

## To study the variability in intensity of muscle soreness by the change in direction of application of myokinetic active release

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### Abstract

**Introduction:** Studies have identified that muscle imbalance is seen often. Muscle that is shortened over a long time results in tightness. This can be treated by modalities, postural modifications and releases. Deep releases cause myogenic condition that is muscles soreness. Due to forceful pressure taut bands break, that causes adhesions and inflammation in muscle which produces pain and reduces Range of Motion (ROM) of joint. In this study we used myokinetic active releases. Active Release Technique (ART) helps to alleviate pain and tightness and has shown improvement in increased flexibility and ROM immediately after the treatment.

**Objective:** This study is aimed to determine effect of change in direction of ART on experimentally induced muscle soreness.

**Materials and Methods:** Individuals with chronic neck pain, specifically due to trapezius muscle tightness were selected by random sampling and divided into Group A and B. Each group consisted of 20 patients. Neck range of motion (ROM) was measured with goniometer and Intensity of pain was scored with visual analogue scale (VAS) for both groups. Group A was treated with myokinetic active release towards the painful area and group B was treated with Myokinetic active release opposite to the painful area for 3 consecutive days.

**Results:** Reduction in pain in Group A was statistically significant at  $p < 0.05$  but not in Group B. Pre versus post intervention, increase in ROM in both groups was significant at  $p < 0.05$ .

**Conclusion:** The study concluded that both methods result in increase of ROM, but only release given towards the painful area produces less muscle soreness and pain after intervention.

**Keywords:** Fascia, Muscle imbalance, Muscle tightness, Muscle soreness, Active release technique.

### Introduction

Studies have identified that nowadays muscle imbalance is a common diagnosis. Muscle is a contractile tissue which brings about movements. Each movement at a joint is a coordinated activity of different groups of muscles.<sup>1</sup> Fascia is composed of collagenous connective tissue surrounding the skeletal muscles, joints, organs, nerves and vascular beds. The ability of fascial stiffness over a period contributes more actively to musculoskeletal dynamics. Imbalance of this regulatory mechanism results in increased or decreased myofascial tonus.

The role of fascia is creating distinctive compartments for muscles and in acting as an ectoskeleton for their attachment. In most of cases the muscles had extensive attachments to ligaments and fascia that effectively link the muscles together to promote their contraction as a coordinate unit.<sup>2</sup> Muscle Imbalance occurs when opposing muscles provide different directions of tension leading to joint dysfunctions.<sup>3</sup> Muscle contraction is the generation of tension in the muscle tissue results in lengthening or shortening of muscle. Muscle that is shortened for a long-time results in tightness.<sup>4</sup>

Muscular tightness is frequently postulated as an intrinsic risk factor for the development of a muscle injury.<sup>5</sup> Treatment of Myofascial pain requires a multifaceted approach. If left undiagnosed and untreated, it may develop into chronic pain with overlying functional problems. The treatment includes physical modalities, heat therapy, electrical therapy, postural mechanical and ergonomics modifications, massage, needling and deep release.<sup>6</sup>

After deep releases a myogenic condition can occur i.e. Muscle Soreness. Subjects with muscle soreness present with painful and tender muscles which are unable to move the adjacent joints through the full range of motion. The onset of muscle soreness occurs in the first 24 hours after release and the intensity will generally peak by 48-72 hours.<sup>7</sup> Due to forceful pressure in the depth of the muscles taut bands breakdown. This may produce adhesions in the muscles which may further lead to inflammation in the muscle. This inflammation produces pain which may reduce ROM of the joint to which muscle is attached.<sup>8</sup>

Several releases have been investigated for assessing the beneficial effects of decelerating the progress of muscle soreness. Myokinetic Active Release Technique is one of the most commonly used with in clinical practice. It is an application of deep digital tension over tenderness and asking the patient to actively move the tissue from the shortened to a lengthened position and breaking the adhesion formed. It is designed to alleviate pain and tightness and help the muscle to return to its normal position. ART has shown better improvement in increased flexibility and ROM immediately after the treatment.<sup>9</sup>

The aim and objective of the study is to find out the change in VAS and ROM after change in direction of active releases techniques and to compare the effect of Myokinetic active release towards the painful area and opposite to the painful area.

**Materials and Methods**

The experimental study was conducted at the various OPDs of SBSPGI, Balawala, Dehradun. The study included 40 participants who had chronic neck pain due to muscle tightness tested with movement. They were recruited using the random sampling method. Exclusion criteria of study included patients with inflammatory signs, continuous pain, neurological deficit, unstable pathology, previous surgery and disease in neck. Informed consent was obtained after proper explanation of the study objectives to all participants. The participants were divided into two groups, namely Group A and Group B. Each group consisted of 20 patients.

All participants were assessed for Pain and contralateral cervical side ROM with the help of VAS and Goniometry respectively. The painful area was marked and documented. For group A, the Myokinetic Active Release Technique for the trapezius muscles towards the painful area (Fig. 1) and for group B, the Myokinetic Active Release technique for the trapezius muscles opposite to the painful area was given for a period of 2-3 minutes for 3 repetitions in a session, and was carried for 3 days. VAS and Range of Motion was measured again at the end of 3rd session. Data was recorded and then analyzed.<sup>9</sup>

**Result**

According to the objective of the study, value of VAS and ROM after Myokinetic active release technique were compared between 2 groups using statistical tests which were performed using Graph Pad. Paired t-test was used to evaluate the pre and post values of VAS and ROM for both groups. The result shows that there is significant ( $p < 0.05$ ) improvement in VAS score and neck ROM in group A (Table 1). This means, that the Myokinetic ART towards painful area is an effective treatment for trapezius muscle pain, and effective to reduce both the pain and restricted ROM. However results for group B shows insignificant ( $p > 0.05$ ) changes in VAS score but significant ( $p < 0.05$ ) improvements in neck ROM after the treatment (Table 2). This means, that Myokinetic ART opposite to the painful area can improve the neck ROM but has insignificant role in reducing the muscle pain. The mean difference comparison between the groups shows that there is a significant improvement in VAS score (Fig. 1) and ROM (Fig. 2) between group A and group B. This means Myokinetic ART towards painful area is comparatively effective procedure than Myokinetic ART opposite to the painful area.

