**Original Article**

# Trapezius upper portion trigger points treatment purpose in positional release therapy with electromyographic analysis

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## Abstract
**Background**: This quantification process is made through electromyography analysis. This technique of analysis is able to provide a general view of the tension decrease in the superior muscle fibers of the trapezius after therapy. **Aims**: The focus of the present work is to evaluate the treatment of the cervicobrachialgia by Positional Release Therapy (PRT). **Material and Methods**: The present work studies six patients, with ages 44 to 63 (1 male and 5 female) who present tension in the trapezius upper portion fibers. All patients were submitted to 10 session of 30 minutes each. The electromyography was collected on the first and tenth day of treatment. **Results**: The results demonstrated a progressive decrease of pain in each session. The tension was evaluated by the electromyography analysis, which showed the relations between time of treatment and less pain. **Conclusion**: With these results, it was possible to verify quantitatively the efficiency of the PRT in the improvement of life quality.

**Keywords**: Trapezius upper portion, electromyography, muscle tension, positional release therapy.

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## Introduction
The cervicobrachialgia is defined as the presence of pain (algia) in the cervical region with irradiation to the arm, due to compression of the nerve root of the brachial plexus. This pathology can generate sensitivity and/or motor alterations in the corresponding dermatomes[1].

This problem can be related to brusque movements, and long periods standing in uncomfortable positions which cause frequent muscular spasms and trigger points (TPs) resulting from the opening of the sarcoplasmatic reticulum. This causes the release of calcium which is combined with adenosine triphosphate (ATP), activates the local mechanisms of contraction, generating landslide and interaction of actin and myosin which shortens the affected muscular beam. In this experiment with the superior portion of the muscle trapeze, there are definitive actions when it has the cervical waist as fixed point. When the bilateral contraction of the trapezes is symmetrical, it promotes the extension of the cervical column and of the head with accentuation of cervical lordosis. When the contraction of the trapeze is unilateral or anti-symmetrical, it promotes the extension of the head and the cervical column with hyper-lordosis, with inclination to the same side of the contraction and rotation of the head for the opposing side [1, 2].

One way of dealing with the affected muscle group is the “Positional Release Therapy” (PRT), a method for assessing the whole body. It is also a treatment that uses sensitive points and a position of comfort to solve the associated dysfunction. PRT is a passive and indirect therapy for tissue resistance (application of the technique in the direction of ease), using the positioning of the body and sensitivity to identify and monitor the injury. By doing so, it improves the function, relieves the tension and eases the musculoskeletal pain [3-6].

The fundamental principle of the PRT technique is to determine the (ideal) position of maximum comfort of articulation, lowering the sensitivity of the painful point. This treatment is done by placing the tissue involved in the position of comfort, which in the case of this experiment was evaluated through surface electromyography[6, 7].

The surface electromyography has been a widely used method in Biomechanics, along with other measurement procedures, to obtain data on the components of neuromuscular movement control [8, 9]. The objective of the study was to emonstrate throuth electromyography the reduction of tension in the upper portion trapezius in patients with cervicobrachialgia after application of the positional release therapy (PRT).

# Materials and Methods

Six volunteers with average age 55.3, male and female, with cervicobrachialgia and tension in the trapezius muscle (upper). The criteria of inclusion were: age, tension in trapezius upper portion and base disturbances, and not be undergoing any other treatment that might interfere in the study.

The subjects received treatment, and electromyography analysis was conducted at initial rest with the application of the PRT technique in bilateral the upper trapezius and at rest after the application.

The points of palpable tension in the upper trapezius were demarcated and the Mcgill pain questionnaire was applied before the initial assessment. Then, the first electromyography was collected [10].

The treatment was conducted with the application of the PRT technique in point(s) of tension in the upper trapezius by palpation. The muscle was placed in a position of comfort, and maintained by reduction or abolition of tension and monitored by a gentle touch on these points. Before and after application of the PRT of each session, patients were questioned about the intensity of pain, which could range from 0 (no pain) to 10 (unbearable pain). The final evaluation was composed of electromyography analysis and the Mcgill pain questionnaire [10].

Ten thirty minute sessions were held, twice a week in the School Hospital Wladimir Arruda (HEWA). The electromyographyc measurements were conducted in the Laboratory of Human Biodynamics of the Faculty of Physical Education of the University of Santo Amaro, where the data were taken on the first and tenth days of treatment. The electrodes were placed in the upper trapezius of both sides, according to the Delagi protocol [11, 12] (Figure 1). The subjects were placed on an isometric test table in dorsal decubitus position with the head on the table (resting position), keeping this position for 90 seconds to collect EMG signs (Figure 2). In the second collection, the physiotherapist held the head both in rotation and passive tilt, with the passive lifting of the homolateral shoulder (zone of comfort) to the trapezius muscle (Figure 3). The subjects stayed in this position for 90 seconds to collect EMG signs. A third collection was performed with the contralateral side (Figure 4), in the same position and duration previously cited. The final collection was held in the original position.

