

# ASSESSMENT OF THE INFLUENCE OF ISCHEMIC COMPRESSION AND CLAVITHERAPY ON COMPRESSION PAIN THRESHOLD MEASURED ON THE LUMBAR SPINE RECTIFIER MUSCLE

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## ABSTRACT

**Background:** The British physician, Balfour, at the beginning of the nineteenth century was one of the first to describe thickened nodules and bumps in tissue, which could be painful under pressure. This pressure often also caused pain in other distant parts of the body. The above characteristics perfectly reflected what is now referred to as the trigger point.

**Aim of the study:** The aim of this study was to assess the impact of ischemic compression using clavitherapy on the level of compression pain threshold measured with an algometer on the muscle of the lumbar region spine extender. The following research questions were posed:

**Material and methods:** The research involved 40 patients with pain in the paraspinal muscles who were attending the Physio-Wysz Rehabilitation Center. In each subject, pain threshold was assessed using an algometer, 5 points before and after therapy. Each subject was then subjected to ischemic compression for each of the 5 points. The obtained results were entered into an Excel™ database and then analyzed using the Statistica program.

**Results:** The mean value of the pain threshold for the L1 point before therapy was  $114.4 \pm 17.22$  N/cm<sup>2</sup> and for P1 was  $113.24 \pm 18.85$  N/cm<sup>2</sup>. Immediately after therapy, the compression pain threshold decreased to  $84.15 \pm 10.79$  N/cm<sup>2</sup> and  $84.89 \pm 10.11$  N/cm<sup>2</sup> for the L1 and P1 points, respectively.

**Conclusions:** There was a reduction in the mean compression pain threshold immediately after clavicle therapy. There were no significant differences when measuring the pressure pain threshold after therapy.

**KEYWORDS:** clavitherapy, ischemic compression, compression pain threshold

## BACKGROUND

Generalised muscle soreness or discomfort often occurs on the day after intense physical activity. The concept for this study has its origins in the research of the British scholar, Archibald V Hill. He observed the presence of lactic acid in very fatigued frog muscles and concluded that lactic acid was responsible for this fatigue [1–5]. However, Hill did not carry out other experiments to confirm this thesis, and for some time it remained unclear what caused this muscular soreness. Current research indicates that after physical exertion, lactic acid is oxidized and returns towards normal levels [6–9]. Researchers consider that delayed muscle soreness results from microdamage to muscle

fibers. This microdamage may be caused by excessive intensity, repetitive eccentric contractions and by non-specific exercises of too high strength [10–14]. Typical symptoms of this microdamage include reduced range of motion, joint stiffness, reduction in maximum contraction force, pressure soreness and the presence of increased creatine activity in the blood [15–20].

Klawiterapii (clavitherapy) is a method of treatment performed using a key. This is an oblong tool about 10 cm in length, with one end being sharp and the other end having a shape similar to a screwdriver. Clavitherapy is often done with toothpicks. The creator of this method, Ferdynand Barbasiewicz (PhD), considers that this approach is based on neurophysiological processes,

with the main goal to provide a good blood supply to tissues, which may affect activation of neurochemical relays. Clavithery consists of compressing the clavicle into specific points on the body. The pressure usually lasts for a few seconds and is repeated up to 10 times. The heavier the dysfunction, the longer and more frequent the procedure should be. The tools are made of surgical steel and laser-treated so that they do not disturb the integrity of the patient's skin despite being sharp. According to Barbasiewicz, the above-mentioned tightening of the key stimulates nerve impulses that reach the principle structures of the nervous system [20–21].

### AIM OF THE STUDY

The aim of this study was to assess the influence of clavicle therapy on compression pain threshold, measured with an algometer, on the spine extender muscle in the lumbar region. The following research questions were posed:

1. Does clavithery influence the compression pain threshold measured with an algometer?
2. Is a difference in therapy detectable between the left and right sides?