**Discussion**

This study was designed to check the variability in intensity of muscle soreness by the change in direction of application of Myokinetic Active Release Technique among chronic muscular neck pain patients. In this study, the Myokinetic Active release technique was effective in muscle soreness and pain when the release was given towards the lengthened area.

When the muscle remains in contracted state for a long time it becomes shortened. As the muscle gets shortened the muscle spindle and muscle fibers get close to the shortened

area and make it strong and non-fragile. In this study for intervention, release was given towards the lengthened area in order to increase the blood circulation in the weak side. This also resulted in breaking of adhesions which were formed in the shortened area on the other hand, when the release was given away from weak area, it pulled the fibers of the dysfunctional zone and produce more stretch and may cause more soreness and pain.

One of the causes of scar tissues is micro trauma, leading to destruction of the sarcoplasmic reticulum. After the destruction of the sarcolemma,  $Ca^{2+}$  is released from the lesion. If there is a good blood circulation, there will be an excessive release of acetylcholine in the synaptic cleft, depolarizing the postsynaptic membrane. This increases the opening of  $Ca^{2+}$  channels, which together with the large amount of free  $Ca^{2+}$  crosses the presynaptic membrane contributing to the connection with the seminal vesicles and the diffusion of acetylcholine in the synaptic cleft. This prolonged muscle contraction of maximum effort provokes ischemia, hypoxia and accumulation of metabolic waste in the injury, as blood flow is compromised gathering  $Ca^{2+}$  is flawed, leading to lack of ATP and causing the crisis energy leads to release of nociceptive substances, which sensitize the injured area causing pain and formation of adhesions.

Previous studies have recently demonstrated changes in cell metabolism and blood flow before and after manual therapeutic interventions inhibition of taut bands changes in interstitial fluid with consequent reduction contracture and pain.<sup>10</sup> Nowadays soft tissue techniques like Myokinetic Active Release, Myofascial Release are used for the treatment which helps in breaking the adhesions, increasing the blood flow and lymphatic drainage resulting in increase of the soft tissue extensibility and improving ROM and Muscle Strength. Myokinetic Active release technique is application of deep tension over the tenderness and asking the patient to actively move the tissue from the shortened to the lengthened position and thereby breaking the adhesion.<sup>11</sup> Static stretching in positional faults can be counterproductive.<sup>12</sup>

**Table 1:** Comparison of pre and post VAS and ROM within Group A (Towards the painful area)

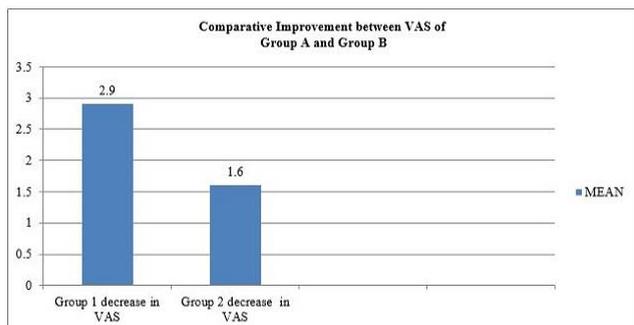
	Pre-Release	Post Release	Significance
<b>VAS Mean±SD</b>	7.15±0.65	4.25±1.65	$p < 0.05$
<b>ROM Mean±SD</b>	33.4±7.69	43.75±8.31	$p < 0.05$

**Table 2:** Comparison of pre and post VAS and ROM in Group B (Opposite to the painful area)

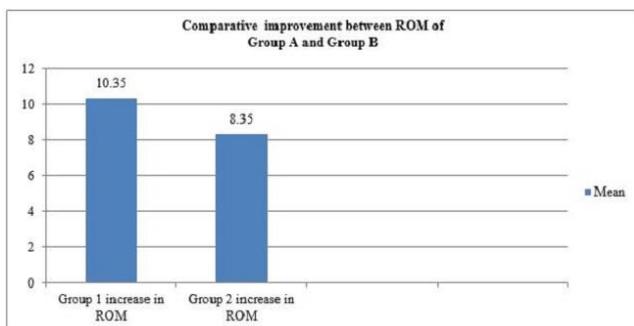
	Pre Release	Post Release	Significance
<b>VAS Mean±SD</b>	6.7±0.64	5.1±1.26.	$p > 0.05$
<b>ROM Mean±SD</b>	35.5±5.89	43.85±5.13.	$p < 0.05$

Reduction in VAS by 1.6 which was found to be statistically insignificant ( $p > 0.05$ )

Increase in ROM by 8.35 which was found to be statically significant ( $p < 0.05$ ).



**Fig. 1:** Comparative improvement between VAS of Group A (Towards the Painful Area) and Group B (away from the painful area)



**Fig. 2:** Comparative improvement between ROM of Group A (Towards the painful area) and Group B (Opposite to the painful area)

**Conclusion**

Result of the study concluded that there is significant effect of change in direction of the Myokinetic Active Release. The release that was given towards the painful area produces less muscle soreness and pain.

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**Conflicts of Interest:** Nil

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