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Immediate effect of positional release technique in gastro-soleus muscle cramps

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Abstract
Background: Positional Release Technique (PRT) earlier was known as strain -counter strain therapy. Nowadays PRT is popularly used in musculoskeletal conditions. PRT also helps in relieving spasms, tightness, tenderness and trigger points. A muscle cramp describes involuntary, painful, visible contraction of a muscle which is sudden in onset. In cramps the affected muscles become tight and taut.Most common muscle cramp is gastro-soleus muscle cramp. Hence, the study is carried out to evaluate its effects.
Materials and Methods: 30 participants were included, who were experiencing gastro-soleus muscle cramps and were given PRT to gastro-soleus muscle, in which their pain, range of motion and strength was measured using NPRS, Goniometer and MMT respectively.
Result: PRT in gastro-soleus muscle cramps was extremely significant showing significant difference in pain, range of motion (dorsi flexion), and strength and there was no significant difference in the range of plantar flexion.
Conclusion: The study concludes that positional release technique shows extremely significant difference in reduction of pain, increase in range of dorsiflexion and increase in strength of gastro-soleus muscle.

Keywords: gastro-soleus muscle cramps, PRT, NPRS, goniometer, MMT

Introduction
Major portion of the human body consists of the skeletal muscles. In humans, the gastrocnemius muscle is known as the stomach of the leg referring to its bulging shape. It is a very powerful, superficial bipennate muscle that lies on the posterior aspect of the lower leg. Deep to the gastrocnemius is the soleus muscle. Its function is plantar flexion of the foot and knee flexion. The gastro-soleus muscle is primarily involved in activities such as running, jumping and other 'fast' movements of leg [1].
The term "cramp" is commonly used to describe a variety of symptoms involving muscles which is characterized by pain. A muscle cramp describes involuntary, painful, visible contraction of a muscle which is sudden in onset. Cramps usually occur in athletes or people with high intensity exercise [2]. Most of the time, cramps occur in the calf muscles (gastrocnemius and soleus) and, less commonly, in the feet and thighs. Cramps may occur from few seconds up to 10 minutes. At the time of muscle cramps (calf), the affected muscles will become tight and painful and the muscles of feet and toes will be stiff. Muscle cramps are most common complaint of younger and elder population nowadays due to exercise, post pregnancy, neurogenic claudication, prolonged standing, etc. Muscle cramp may occur with the muscle at rest or during prolonged use, but usually it occurs during exercise or with prolonged standing and may be enhanced by further contraction or shortening of the muscle. Muscle cramps are mainly caused due to dehydration or inadequate intake of water, depleted levels of potassium, sodium (salt) and carbohydrate, tense or stiff muscles, vitamin deficiencies, poor blood circulation, shifts in the body fluids such as seen in cirrhosis or during dialysis for kidney failure, vigorous physical activities and muscle fatigue, injury or trauma such as bone fracture can cause leg muscle spasm and leg cramps. It acts as a defense mechanism to prevent further injury.
Rest cramps are commonly seen in older individuals and they often occur at night [3]. Cramps can be diagnosed by intense pain, which can awaken an individual at night or make it difficult to walk. If patient is suffering from weakness, pain and loss of sensation it could be nerve disorder and not muscle cramp. In severe cramps therapist may suggest for electromyography to note the activity of muscle during muscle cramp [4]. Patient can apply ice pack if the condition is acute or a hot pack on sore muscles for pain relief. After cold pack or hot pack, stretching the affected muscle can relieve the pain of muscle cramps. Ultrasound can also be given. It has been found to be helpful in improving the flexibility of connective tissue, which facilitates stretching.
The Pathophysiology of muscle cramp may be central or peripheral in origin. Some studies have concluded that it occurs due to hyper excitability of motor neurons i.e. central or spinal in origin. While some studies have concluded that it is due to spontaneous discharge of motor nerves or unwanted excitation of terminal branches motor axons i.e. peripheral or axonal in origin [5]. Some studies hypothesize changes in fluids and electrolytes causes contracture of interstitial spaces