### MATERIAL AND METHODS

Forty patients with pain in the paraspinal muscles were identified from the Fizjo-Wysz Rehabilitation Center. The conducted physical and physical examination enabled identification of the main cause of the DOMS ailments, ie delayed muscular pain syndrome. In each subject an assessment of the compression pain threshold was made using an algometer, with 5 points for both the left and right muscles of the dorsal rectifier. Values were expressed in kilogram per square centimeter ( $\text{kg}/\text{cm}^2$ ). The measurement was repeated three times to eliminate measurement error. Each subject was then given therapy using the clavicle for each of 5 points, on both the left and right side, lasting until the minimum pain had subsided. This therapy consisted of compressing each of the 5 points with a tip reminiscent of a flat screwdriver. The pressure pain threshold was measured immediately after therapy. All obtained parameters were entered into an Excel™ database. Next, a database was created in the Statistica program and normality of the results distribution was

examined using the Shapiro-Wilk test. An appropriate histogram was obtained along with the imposed normal distribution density curve, which allowed for its appropriate assessment. Due to a lack of differentiation of results, statistical analysis in the case of normally distributed data was performed with the Student's t-test for dependent samples. The level of statistical significance was  $p < 0.05$  in both cases.

### RESULTS

Before therapy, the mean  $\pm$  standard deviation pain threshold for the L1 point was  $114.4 \pm 17.22 \text{ N}/\text{cm}^2$  and for the P1 points was  $113.24 \pm 18.85 \text{ N}/\text{cm}^2$ . Immediately after therapy, the compression pain threshold decreased to  $84.15 \pm 10.79 \text{ N}/\text{cm}^2$  for the L1 point and  $84.89 \pm 10.11 \text{ N}/\text{cm}^2$  for the P1 point. The changes were not statistically significant ( $p > 0.05$ ) (fig. 1).

The mean  $\pm$  standard deviation value of the pain threshold before therapy was  $114.19 \pm 16.74 \text{ N}/\text{cm}^2$  and  $114.69 \pm 18.48 \text{ N}/\text{cm}^2$  for L2 and P2 points, respectively. Immediately after therapy, the compression pain threshold decreased to  $83.35 \pm 9.88 \text{ N}/\text{cm}^2$  for point L2 and  $85.03 \pm 10.61 \text{ N}/\text{cm}^2$  for point P2. These changes were not statistically significant ( $p > 0.05$ ) (fig. 2).

The mean  $\pm$  standard deviation value of the pressure pain threshold for the L3 point before therapy was  $113.06 \pm 16.95 \text{ N}/\text{cm}^2$  and for the P3 point was  $114.99 \pm 18.99 \text{ N}/\text{cm}^2$ . Immediately after therapy, the compression pain threshold decreased to  $83.18 \pm 9.94 \text{ N}/\text{cm}^2$  for point L3 and  $83.9 \pm 10.84 \text{ N}/\text{cm}^2$  for point P3. The changes did not attain statistical significance (fig. 3).

The mean  $\pm$  standard deviation value of the pain threshold for the L4 point before therapy was  $118.39 \pm 15.33 \text{ N}/\text{cm}^2$  and for P4 was  $113.88 \pm 18.47 \text{ N}/\text{cm}^2$ . Immediately after therapy, the compression pain threshold decreased to  $82.16 \pm 10.91 \text{ N}/\text{cm}^2$  for the L4 point and  $83.05 \pm 10.41 \text{ N}/\text{cm}^2$  for the P4 point. These changes did not attain statistical significance (fig. 4).

The mean  $\pm$  standard deviation value of the pressure pain threshold for the L5 point before therapy was  $115.05 \pm 18.07 \text{ N}/\text{cm}^2$  and for P5 was  $115.65 \pm 17.46 \text{ N}/\text{cm}^2$ . Immediately after therapy the compression pain threshold decreased to  $85.22 \pm 10.47 \text{ N}/\text{cm}^2$  for the L5 point and  $83.59 \pm 10.59 \text{ N}/\text{cm}^2$  for the P5 point. These changes were not statistically significant (fig. 5).

