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Massage therapy in cortisol circadian rhythm, pain intensity, perceived stress index and quality of life of fibromyalgia syndrome patients

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ABSTRACT

We investigate the effects of a massage therapy program (MTP) in cortisol concentration (CC), intensity of pain, quality of life and perceived stress index of fibromyalgia patients. Volunteers (n = 24, aged 26–55 years) were treated with MT, twice a week for three months. They answered the Fibromyalgia Impact Questionnaire (FIQ), Perceived Stress Questionnaire (PSQ) and McGill Pain Questionnaire (MPQ-Br), and collected saliva to evaluate CC before and after the end of each month. The MT had improvement in quality of life, according to the FIQ results, and promoted reduction in PSQ values after the second (PSQ2-0.62 ± 0.04vsPSQ0-0.71 ± 0.04) and third month (PSQ3−0.64 ± 0.04vsPSQ0-0.71 ± 0.04). The MTP also promoted reduction in pain after the third month (MQP-Br1-44.50 ± 2.15vsMQP-Br4−35.38 ± 3.71). Despite PSQ reduction, the CC were not affected by the program. This pilot suggests that this treatment improved quality of life, reduced perceived stress index and pain in these volunteers.

1. Introduction

Fibromyalgia syndrome (FMS) is a chronic musculoskeletal disease of unknown etiology and characterized by pain diffused throughout the body and hyperalgesia. In addition, patients with FMS also have functional and emotional disorders including persistent muscle fatigue, sleep disturbances, paresthesia, mood disturbance, and cognitive disorders [10,36]. FMS prevalence is very diverse in the literature. Studies have found prevalence lower than 1% in Denmark; 2% in Spain and an estimated from 3.3 to 2% in North America [21]. Generally, it is believed that FMS affects between 2 and 4% of the world population, and the prevalence is higher among women aged between 50 and 80 years, reaching 7% [52]. Because of generalized pain throughout the body, patients with fibromyalgia show significant reduction in quality of life; in addition, between 30 and 45% of patients with fibromyalgia show symptoms related to stress [48].

The primary neuroendocrine control that regulates the stress response in the body involves participation of hormones that are part of the hypothalamic pituitary adrenal axis (HPA), with the participation of corticotropin-releasing hormone, adrenocorticotropic hormone and cortisol [24]. The pathophysiology of FMS is still not fully elucidated, and studies suggest an association with environmental and genetic factors [35]. Much of the symptoms reported by patients with FMS are related to generalized pain. Studies report changes in the peripheral and central nociceptive pathways, which are constantly activated in patients with fibromyalgia [40].

Pain has a considerable impact on psychological, social, economic and biological well-being of the patient [46]. As a result, different treatments have been proposed for patients with FMS, and one of the most widely used techniques, with positive results as pain reduction and muscle tension is the massage therapy. Swedish massage, an European traditional massage, uses gentle strokes and has proven effective in reducing muscle pain and stress [12]. As

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Swedish massage uses gentle touch, this technique can be an important alternative treatment for patients with FMS, which have excessive muscle tension. Therefore, the aim of this study was to verify if a massage therapy program during three months can influence cortisol concentrations, perceived stress index, intensity of pain and quality of life of patients with FMS before the treatment and after the end of each month.

2. Material and methods

2.1. Patients

Women with medical diagnosis of fibromyalgia, sedentary lifestyle and aged between 26 and 59 years participated in this study. Initially, 27 women started the MT program, however, only 24 finished the three months of treatment. The volunteers were not using any medication to treat fibromyalgia. All patients signed the free and informed consent, declaring understanding on the procedures that would be performed during the search (Ethics Committee Protocol: 386,577).

2.2. Massage therapy program

Patients underwent 24 sessions of Swedish massage therapy in the whole body [51], lasting 40 min, two sessions per week, for a period of three months. Sessions were held during the afternoon. Sessions were performed by trained professional, in an acclimatized room in the Physiotherapy clinic of the Padre Anchieta University Center. In our study, the Swedish massage included the following techniques: effleurage, petrissage, vibration and friction. The original technique of Swedish massage also include tapotement technique, however, as this procedure could increase the muscle tension, we did not performed tapotement during the sessions.