**Figs. 1 and 2** Electrodes placed on the trapezius upper portion, patient on resting position.

**Figs. 3 and 4** Patient resting on a comfortable position for the treatment. From a different view.

The command to start to capture the electromyography records was previously arranged with the therapist, so as not to activate unconscious isometric upper trapezius contractions of the patient.

Biological signals were obtained using a 16 channel module (EMG System do Brasil LTDA), consisting of a signal conditioner with a band pass filter with cut-off frequencies at 20–1000 Hz, an amplifier gain of 1000 and a common mode rejection ratio higher than 120 dB. The data were processed using specific software for acquisition and analysis (EMG Analysis V1.01), a converting plate for A/D 16 bits signal to convert analog into digital signals with a sampling frequency of anti-aliasing 2.0 kHz for each channel and an input range of 5 mV[13, 14]. Active bipolar superficial electrodes consist of two rectangular parallel bars of Ag/AgCl (1 cm in length, 0.2 cm in width and 1 cm apart). These bars are coupled to a rectangular acrylic resin capsule 2.2 cm in length, 1.9 cm in width and 0.6 cm high with an internal amplifier in order to reduce the effects of electromagnetic interferences and other noises [15].

Electrodes were fastened to the skin, which was previously cleaned with alcohol, guided by bone prominences and the route of the muscle fibers [16]. The electrodes were then coated with a thin film of conductive gel and fixed with micropore adhesive tape at the midline of the muscle belly with their detection surface perpendicular to the muscle fibers [17]. In all procedures the capture and analysis of EMG signals were carried out as recommend by the International Society Electrophysiology Kinesiology (ISEK) [18].

The records were standard in the time through the ORIGIN® software and subjected to an analysis of the variability at the number of repetitions and at volunteers among themselves, using the calculation of the variability coefficient.

The image acquisition was made aiming to demonstrate the maintenance of the initial positions of volunteers during the position of relaxation of the upper trapezius, before and after the application of the technique in rest, and in the position of greater relaxation of trapezius, during the implementation of technique.

This study was approved by the Univap research ethics committee under protocol No. l 110/2004, as per resolution No. 196/96 of the National Health Council on the 20, March, 2004. The volunteers signed the consent term to the research.

# Results

The results showed that all patients had a gradual decrease in pain after each session. The numerical scale of pain (Figure 5) shows that, four patients had 100% of pain reduction, one presented 87.5% and the other 84%.

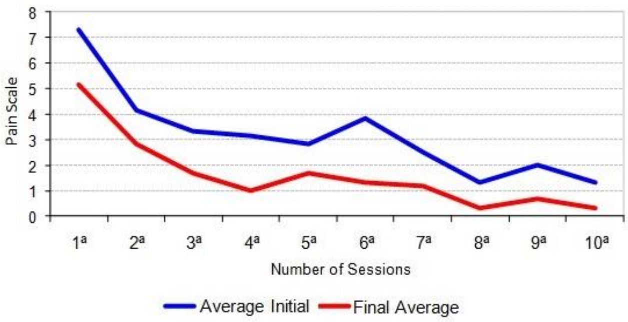
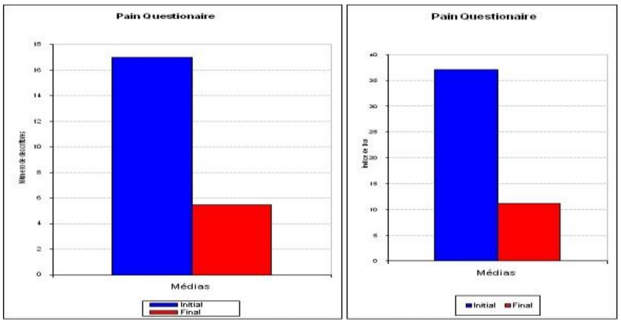



**Fig. 5** Average pain scale during treatment. Average of measures from the beginning to the end of the treatment.




**Figs. 6 and 7** Average of numbers of descriptors and pain scale, according to the McGill Pain Questionnaire, respectively.

The values were measured according to the McGill Pain Questionnaire [10] which examines the pain by the numbers of descriptors and rates of pain, showing a reduction of these values. The number of descriptors decreases 64.34% on average, ranging from 25% to 100% (Figure 5) and the pain index decreases 67.65% in average, ranging from 24.32% to 100% (Figure 6).

The state of tension of the upper fibers of the trapezius muscle of the patients decreases in average, 31.86% on the right side and 43.38% on the left side (Figure 8) after the treatment. The electromyography data show a decrease during the application of the PRT technique in the upper trapezius, on the right side at 51.87% and on the left side in 50.81% (Figure 9), but they did not show significant values in accordance to the coefficient of variability [19].