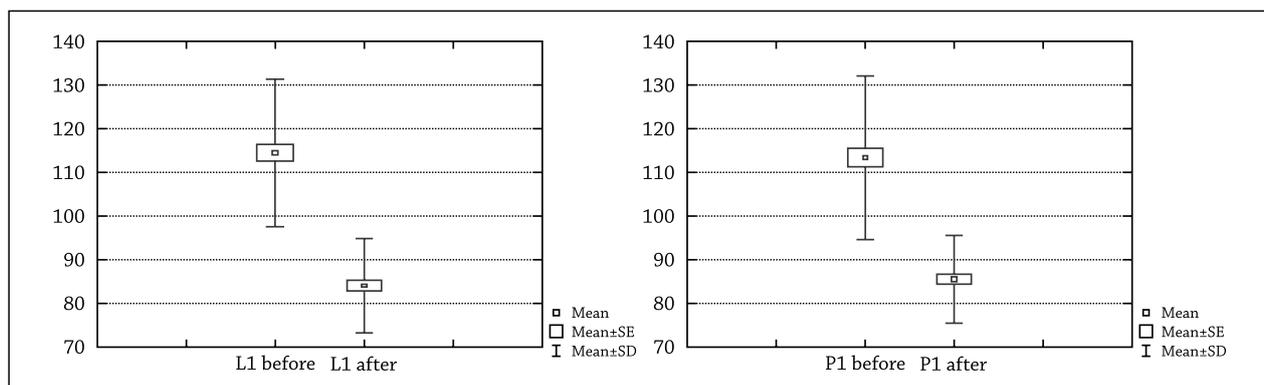


Figure 1. Mean pressure pain threshold values for L1 and P1 points before and immediately after therapy.

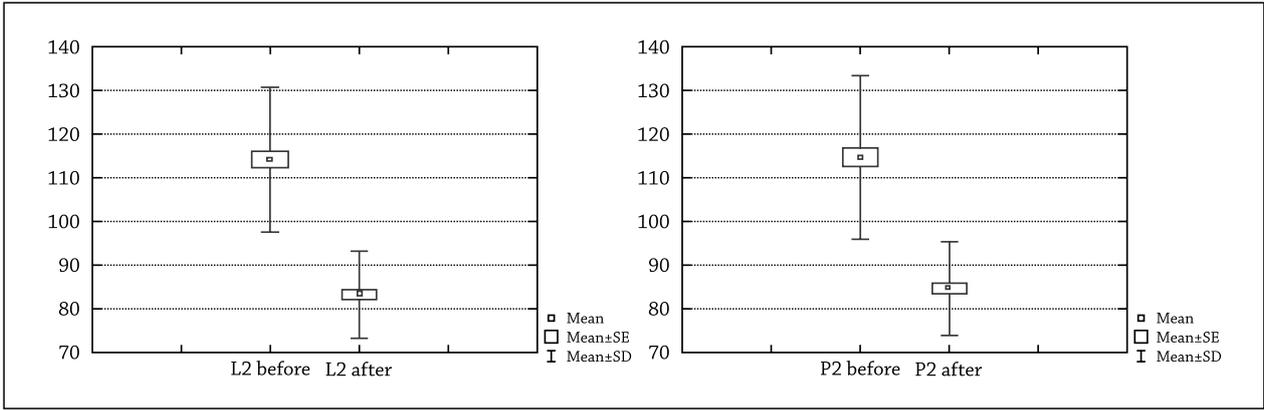


Figure 2. Mean pressure pain threshold values for L2 and P2 points before therapy, and immediately after therapy.