which causes spontaneous discharge of terminal branches and results in deformation of terminal branches of motor axon which results in muscle cramps [6]. Calf cramp causes pain in the calf region, pain usually interferes with daily activities which usually lead to anxiety and irritation due to which patients can even feel depressed, and it is usually seen in patients having chronic pain. Due to pain patients sleep is also disturbed and they feel low throughout the day [7]. Position Release Technique (PRT) is a unique technique focusing on treating muscle spasm in the body. It involves finding a tender point in the patient's body (muscles, ligaments, tendons and joints) and then moving the adjacent joint of the trigger point of the patient away from the barrier and towards the relieving position [8].

Positional Release Technique is also known as strain counter stain therapy i.e. manual therapy which increases the flexibility of muscle by keeping the muscle in shortened position for further muscle relaxation. PRT positions the muscle in position of comfort for a period of 90 seconds. When a muscle gets hyperactive or when the use of particular muscle is repetitive PRT can be given for muscle relaxation. PRT also helps to increase the range of motion of the affected joint. It is also used for treatment of trigger points. PRT mainly requires proper positioning of the affected area which immediately reduces pain, tenderness, spasm. It mainly reduces the nociceptive sensitivity and circulatory enhancement [9]. Contraindications for PRT are open wounds, malignant tumors, hypersensitivity, hematoma and infections. Primary goal for the therapist is relive taut bands, trigger points and tender points for pain relief. Secondary goal is to reduce the rate of recurrence. It has been said that PRT along with exercise reduces pain and recurrence [10].

Material and Methodology

Study Design: The research design used for the study is Prospective Comparative study.

Source of Data: The source of data are young adults with muscle cramps, referred from orthopedic department to Dr. A.P.J Abdul Kalam College of physiotherapy (Tertiary Hospital), and students of PIMS, Loni, Taluka–Rahata, District- Ahmednagar, Maharashtra state, India-413 736.

Type of Data: The data collected was primary which was collected by the principal investigator.

Study setting: Orthopedic department of Dr. A.P.J Abdul Kalam College of physiotherapy (Tertiary Hospital).

Sample size: 30

Target Population: Individuals with Gastro-Soleus muscle cramps.

Sampling Method: Convenient sampling

Study Duration: 3 months

Selection Criteria

1. Males and females aged between 18-30 years diagnosed with gastro-soleus muscle cramps that were willing to participate.
2. Individuals diagnosed with signs or symptoms of nerve involvement, varicose veins, tumor, and infection, lower extremity fracture on the affected side and intermittent claudication (vascular cause) were excluded from study.

Procedure

The study received ethical approval from Institutional Ethical Committee of Dr. A. P. J. Abdul Kalam College of Physiotherapy, Loni

The participants were screened and according to inclusion and exclusion criteria they were requested to participate in the study. The participants were briefed about nature, duration of the study and intervention being used and were explained about the intervention in the language best understood by them. They were encouraged to clarify the queries regarding the study. A written informed consent form, approved by ethical committee was taken from the participants. The demographic data was obtained and the detailed assessment was done.

The patients were assessed for pain, range of motion of ankle joint and strength for gastro-soleus muscle as per NPRS, Goniometer and MMT respectively. The patients were explained in detail about Positional Release Techniques, its advantages and disadvantages as well; if they were convinced about the whole protocol, then PRT was given. After the session they were asked about any discomfort and pain they experienced after the techniques were applied.

PRT for gastro-soleus is given in prone lying; Therapist uses rotation of calcaneus with inversion and eversion to fine tune the release where patient's knee is flexed to about 90º. The tender point should either be completely gone or better than the patient initially complained. After a successful treatment, the patient will experience decrease in pain, intensity of muscle cramps and fascial tension [8].

