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Role of physiotherapy in M.P.D.S: Systematic review and meta-analysis

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***Abstract*---**Aim: To analyze the methodologic quality, summarize the findings, and perform a meta-analysis of the results from randomized controlled trials that assessed the effects of physiotherapy management of Myofascial Pain Dysfunction syndrome (MPDS). Methodology: A literature review was performed using the electronic databases PubMed, Science Direct. Each article was independently assessed by two investigators using the Cochrane Risk of Bias tool. A meta-analysis was conducted to obtain summary estimates of the standardized mean differences (SMD) and the corresponding 95%

confidence intervals (95% CI). Between-study heterogeneity was computed and publication bias was assessed. Results : Seven articles met the inclusion criteria and were used in the analysis, corresponding to nine estimates of SMD. The meta-analysis showed that for pain reduction, the summary SMD favored physiotherapy (SMD = −0.63; 95% CI: −0.95 to −0.31; number of studies = 8; I2 = 0.0%), while for active range of movement (ROM) the differences between the intervention and control groups were not statistically significant (SMD = 0.33; 95% CI: −0.07 to 0.72; number of studies = 9; I2 = 61.9%). Conclusion: Physiotherapy seems to lead to decreased pain and may improve active muscle movement. However, the results are not definitive and further studies and meta-analyses are needed before these results can be considered fully generalizable.

***Keywords*---**physiotherapy, pain, temporomandibular disorders.

Introduction

Patients suffering from the Myofascial Pain Dysfunction syndrome (M.P.D.S.) of the masticatory system are a common problem in oral surgery. Patients present with varying degrees of unilateral facial pain, masticatory muscle tenderness, joint crepitation and limitation of mandibular movement.[1] Numerous etiologies for M.P.D.S have been proposed. Some hypotheses implicate the temporomandibular joint, either by hypermobility[2] or inflammation.[3] More recent hypotheses implicate localized areas of muscle hypertonicity or spasm as the cause of the pain and dysfunction.[4] The muscle spasm maybe as a result of local factors, especially malocc1usion[5]or from generalized psychogenic or stress factors.[6] Numerous treatments, either single or in combination, have been proposed in accordance with the various etiologic theories. It has been found that a wide range of pharmacological[7], occlusal alteration[5], surgery[8], and psychotherapeutic treatments will result in relief of symptoms in 70-80 % of cases.[6] Physiotherapists have long been associated with orthopedic surgeons in the management of musculo-skeletal disorders. MPDS is clearly a musculo-skeletal disorder involving the temporomandibular joints, jaws and associated masticatory muscles. In particular, physiotherapeutic tests can be used to localize the probable source of pain. Positive responses to resisted static contraction tests, palpation for tenderness and electromyography, indicate pain arising from muscle tissue whereas positive results from passive physiological and accessory movement tests indicate pain arising from joint structures. People with MPDS have limited daily activity functions due to the severe and chronic pain they experience.[9-12] When trigger spots are activated, referred pain and other autonomic nervous system (ANS) reactions are induced.[13-15] The ANS dysfunction symptoms include abnormal sensation, neuromuscular function attenuation, and heart rate alternation.[16-18] Together with pain expression, the augmentation of pain can increase the sympathetic nervous system activity. The goals of treating MPDS are reduction of muscle tension and pain, amelioration of the myogenic dysfunction, recovery from muscle imbalance, increase of muscle flexibility, and finally normalization of muscle activity.[19,20] The common treatments for MPDS are analgesic drugs, dry needle therapy, laser exposure, ultrasonic treatments, and

physical therapy.[20-25] Currently, MPDS may be managed by a combination of physiotherapy, splint therapy, orthodontics, pharmacotherapy, counselling, and surgery, among others. Non-invasive treatments tend to be the first option for approximately 85 to 90% of TMD patients.[26] In the case of physiotherapy, two systematic reviews performed in 2006 concluded that the studies reviewed had methodologic problems that affected any possible conclusions about the effectiveness of physiotherapy in treating MPDS. Since then, new studies attempting to overcome these problems have been conducted, but the effectiveness of physiotherapy interventions in the management of MPDS is still unclear.[27] Thus, the aim of this systematic review was to analyze the methodologic quality, summarize the findings, and perform a meta-analysis of the results from randomized controlled trials (RCTs) that assessed the effects of physiotherapy management of MPDS.

Aim of the Present Study

To analyze the methodologic quality, summarize the findings, and perform a meta-analysis of the results from randomized controlled trials that assessed the effects of physiotherapy management of MPDS.

