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# The role of physical therapy for the treatment of temporomandibular disorders

In the field of temporomandibular disorders (TMD), the role of physical therapy has been shown to be one of the most effective among conservative treatments.<sup>[1-4]</sup> Since the need for irreversible therapies such as dental and surgical procedures is fortunately rare for such patients, conservative and reversible treatment modalities are recommended.<sup>[5]</sup> Such therapies include patient reassurance, patient education and self-management, cognitive-behavioral intervention, medications, use of dental appliances, and physical therapy.<sup>[5]</sup> Nevertheless, the term “physical therapy” includes a large number of different modalities, from more simple therapies (use of hot/cold packs, massage, posture training, exercise, mobilization) to instrumental techniques (transcutaneous electrical nerve stimulation, laser).<sup>[6]</sup> Recently, the use of lasers has become noteworthy in the field of medicine, especially in the field of chronic joint and muscle disorders.<sup>[7-9]</sup> Based on these results, its use has also been tested with promising results for the treatment of TMD.<sup>[10]</sup>

Lasers can be divided into “hard lasers” and “soft lasers” based on their energy output.<sup>[11]</sup> Hard lasers, with high energy output, are used during surgical procedures to incise biological tissues, while soft lasers, with low energy output, are used to improve tissue healing.<sup>[11-13]</sup> Treatment by the use of soft lasers, also called low-level laser therapy (LLLT), is the one that has been lately used for the management of temporomandibular joint (TMJ) and masticatory muscles’ pain and dysfunction.<sup>[10]</sup> However, scientific evidence of efficacy has not been demonstrated. In the last 3 years, five review articles have been published on the topic of LLLT for the treatment of TMD,<sup>[14-18]</sup> and this reveals the growing interest of the medical community in the field. All of them, except for the last, are systematic reviews of randomized controlled trials (RCTs), which represent the highest level of scientific evidence available.

The first article was published in 2011 by Petrucci *et al.*<sup>[14]</sup> and examined a total of six RCTs carried out from 1997 to 2008. Two trials reported nonsignificant difference in pain reduction between pre- and post-treatment, while in the remaining four trials, the difference was statistically significant. Pain intensity decreased in both active and placebo groups, without statistically significant difference between the groups. Only one trial reported better results for the active group in terms of mandibular range of motion.

The second article was published in 2012 by Tengrungsun *et al.*<sup>[15]</sup> and examined a total of 33 RCTs carried out from 1989 to 2009. However, only 13 of them included TMD patients and a placebo-controlled group. Four trials reported better results for the active group when compared to the placebo, but nine trials did not find statistically significant difference between the groups.

The third article was published in 2012 by Melis *et al.*<sup>[16]</sup> and examined a total of 14 RCTs carried out from 1995 to 2010. In eight trials, LLLT was found to be superior to placebo in improving pain intensity and mandibular range of motion. Conversely, no significant difference between the active and control groups was reported in the other eight trials (the sum is higher than 14 because in some studies, more than one trial was performed). Interestingly, six out of eight articles reported LLLT to be superior to placebo when applied on the TMJ, while one out of three reported LLLT to be superior to placebo when applied on the masticatory muscles.

The fourth article was published in 2012 by Maia *et al.*<sup>[17]</sup> and examined a total of 14 RCTs carried out from 2003 to 2010. However, only 12 of them included a placebo-controlled group. In seven trials, LLLT was found to be superior to placebo. On the contrary, no significant difference between the active and control groups was reported in five trials.

The fifth article was published in 2013 by Herranz-Aparicio *et al.*<sup>[18]</sup> and examined a total of 16 articles published between 2003 and 2010. However, only five of them carried out an RCT including a placebo-controlled group. In two trials, LLLT was found to be superior to placebo; in another two trials, no significant difference was found between the active and control groups. In one trial, LLLT was more effective than placebo in improving mandibular range of motion and reducing tender points, but was equal to placebo in reducing pain intensity and TMJ sounds. Anyhow, many RCTs were not included in this review because of the limited choice of the key words used for the search.

Evaluating the five reviews, a considerable heterogeneity of the methods followed in the studies included is evident, in terms of sites of laser application, number and duration of laser applications, characteristics of the laser beam, patients’ selection, and outcome measures. This can be the reason for the contradictory results obtained. However, LLLT is probably more effective for the treatment of TMJ disorders and less effective for the treatment of masticatory muscle disorders.

It must be considered that TMD include articular and muscular disorders that, although some specific features, should not differ from articular and muscular pathologies in the rest of the body. Scientific data demonstrate the efficacy of LLLT for chronic joint and muscle disorders;<sup>[7-9]</sup> therefore, the results of these reviews are unexpected.

At this time, the use of LLLT for the treatment of TMD cannot be recommended, although no definitive conclusions can be drawn. It is likely that when functional or structural problems

occur, for example, a displaced disc, the laser beam cannot adequately reduce the symptoms until the main cause is corrected, and this can be a peculiarity of TMD.

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