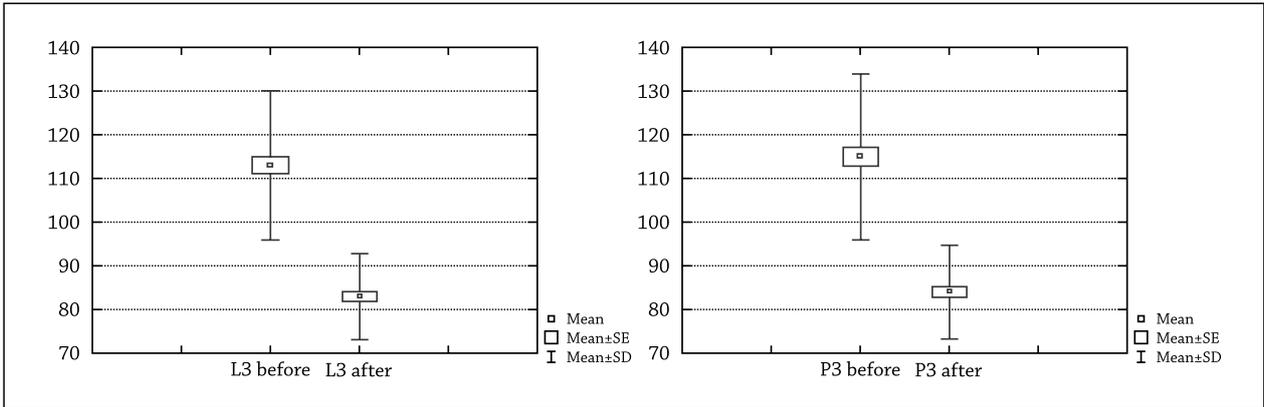


Figure 3. Mean pressure pain threshold values for L3 and P3 points before and immediately after therapy.

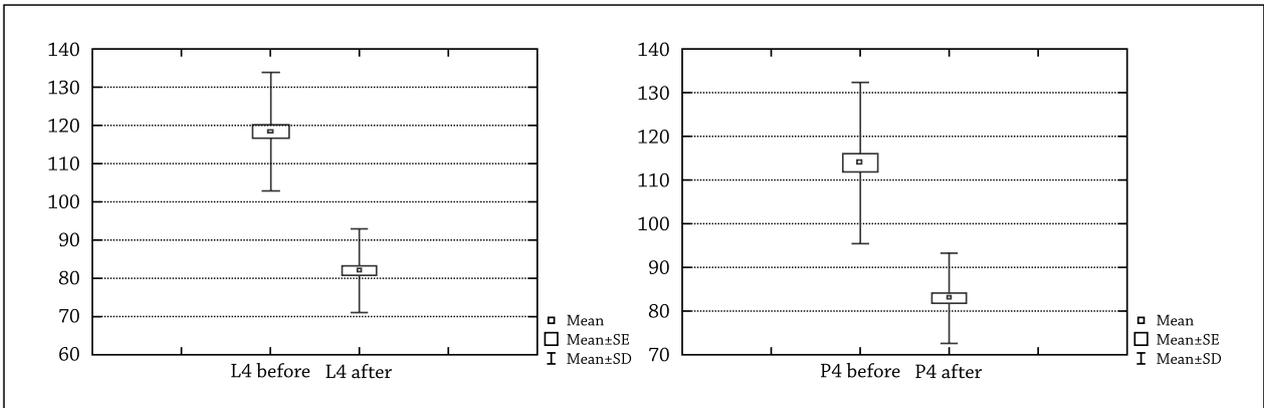


Figure 4. Mean pressure pain threshold values for L4 and P4 points before and immediately after therapy.