Methodology

The following electronic databases were searched from inception to June 2021: PubMed, and Science Direct. The search expression used was built according to medical subject headings (MeSH) terms - “MPDS, temporomandibular disorders, physiotherapy, physical therapy OR rehabilitation OR exercises OR manual therapy and restricted to articles published in English. In addition, a manual search for further relevant articles in the references of all the included studies was performed. This systematic review included RCTs that assessed the effects of physiotherapy treatment regardless of blinding. Interventions performed by therapists and within the scope of physiotherapy practice (i.e, manual therapy, dry needling, exercise therapy) were included. Quality assessment was performed using the Cochrane Risk of Bias tool,[28] The Cochrane Risk of Bias tool assesses six domains: (1) selection bias (random sequence generation, allocation concealment); (2) performance bias (blinding of participants and personnel); (3) detection bias (blinding of outcome assessment); (4) attrition bias (incomplete outcome data); (5) reporting bias (selective reporting); and (6) other bias. The standardized mean difference (SMD) of each individual study was calculated by determining the difference between the mean outcomes of the intervention’s effectiveness and, in the control group, dividing by the pooled standard deviation. Heterogeneity between the studies was quantified by using the I2 statistic.24 Visual inspection of the funnel plots and Egger’s regression asymmetry tests were used to assess publication bias.[29] A P value of $< .05$ was considered to reflect statistical significance.

Results

The search identified 3,243 potentially relevant studies, 3,218 of which were excluded after screening the titles and/or abstracts. After the full-text reading, only seven studies fulfilled all inclusion criteria and were used in the qualitative

and quantitative analysis (Fig 1). A total of 329 patients were included in these studies (mean sample size: 47 participants). The duration of total treatment ranged from 1 day to 6 weeks (mean = 5 weeks). Of the included studies, one used a single treatment to test immediate effects of dry needling, three studies performed a 5-week protocol (one with 15 treatments and two with 10 treatments), one performed a 4-week protocol (12 treatments), and two had an intervention period of 6 weeks which was comprised of nine treatment sessions. Two trials evaluated manual therapy with additional exercise, three trials assessed manual therapy combined with home physical therapy, one trial studied the effect of manual therapy alone, and one trial studied the effect of dry needling. The participants who underwent manual therapy combined with home physical therapy were compared with a control group, a wait-list control group, and two groups of participants who underwent manual therapy alone or home physical therapy alone. The outcome measures found in the studies were visual analog scale (VAS), pain physiopathology instrument scale, 11-point graded chronic pain scale (CPS). The summary Standard Mean Deviation (SMD) showed that globally, there was a statistically significant improvement favoring intervention (SMD = −0.63; 95% confidence intervals [CI]: −0.95 to −0.31). The I2 result showed no heterogeneity between studies. When a sensitivity analysis was performed restricting the analysis to studies that presented the same diagnostic criteria, the estimated summary remained similar (SMD = 0.59; CI: −0.98 to −0.21; number of studies = 6; I2 = 20.5%).

Discussion

As with most multidisciplinary investigations it was found that each discipline had skills to offer the other. The physiotherapist has knowledge of the general principles of musculo-skeletal function, diagnostic tests such as resisted static contraction and treatments such as general relaxation therapy which are unfamiliar to most oral surgeons; on the other hand the oral surgeon has knowledge of local anatomical features such as the dental occlusion and the paired temporomandibular joints which make some features of MPDS unique. The methodologic quality based on the Cochrane Risk of Bias tool was good, with an overall low risk of bias for all studies, except for the study by Carmeli et al, which had a lower-quality score. All studies used an appropriate sequence generation, which reduced their risk of selection bias. The amount of physiotherapy treatment (i.e, time per session and number of sessions) is an important clinical consideration and is quite variable. This variability is related to the patient's response to the treatment and the treatment technique selected, as there are so many different techniques within the scope of physiotherapy. This variability and the fact that there are several studies in which physiotherapy is performed by medical assistants or is considered to be any exercise or movement of the jaw is the reason why the present systematic review set the inclusion criterion that the treatment must be performed by a therapist and excluded studies that were solely hands-off. Additionally, while performing the review, several studies were found that used the word "exercise" to describe simply opening and closing the mouth. The meta-analysis results on pain at rest showed that a physiotherapy intervention produced a significant reduction in pain at rest. Schmid et al found strong evidence to support the involvement of the central nervous system in mediating the response to manual therapy treatment.[30] Standardization of the

outcome assessment instruments would allow researchers to pool data from multiple studies and to thereby draw consistent conclusions for the efficacious management of MPDS. It will also be important to study further the pain mechanisms underlying physiotherapy interventions.

Conclusion

Physiotherapy seems to lead to decreased pain and may improve active ROM. However, the results are not definitive and further studies and meta-analyses are needed before these results can be considered fully generalizable.

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Figures

Figure 1- Prisma Flowchart Of Study Selection Process