2.3. Questionnaires

The participants answered three questionnaires that were validate for Portuguese language. To analyze the quality of life the fibromyalgia impact questionnaire (FIQ) was applied [31]. This questionnaire assesses fibromyalgia impact on patients' quality of life, with questions that address functional capacity, professional, psychological disorders and physical symptoms. In this questionnaire scores range from 0 to 100, where the negative impact of fibromyalgia on the quality of life is evidenced when the score is above 50 [5].

McGill questionnaire (MQP-Br) [14] aimed to verify the intensity of the patients' pain. This questionnaire consists of 78 adjectives for pain classification, organized into four categories (sensory, affective, evaluative and miscellaneous). These words are divided into 20 groups, sorted into the descriptors in ascending order of intensity.

First, the patient should be asked to select only the words or phrases that best describe their pain at the time of the interview. Because of the difficulty of understanding some words, the therapist can define them to the patient. All the adjectives must be read to the patient, so that they can qualify their pain. Only one adjective of each descriptor can be chosen. The total score was obtained considering the sum of the values of words for each category.

Perceived Stress Questionnaire (PSQ) was used to check the perceived stress index. The questionnaire is composed of 30 questions related with harassment, overload, irritability, lack of joy, fatigue, worries and tension. Participants should indicate the frequency of events in the period analyzed [38,45].

All questionnaires were applied before the start of massage therapy program and at the end of each month of treatment.

2.4. Collection of saliva samples

Saliva was collected using a sterile cotton dental roll, which was placed under the tongue of the patient until was completely full of saliva (5–10 min). Then, it was stored in a plastic tube (salivette) and stored in refrigerator. Only after centrifugation the saliva was stored at −20 °C for further analysis. Saliva samples were collected before the start of massage therapy program, and at the end of each month of treatment in days when there was no massage therapy session. In each collection period, patients were instructed to collect samples in five periods throughout the day: upon awakening (6 a.m.), 30 min after waking up (CAR), before lunch (12 p.m.), before dinner (6 p.m.), and before bedtime (10 p.m.), always fasting for at least an hour [39].

2.5. Determination of salivary cortisol

Salivary cortisol concentrations were determined in order to verify whether this hormone, associated with stress response, showed any change in the quantity produced and/or daily rhythmicity of this hormone (circadian cycle). The response of the HPA axis analyzed by the cortisol response when awakening is also possible to evaluate.

The determination of salivary cortisol concentrations was performed by the Elisa method, using the cortisol kit of the IBL International Company (RE52611, Hamburg, Germany).

2.6. Statistical analysis

The single population experimental design was chosen, evaluated before the treatment and after the end of each month, during three months. Results are presented as mean ± SEM. After normality test performed by Kolmogorov-Smirnov or D'Agostino & Pearson test, according to Graph Pad Prisma suggestion. The tests utilized were Anova or Manova (F) followed by Tukey or paired Student *t*-test when normality data was detected, and Mann-Whitney test when normality was not detected. Differences were considered significant when $p < 0.05$ and p values were presented in figure legends.

3. Results

Twenty-four patients were evaluated in this study and participated in the massage therapy program for three months. The average age of patients was 45.9 ± 2.89 years and body mass index (BMI) showed that the patients were overweight (26.04 kg/m^2). Table 1 shows the patients' anthropometric data.

3.1. Quality of life

The initial result of the first FIQ, applied before the start of the rehabilitation program, was 59.31 ± 4.87. There was a significant drop in this questionnaire scores throughout the weeks, considering the initial FIQ: FIQ 2–42.82 ± 5.18; FIQ 3–39.05 ± 6.18; FIQ

Table 1
Anthropometric data of the population of volunteers with FMS subjected to massage therapy treatment over three months (n = 24).

Age (years)	Weight (Kg)	Height (m)	BMI (Kg/m^2)
45.9 ± 2.89	68.46 ± 6.88	1.48 ± 0.12	26.04 ± 2.52