Journal of Pain & Relief
ISSN: 2167-0846
Oliver, J Pain Relief 2023, 12:2
Mini Review
Open Access

Therapeutic Effects and Groups on Pain Disorders

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Abstract

Several studies carried out using different approaches in Temporo-mandibular disorder have obtained contradictory results. Physiotherapy plays a prominent role in the treatment of Temporo-mandibular disorder and has several intervention strategies, including therapeutic exercises; however, although several studies have evaluated the effects of therapeutic exercise on pain control, the significant methodological heterogeneity among studies makes it difficult to reach a consensus.

Keywords: Intervention strategies; Therapeutic exercises; Hypoalgesia; Pain decrease; Temporo-mandibular disorder; Experimental group

Introduction

Exercise is an important component of pain management strategies for most patients and is also vital for their general health and well-being. Several studies report that exercise reduces the sensitivity to painful stimuli in healthy individuals, which is termed exercise-induced analgesia or hypoalgesia. High-intensity aerobic exercise has been known to produce a large hypoalgesic effect in healthy individuals; other studies carried out in subjects with chronic pain, including fibromyalgia, undergoing aerobic exercise have also shown that intense exercise can decrease pain [1]. However, there is a lack of studies investigating the role of aerobic exercise in patients with Temporo-mandibular disorder. Therefore, the present study aims to assess the effects of three eight-week exercise intervention programs on pain, neuromuscular activity, and bite force of masticatory muscles in patients with muscle-related Temporo-mandibular disorder. Patients were distributed among the three exercise groups [2]. Those who did not agree to perform aerobic exercise were allocated to experimental group, and the remaining patients were randomly allocated to the other two groups, using a computer program.

Discussion

Experimental group carried out a protocol of specific therapeutic exercises for the masticatory muscles, Experimental group carried out the same therapeutic exercise protocol directed at the masticatory muscles associated with aerobic exercise, and Experimental group carried out the same aerobic exercise program as Experimental group. At the first moment of assessment, pain intensity and sEMG data at the resting position and maximum voluntary contraction were collected [3]. Two weeks later, a new evaluation was carried out without any intervention between these two moments. Then, the Experimental groups exercise programs were started. Eight weeks after the start of the intervention protocols, a new evaluation moment was carried out, which took place 48 h after the end of the exercise programs. Eight to twelve weeks after the end of the intervention, the patients returned to the clinic for the last evaluation moment. All evaluation data were collected by an independent researcher who was blinded to the group allocation directed at the masticatory muscles associated with aerobic exercise, and Experimental group carried out the same aerobic exercise program as Experimental group. At the first moment of assessment, pain intensity and sEMG data at the resting position and maximum voluntary contraction were collected. Two weeks later, a new evaluation was carried out without any intervention between these two moments. Then, the Experimental group exercise programs were started. Eight weeks after the start of the intervention protocols, a new evaluation moment was carried out, which took place 48 h after the end of the exercise programs [4]. Eight to twelve weeks after the end of the intervention, the patients returned to the clinic for the last evaluation moment. All evaluation data were collected by an independent researcher who was blinded to the group allocation. Patients in the Experimental group participated in a weekly exercise session for a period of 8 weeks. The physiotherapy session was the same for all participants, the techniques were always applied in the same sequence, and they were always performed by the same physiotherapist for 30 min. Each session consisted of the following techniques: compression, transverse, and longitudinal massage of the masseter muscle, bilaterally; longitudinal massage of the temporal muscle, bilaterally; compression of the medial pterygoid muscle, bilaterally; passive stretching of the masseter and medial pterygoid, bilaterally; isotonic strengthening exercises through resisted mouth opening and closing and resisted left and right deviation; and coordination exercises through mouth opening and closing exercises and laterals [5]. Patients in the Experimental group participated in a weekly physiotherapy session for a period of 8 weeks. The physical therapy session was the same as described for Experimental group. The Experimental group exercise program also included two weekly cycle ergometer training sessions, which were always supervised by the same physiotherapist and lasted for 30 min. The participants cycled the first 5 min with an intensity of 50% of the heart rate reserve, the next 24 min with an intensity of 70% of the HRR, and the last minute at 50% of the HRR for active recovery [6]. The speed and/or resistance of the cycle ergometer were adjusted throughout the training period in order to keep the exercise intensity within the predefined value. HRR was determined according to the Karvonen formula, and resting heart rate was assessed on three consecutive days, after five minutes of rest in a chair with the arms supported. The average value was calculated and used as the resting HR. Patients in the Experimental group underwent only two weekly cycle ergometer training sessions for eight weeks, which were always

