

# The prevalence of temporomandibular disorders in patients with late whiplash syndrome who experience orofacial pain

## A case-control series study

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**W**hiplash is an acceleration-deceleration mechanism of energy transfer to the neck that may result from a motor vehicle accident involving a rear or side impact, but it also can occur while diving or as a result of other mishaps.<sup>1</sup> The impact may result in bony or soft-tissue whiplash injuries (WIs), which, in turn, may lead to a variety of clinical manifestations, defined as whiplash-associated disorders (WADs).<sup>1</sup>

Some patients develop chronic pain conditions resulting in late whiplash syndrome (LWS), which the Quebec Task Force defined as the “presence of pain, restriction of motion or other symptoms at six months or more after a whiplash injury, sufficient to hinder return to normal activities such as driving, usual occupation and leisure.”<sup>1</sup>

Some researchers have suggested that temporomandibular disorders (TMDs) are a cluster of dysfunctions that can occur in patients with WAD.<sup>1,2-5</sup> Although the correlation between TMD and acute WAD is controversial, the results of a few studies show a positive correlation between TMD and chronic WAD.<sup>3,4</sup> Investigators in the majority of these studies

## ABSTRACT



**Background.** The authors conducted a study to compare the frequency of specific temporomandibular disorder (TMD) diagnoses in patients who had late whiplash syndrome (LWS) with that in a control group.

**Methods.** The authors recruited 65 patients who had orofacial pain and a previous diagnosis of LWS and 65 age- and sex-matched control patients who had chronic orofacial pain without a history of whiplash injury (WI) for a case-control series study. All patients completed a questionnaire pertaining to the Research Diagnostic Criteria for Temporomandibular Disorders and underwent a clinical examination.

**Results.** The authors compared the frequency of TMD diagnoses in case patients with that in control patients by using a  $\chi^2$  test; they set the  $\alpha$  level a priori at .05. The number of patients diagnosed with myofascial pain (MP) and disk displacement with reduction (DDWR) was significantly higher in the case group than in the control group ( $P = .002$  and  $P = .001$ , respectively).

**Conclusions.** The results of this study show a higher frequency of MP and DDWR in patients with LWS than in patients with chronic orofacial pain and no history of WI.

**Practical Implications.** Clinicians should be knowledgeable about the correlation between WI and TMD so they can inform and treat patients accurately.

**Key Words.** Temporomandibular dysfunction; orofacial pain; myofascial pain; whiplash injury; temporomandibular disorders; whiplash-associated disorders; late whiplash syndrome.

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analyzed only TMD signs and symptoms, with no diagnostic protocol, but signs and symptoms do not always correspond to a TMD diagnosis. The Research Diagnostic Criteria for Temporomandibular Disorders<sup>6</sup> (RDC/TMD) is an internationally recognized classification system for TMD that represents accepted practice for TMD diagnosis and classification in research settings. Use of the RDC/TMD allows researchers to compare the results of TMD studies, and this classification system has dominated the field of TMD research for 20 years.<sup>7,8</sup> To date, no investigators, to our knowledge, have used the RDC/TMD in patients with WI.

The aim of this case-control series study was to compare the frequency of specific TMD diagnoses in patients who had LWS and experienced chronic orofacial pain with that in patients who experienced chronic orofacial pain but had no history of WI.

## METHODS

One hundred seven consecutive patients (48 men and 59 women), aged 19 to 62 years, with a complaint of orofacial and neck pain who had sustained a WI were referred to the Department of Orthodontics and Gnathology, University of Bologna, Italy. One of us (F.B.) administered an anamnestic questionnaire to all participants. The study inclusion criterion was a previous diagnosis of LWS made by a physiatrist. Exclusion criteria included a TMD diagnosis before the WI, self-reported symptoms of TMD that preceded the accident, previous direct facial trauma, fibromyalgia, rheumatoid arthritis, cervical lesions and involvement in litigation pertaining to the accident. All patients were asked to record their spontaneous pain on a 100-millimeter visual analog scale (VAS).<sup>9</sup>

We enrolled in the study 65 patients (26 men and 39 women) with a mean (standard error [SE]) age of 32.7 (6.56) years and an age range from 19 to 57 years who met the eligibility criteria (case group). The time between the WI and the examination varied between 12 and 28 months. Of the 42 patients who were excluded, 31 had not received a diagnosis of LWS by a physiatrist, two had received a diagnosis of fibromyalgia, seven reported having experienced a previous direct facial trauma and two developed a cervical lesion in the accident. No patients declined to participate in the study.

An age-, sex- and VAS-matched control group consisted of 65 patients who had no history of WI or direct facial trauma; they were referred to our department from among patients with chronic orofacial pain (that is, the pain started

12 to 28 months before the examination).

**Clinical examination.** We based the TMD diagnosis on Axis I (clinical physical examination) of the RDC/TMD, as described by Dworkin and LeResche.<sup>6</sup> All patients signed an informed consent form and completed the Axis I RDC/TMD questionnaire before undergoing the clinical examination. To standardize the study protocol and avoid any bias, one experienced orofacial pain specialist (I.M.), who was masked and trained in the RDC/TMD, performed all of the clinical examinations. The institutional review board at the University of Bologna approved the study protocol.

**Statistical analysis.** We used proportions (SE) to describe the frequency of each condition. We calculated 95 percent binomial exact confidence intervals (CIs) because of the small sample size. We used a  $\chi^2$  test to compare the frequency of TMD diagnoses in case patients with that in control patients and set the  $\alpha$  level a priori at .05.

## RESULTS

The mean (SE) VAS score for the intensity of spontaneous pain in the case group was 83 (13) mm.

Tables 1<sup>6</sup> and 2<sup>6</sup> show the frequency of RDC/TMD diagnoses, with 95 percent binomial exact CIs, for the LWS and control groups, respectively. We found that the frequency of myofascial pain (MP) and disk displacement with reduction (DDWR) was significantly greater in patients in the LWS group than in those in the control group ( $P = .002$  and  $P = .001$ , respectively). We found no significant differences between patients in the LWS group and those in the control group with respect to disk displacement without reduction (DDWOR) and osteoarthritis (OA) diagnoses. Table 3<sup>6</sup> (page 489) shows the frequency of RDC/TMD diagnoses in the two groups.

## DISCUSSION

**TMD and WI.** The literature contains discordant data concerning the correlation between WI and TMD. Researchers have used questionnaires or clinical examinations to compare the prevalence of TMD signs and symptoms in patients

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**ABBREVIATION KEY.** **DD:** Disk displacement. **DDWOR:** Disk displacement without reduction. **DDWR:** Disk displacement with reduction. **LWS:** Late whiplash syndrome. **MP:** Myofascial pain. **OA:** Osteoarthritis. **RDC/TMD:** Research Diagnostic Criteria for Temporomandibular Disorders. **TMD:** Temporomandibular disorder. **TMJ:** Temporomandibular joint. **VAS:** Visual analog scale. **WAD:** Whiplash-associated disorder. **WI:** Whiplash injury.

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