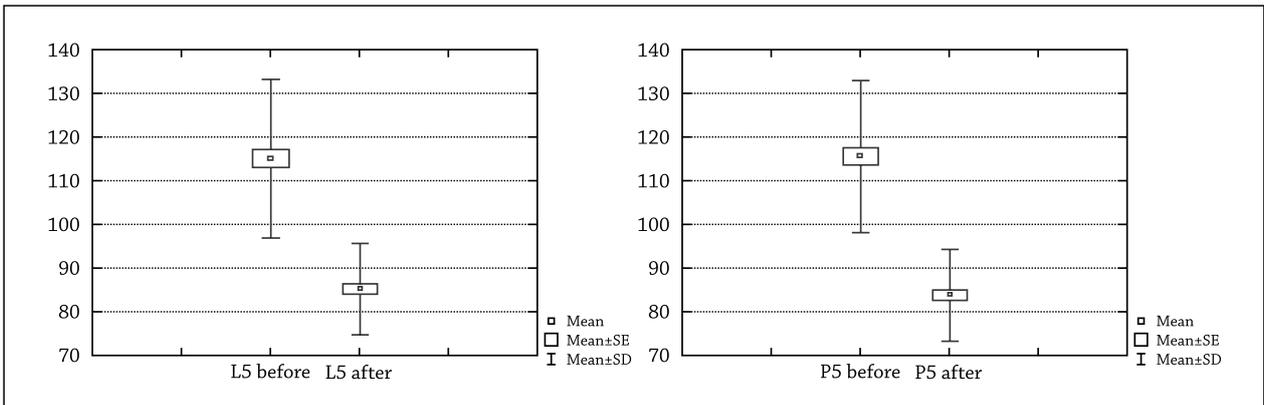


Figure 5. Mean pressure pain threshold values for L5 and P5 points before and immediately after therapy.

## DISCUSSION

Our results illustrated that the use of clavicles in the ischemic compression technique is an effective approach that increases compression pain threshold in patients with DOMS. In a characteristic study, it was observed in all cases that an increase in the pressure pain threshold value occurred an hour after therapy, compared with the measurement taken immediately beforehand. In each case, a reduction in standard deviation occurred after treatment. However, there were no changes in the pain threshold with respect to whether the point was located more cranially or caudally. Our group has previously conducted research within the interphalangeal joint, which showed an increase in pain threshold after use of traction techniques [22]. Due to the subjectivity of pain sensation it is difficult to determine its intensity with a quantitative scale. In the tests that we performed, an algometer was used to measure pain threshold. This method allows for precise determination of the place where the pain threshold is increased and enables effective assessment of the effects of the performed therapy [23,24]. An algometer also facilitates planning for and monitoring of the results of therapy [25,26]. There was no significant difference between the left and right muscles of the spine rectifier. It is worth noting that work using the clavicle relieves the therapist's hands. The pressure exerted by the clavicle does not have to be as strong as that exerted by the thumb. The effects of treatment involving clavitherapy and ischemic compression performed with the hands should be evaluated next. Ischemic compression is a technique that has long been

known to be characterized by high efficiency. However, prolonged use in patients can contribute to ailments in a therapist. It is also worth considering whether it is possible to reduce the duration of ischemic compression with clavitherapy, due to the smaller, but more powerful, pressure area exerted by the clavicle. At this point, a fundamental question is whether the pressure exercised by the clavicle, which has a smaller surface of contact with the patient's body than the thumb, will produce a greater therapeutic benefit. It seems advisable to analyze other treatment sites. Due to the large number of techniques that can be used during the execution of clavitherapy, there is a need for detailed studies on their impact on tissues. It is worth mentioning that clavitherapy uses two types of pressure: 5-6 clavicles with an acute side or 1 clavicle with an ending similar to a screwdriver. It is also worth assessing this aspect in future research. It seems appropriate to conduct further studies on other groups of patients. So far, no valuable studies have been undertaken about the method of clavitherapy [27–31].

## CONCLUSIONS

1. Clavicle therapy increased the compression pain threshold within the lumbar spine muscle.
2. There were no significant differences during the pressure measurement of the pain threshold after therapy between the right and left muscles of the spine rectifier.
3. Further research should be carried out on a larger group of patients as well as on other muscles.

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