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Received: 30-Jan-2023, Manuscript No.JPAR-23-89714; **Editor assigned:** 01-Feb-2023, PreQC No. JPAR-23-89714(PQ); **Reviewed:** 15-Feb-2023, QC No. JPAR-23-89714; **Revised:** 20-Feb-2023, Manuscript No. JPAR-23-89714(R); **Published:** 27-Feb-2023, DOI: 10.4172/2167-0846.1000486

Citation: Oliver J (2023) Therapeutic Effects and Groups on Pain Disorders. J Pain Relief 12: 486.

supervised by the same physiotherapist and lasted for 30 min. The protocol performed was the same as that defined for Experimental group. Pain intensity was evaluated using an analogy algometry, with the patients comfortably positioned in the supine position and fully relaxed. The evaluator placed the end of the contact surface of the algometry perpendicularly and exerted a gradual pressure on the three portions of the masseter and temporal muscles bilaterally, according to the physical examination indications of the DC-TMD. Changes in pain intensity were evaluated by applying a constant pressure using the NPRS. The subjects were instructed to classify the pain intensity at the maximum pressure exerted. Pain was measured three times at each of the points mentioned above, with an interval of 10 s between each measure at the same point and 30s between different points. For each point, the average of the three measurements was calculated to determine the NPRS. The minimum clinically important difference considered was two points. sEMG procedures and data acquisition were performed by a physiotherapist with previous experience in sEMG [7]. All procedures and sEMG data were collected with patients in a calm and quiet environment with a constant room temperature, seated comfortably in a chair without head support, hands resting on their legs and aligned with their shoulders, hips, and knees at 90° of flexion, and instructed to look ahead and avoid facial and orbicular expressions. Before the start of data collection, sEMG data acquisition procedures were prepared. AMBU BlueSensor N electrodes, which were bipolar, were positioned parallel to the muscle fibers and fixed on the skin in the masseter muscle, bilaterally [8]. To determine electrode placement, an isometric contraction of the masseter in maximum inter-cuspation was requested, in order to guarantee the same position of the temporo-mandibular joint was maintained in all subsequent procedures. The electrodes were placed in the muscle belly, with the upper electrode at the intersection between the tragus-labial commissure and the exocanthion–gonion lines, and were positioned 20 mm apart according to SENIAM recommendations. Skin preparation was performed by gentle sanding and cleaning with cotton wool soaked in a 70% alcoholic solution. A bracelet ground electrode was placed over the wrist styloid apophyses. For the collection of sEMG data, an eight-channel system with active electrodes connected to a bioPLUX research 2010 system was used, with a common mode rejection ratio of 110 dB, input impedance > 100 MΩ, and gain of 1000 [9]. The data were recorded with a sampling frequency of 1000 Hz. Prior to processing, the raw sEMG signals were inspected by an experienced researcher to assess their quality. Afterwards, the signals were digitally filtered, rectified, and smoothed using a 4th-order 5-Hz Butterworth low-pass filter. The normalization of the resting sEMG value was performed using the MVC sEMG value as a reference. To quantify sEMG intensity, the average EMG signal amplitude was determined during the defined time periods. All sEMG signal processing was performed through routines developed with Matlab software. The recording of sEMG activity in the RP was performed by maintaining the masticatory muscles at rest for one minute. The 10 s between 40 and 50 s were selected to assess muscle activity at rest. sEMG during MVC was assessed by maintaining a maximum contraction for three seconds and was controlled using a bite force dynamometer, which was placed between the first and second premolars. The defined procedure was performed bilaterally and repeated three times on each side. Both used software programs, sEMG, and Matlab, were configured to store all generated data files in a solid state disk encrypted with Bitlocker, accessible only to the principal investigator of this study. All collected data were properly anonymised [10]. Categorical variables were analysed using Pearson's Chi-Square Test to confirm equality between groups at the time A01. For continuous variables, a non-parametric Kruskal Wallis Test was performed to confirm equality between groups at time A01. A two-way mixed ANOVA was used to assess the behaviour of the variables at the various assessment times and for the three intervention groups. A 95% confidence interval was determined for all tests, and a 5% significance level was used.

Conclusion

The Statistical Package for the Social Sciences version was used for all statistical analyses. Cohen's d effect size was also calculated: effect sizes up to 0.2 were considered irrelevant, those between 0.2 and 0.5 were considered small, those between 0.5 and 0.8 were considered moderate, and values above 0.8 were considered large. The sample consisted of 52 patients, out of which 45 completed the four evaluation moments. Of the 52 initial patients, there were seven dropouts (two who did not attend the third evaluation moment and five who did not attend the last evaluation moment, which represented a value of 13.5% that confirmed a good adherence to the study.

Acknowledgement

None

Conflict of Interest

None

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