Positional Release Technique was given for 1 session. Parameters like pain range of motion of ankle joint and strength of gastro-soleus muscle was reevaluated after the technique. And the acquired data was calculated and accordingly interpreted.

Fig 1: Picture displaying Range of Motion Of ankle Dorsi-flexion

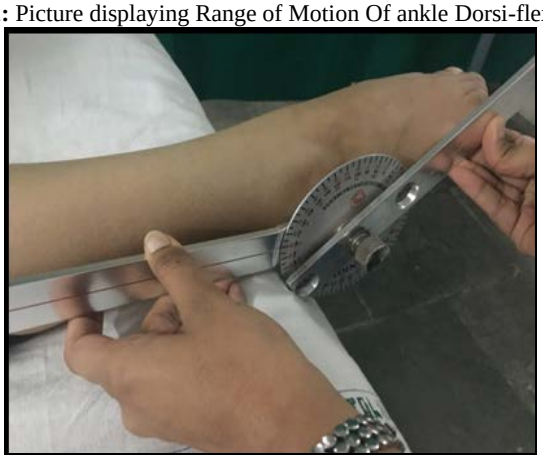

Fig 2: Picture displaying Range of Motion Of ankle Plantar-flexion

Fig 3: Picture displaying starting position of Positional release technique

Fig 4: Picture displaying therapist giving Positional release technique

Data Analysis, Interpretation and Result

Table 1: Data presentation of pain

Parameter	Pre (Mean± SD)	Post (Mean± SD)	T value	P value
Pain	5.53±1.19	0.43±0.62	31.69	<0.001,which is considered extremely significant

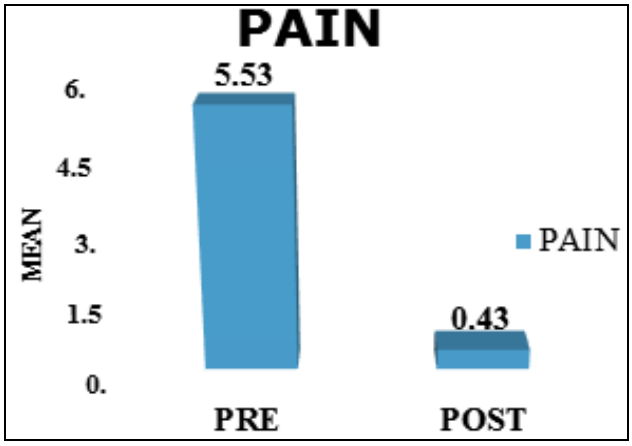

Fig 1: Pain Pre-Post Readings

Result no 1: The graph shows comparison of mean values of pre and post readings of Numerical Pain Rating Scale**,** t value

was 31.69 and p value was <0.001, using student paired t test which shows extremely significant difference.

Table 2: Data presentation of range of motion

Parameter	Pre (MEAN ± SD)	Post (MEAN ± SD)	T value	p value
Dorsiflexion	12.3±1.43	15.9±1.9	11.84	<0.001,which is considered extremely significant
Plantar flexion	46.16±2.30	46.16±2.30	0	>0.05,which is considered not significant

