD arthralgia, myalgia, or both ("TMD cases") and people who had neither of those conditions ("controls") when examined. In order to accomplish this aim, a set of clinical assessment tools was applied to TMD cases and controls. The analyses presented here will serve as the foundation for future analysis of first-onset TMD that is being identified through longitudinal follow-up of the cohort of initially TMD-free controls.

Methods

Study Setting and Participants

As described elsewhere,[82] the OPPERA baseline case-control study used advertisements, emails, flyers, and word of mouth to recruit people who had chronic TMD ("cases") and people who did not ("controls"). For both groups, as described in the accompanying paper,[82] fewer than 10% reported hearing about OPPERA through research clinics; the majority heard either by word of mouth or from advertisements, flyers and emails. They were recruited between May 2006 and November 2008 from communities in and around academic health centers at 4 US study sites: Baltimore, MD; Buffalo, NY; Chapel Hill, NC; and Gainesville, FL. At each study site, the goal was to recruit 800 controls and variable numbers of cases based on local operational requirements, for a total of 3,200 controls and 200 cases. The actual number enrolled was 3,263 controls and 185 cases.

The classification of TMD was based on the Research Diagnostic Criteria for Temporomandibular Disorder.[21] In summary, cases met all 3 of the following criteria: during the telephone interview, 1) pain reported with sufficient frequency in the cheeks, jaw muscles, temples, or jaw joints during the preceding 6 months (at least 15 days in the preceding month and at least 5 days per month in each of the 5 months preceding that); during the examination, 2) pain reported in the examiner-defined orofacial region for at least 5 days out of the prior 30 days; and 3) pain reported in at least 3 masticatory muscles or at least 1 temporomandibular joint in response to palpation of the orofacial muscles or maneuver of the jaw. Examiners defined the orofacial region by touching the following anatomical areas bilaterally: temporalis, preauricular, masseter, posterior mandibular, and submandibular.

Chronic pain for the cases was defined as pain present for at least 6 months. We used a 6-month threshold as the time criterion to define chronic TMD, consistent with the 1994 IASP (page xi) recommended threshold for research in chronic pain, "pain which persists beyond the normal