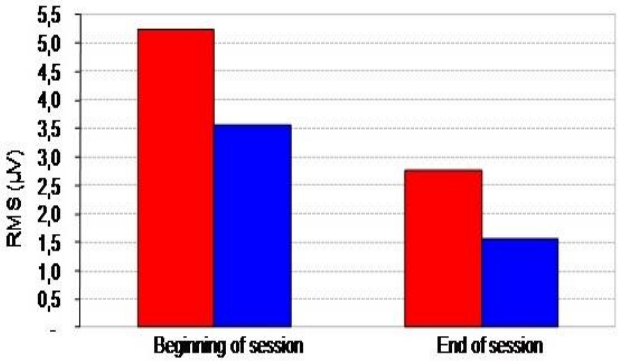



**Fig. 8** Muscle tension before and after treatment. The electromyographic signal average of the trapezius muscle before and after the treatment.

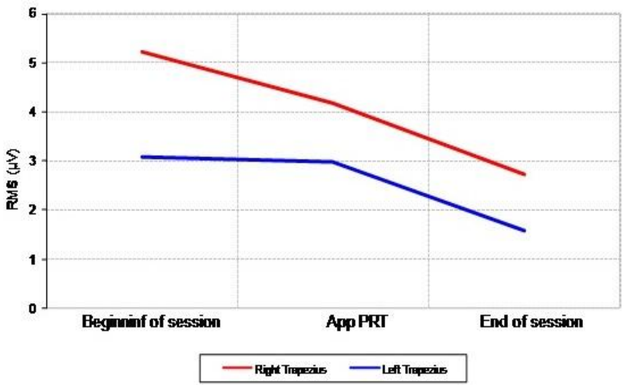



**Fig. 9** Analysis of the trapezius muscle activity throughout the treatment. RMS values to the average of Muscle tension of upper trapezius at rest before, during and after the PRT session.

# Discussion

There are some difficulties in researches that include manual therapy as an object of study This happens mainly because of disagreements among the various authors about the origin of skeletal muscle pain and of the influence of the interaction between patient and therapist. Therefore, it is important to note that the relationship developed with the patients is a significant factor for the confidence deposited by them from the outset, because in the technique of PRT relaxation of the patient is essential to achieve the ideal position of comfort [20].

The treatment position of the upper trapezius described in the literature is: patient placed in dorsal position with the therapist positioned on the side of the sensitive point. The head of the patient is then laterally flexed toward the sensitive point.

The therapist secures the patient's forearm and abducts the shoulder to almost 90$^{o}$, and for the adjustment of the position, holds a flexion or a discreet extension [20]. This position is not always ideal for the patient, because the area of comfort varies from person to person. The literature also reports that the ideal position of comfort is the final goal of treatment and requires a greater degree of clinical refinement, to be specific and different for each position of treatment [21]. This encouraged adapting a position, considering the biomechanics of the upper fibers of the trapezius muscle, which has been effective in the course of treatment through the release of the points of tension.

The present study demonstrated that a) the application of the PRT promotes a decrease in pain and muscle tension in the upper trapezius, confirming the assumptions that the PRT seems to relieve the muscle spasm and restore the appropriate painless movement and the tissular flexibility [22]; b) the relaxation of tensioned muscle fiber promotes normalization of local vascularization and decreased pain, caused by ischemia; and c) the action of PRT on the nociceptive system can be exercised through the relaxation of the surrounding tissues and the consequent improvement in the vascular and interstitial movement. This can have an indirect effect on the removal of chemical mediators of inflammation [2], the subsequent resolution of protective reflexes of the myofascial structures can also contribute to a reduction of the release of more nociceptive substances. The PRT also can act on the traumatic cycle and assist in the resolution of facilitated segments of the central nervous system [17, 23].

As demonstrated by the results, the pain was gradually decreased during the ten sessions of treatment, agreeing with the statement: "the manual therapy induces immediate analgesia, cumulative with repetition of the treatment". With the reduction of pain, from the first session, the treatment allowed the patients to move in an appropriate way in their daily life activities (DLA), also promoting the improvement of self-esteem. Treatment should be focused on the correction of joint, muscle and postural shortcomings, and the adequacy of DLA [20, 24, 25].

Some factors may have influenced the statistical analysis, by calculating the coefficient of variability for example, the small number of patients with cervicobrachialgia, which showed tension in the upper fibers of the trapezius muscle, and the difficulty in finding the ideal position of comfort (the sensitive points were very near or below the electrodes of electromyography, which made palpation difficult). There are still steps to be taken. The completion of treatment with a larger number of patients is suggested, with monitoring at the end of the sessions for verification of recurrence of the clinical state. Development of a method to monitor the sensitive points by palpation during electromyography without generating interference is also indicated.

# Conclusion

The analysis of data collected and the electromyography data showed that the positional release therapy (PRT) for the treatment of patients with cervicobrachialgia has proved effective because it reduced the muscle tension in the upper trapezius and decreased the musculoskeletal pain, with consequent improvement of posture and daily life activities.

The technique is very simple, safe and easy to learn, and it can serve as an introduction to the musculoskeletal techniques for the less experienced and also as a technical assistant to the most qualified professional. Moreover, it is efficient and easy to implement and can be used by any professional in the health area with technical training and knowledge in physiology.

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