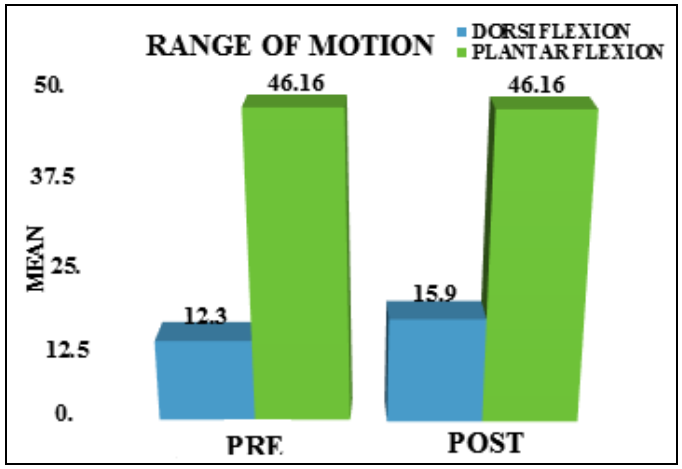

Fig 2: Range of Motion Pre-Post Readings

Result no 2: The graph shows comparison of mean values of pre and post range of motion of dorsiflexion and plantarflexion, t value for dorsiflexion was 11.84 and p value was <0.001 which shows extremely significant difference and for plantarflexion, t value was 0 and p value was >0.05 which shows no significant difference, using student paired t test.

Table 3: Data presentation of Strength

Parameters	3	3+	4	4+	5
Pre %	10	53.3	36.6	-	-
Post %	-	-	10	60	30

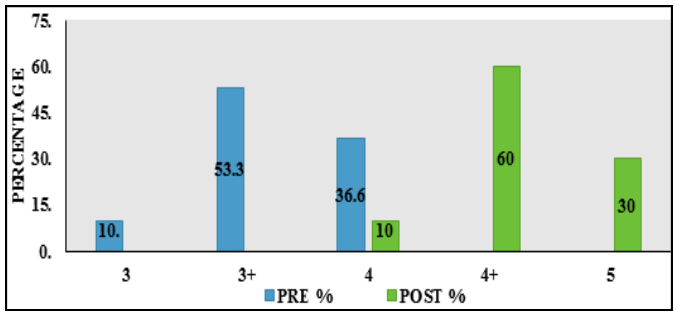

Fig 3: Strength PRE-POST Readings

Result no 3: The graph shows comparison of pre and post values of Manual Muscle Testing using percentage method, in pre values, for grade 3 values were 10%, grade 3+ was 53.3%, and for grade 4 was 36.6%. And in post values, for grade 4 values were 10%, grade 4+ was 60%, and grade 5 was 30%, which shows extremely significant difference.

Discussion

The study evaluated immediate effect of Positional Release Technique in Gastro-soleus muscle cramps. The effect was measured after only 1 session post Positional Release Technique. The result of this study showed that there was extremely significant difference in pain, range of motion of ankle joint and strength of gastro-soleus muscle.

The research done by Sahem A.M. AL Shawabka, Magdolin M.S.S. Shenouda, *et al.* (2013) [11] carried out a study on Positional Release Technique versus Manual Pressure Release on the Upper Trapezius Muscle in patients with Myofascial Pain Dysfunction Syndrome The study concluded that MPR is more effective than PRT. The study for PRT suggested that it was effective in reduction of tenderness and pain of trigger points [11]. So according to the study performed, effect of PRT in gastro-soleus muscle cramps was done to determine the effect of pain, range of motion of ankle joint and strength of gastro-soleus muscle, which showed extremely significant difference in reduction of pain, increase in range of motion and increase in strength.

The research done by Harlapur A.M., Kage Vijay B, *et al.*, (2010) [12] carried out a clinical trial on comparison of Myofascial Release and Positional Release Therapy. All the participants were given MFR and PRT for 10 days along with ultrasound therapy and the study concluded that both MFR and PRT with ultrasound showed positive results with reduction in pain and the functional ability [12]. Similarly, PRT increases flexibility of muscle as it is given by placing the limb in position of comfort which helps in reducing tenderness and tightness which elicits pain relief. Therefore, gastro-soleus muscle cramps showed immediate relief for pain as per NPRS. There are no studies showing immediate effect of Positional Release Technique especially in gastro-soleus cramps. Hence, according to the positive results of the above study it would be beneficial to use Positional Release Technique in patients having muscle cramps so as to have immediate relief of symptoms.

Conclusion

The study concluded that positional release technique given for 1 session shows extremely significant difference in reduction of pain, increase in range of dorsiflexion and increase in strength of gastro-soleus muscle; and no change is observed in range of plantar flexion.

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