RESEARCH PAPER

Comparative Study of Active Release Technique vs Manual Trigger Point Release on Pain and Range of Motion in Individuals with Upper Trapezitis

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ABSTRACT

Background: Long periods of sitting, repetitive tasks, and bad ergonomic practices have all contributed to the rise in neck pain at work. Functional capacity is severely impacted by upper trapezitis, which is characterized by pain, muscle spasm, and restricted neck movements. Active Release Technique (ART) and Manual Trigger Point Release (MTPR) are two popular physiotherapy procedures, although there is still little data comparing them. The study was conducted assess the effect of Active Release Technique versus Manual Trigger Point Release effect on pain and range of motion in individuals with Upper Trapezitis.

Method: In a randomized clinical trial, 70 patients with upper trapezitis took part. Participants were split equally between Group A (ART) and Group B (MTPR). In addition to conventional physiotherapy, both groups received treatment six days a week for two weeks. A universal goniometer was used to quantify cervical range of motion, and the Numerical Pain Rating Scale (NPRS) and McGill Pain Questionnaire were used to measure pain severity. Data Pre and post the intervention were statistically examined.

Results: Active Release Technique (ART) was performed to 50% (35 individuals) and Manual Trigger Point Release (MTPR) to 50% of the 70 participants in this study with upper trapezitis. With a mean age of 24.8 (±4.2) years, the majority of participants (45) were between the ages of 18 and 30. Both groups cervical range of motion and pain significantly improved after the intervention ($p < 0.05$). Compared to the MTPR group, participants in the ART group showed more significant improvements in cervical flexion, extension, lateral flexion, and rotation as well as a larger decrease in Numerical Pain Rating Scale and McGill Pain Questionnaire scores. Participants between the ages of 18 and 24 had the most noticeable changes, while those beyond 30 saw rather modest improvements.

Conclusion: In individuals with upper trapezitis, both the Active Release Technique and the Manual Trigger Point Release are effective in reducing pain and improving cervical range of motion. On the other hand, both pain scores and functional mobility demonstrated comparatively greater improvement with Active Release Technique. These improved results could result from ART's combined strategy of active patient movement along with targeted pressure application, which more effectively relieves adhesions, promotes normal tissue function, and increases muscular flexibility than MTPR alone. They show that ART, resulting in more immediate and comprehensive relief, can be considered as a preferred physiotherapy technique for treating upper trapezitis. More research with larger sample sizes and longer follow-up periods is recommended to validate these results and assess long-term benefits.

Keywords: Active Release Technique, Manual Trigger Point Release, Upper trapezitis, Cervical range of motion, NPRS, McGill Pain Questionnaire.

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Introduction

Work-related musculoskeletal disorders of the neck are among the most common health problems in individuals who use computers for prolonged periods.[1] One well known type of stress pain affecting the neck and shoulder is trapezius pain, often referred to as trapezitis.[2]

Trapezitis is more common in professionals who spend a lot of time at desks and computers because it causes pain and spasms in the upper trapezius muscle.[3] Students develop a forward head posture (FHP) while using a desk or study table. It is recognized that shoulder and neck discomfort dysfunction is caused by an internal element, the FHP. When the head is extended and the upper and lower cervical vertebrae are flexed, the condition is known as an FHP. This lengthens the external movement (the arm) by

influencing the gravitational centre (the head) in front of the load-bearing axis. The biomechanical movement may change as a result of this prolonged strain on the non-contractile tissues and the craniovertebral extension muscles. This elevated stress may lead to musculoskeletal pain or damage.[4]

Trapezitis is frequently caused by prolonged overuse of the trapezius muscle, which is typically caused by non-ergonomic posture, working in a static position, tension, stress, repetitive motions, sitting for extended periods of time without back support, using a desk keyboard that is too high, long rides on bicycles and cars, long head bending activities (reading, looking through microscopes, or practicing dentistry), tight pectoralis major and minor muscles, and activities involving abrupt one-sided movements. It can also occur under stressful conditions.[5] Because bad ergonomics might shorten the muscle's top fibers, more recent studies have linked discomfort to trapezius muscle activity.[4]

Physiotherapy is an important part of treating myofascial trigger points and trapezitis.[6] One of the most popular manual therapy methods for treating myofascial trigger points is manual trigger point release.[7] Manual Trigger Point Release works through ischemic compression, which temporarily reduces blood flow followed by reactive hyperemia, improving circulation and removing inflammatory mediators, leading to a reduction in pain sensitivity and improvement in muscle flexibility.[7] Physiological effects include improved circulation, decreased nociceptive activity, and relaxation of tight muscle fibers. This technique is considered simple and effective but mainly focuses on localized trigger points rather than global tissue mobility.[8]

The effect of MTPR on the central nervous system is a further important characteristic.[9] Furthermore, MTPR has been shown to improve the metabolism of local tissue. Damaged muscle fibers receive more oxygen and nutrients when prolonged pressure is applied and then released.[10]

Additionally, Manual Trigger Point Release (MTPR) demonstrates enhanced therapeutic outcomes when combined with adjunct interventions such as heat therapy, stretching, and strengthening exercises, as these modalities help correct underlying biomechanical dysfunctions while MTPR specifically targets myofascial trigger points.[11] However, precautions are necessary in conditions such as acute inflammation, infection, open wounds, vascular disorders, and in individuals with systemic illnesses or low pain tolerance.[10]

Active Release Technique (ART) is a specialized manual therapy developed to treat soft tissue disorders involving muscles, fascia, tendons, ligaments, and nerves.[12] It combines precise manual tension with active patient movement to disrupt fibrotic adhesions caused by trauma, repetitive stress, or overuse.[13] These adhesions restrict tissue mobility, alter biomechanics, and may compress adjacent nerves and blood vessels, resulting in pain, weakness, and restricted range of motion.[14] ART enables the clearance of metabolic waste, increases oxygen and nutrition delivery, improves circulation, restores tissue flexibility, and encourages tissue repair.[13,15] Furthermore, ART improves proprioceptive input and neuromuscular control by normalizing tissue mobility, thereby enhancing muscular coordination and functional movement.[15]

ART is particularly beneficial in conditions such as trapezitis, tendinopathies, and myofascial pain syndromes associated with repetitive strain and overuse.[15] Unlike passive manual therapies, ART requires active patient participation, making it a more dynamic and functional rehabilitation approach that may accelerate recovery and improve functional outcomes.[13]

Despite the effectiveness of both ART and MTPR, limited comparative evidence exists regarding their efficacy in upper trapezitis. Therefore, the present study aims to compare the effects of ART and MTPR on pain reduction and improvement in cervical range of motion in individuals with upper trapezitis.

Materials and Methods

The interventional study was conducted at the Dr. D.Y. Patil Hospital and Research Centre, Kolhapur, over a period of 6 months. Simple random sampling technique was used and 70 participants fulfilling the inclusion criteria were selected for the study. Approval from the Institutional Ethics Committee was taken before starting the study.

Inclusion Criteria

Individuals aged between 18 and 45, of both genders with unilateral and bilateral trapezitis.

Exclusion Criteria

Patients with diagnosed fibromyalgia, Cervical pathologies like radiculopathy, myelopathy, consuming painkillers or steroids during sessions, recent trauma to the cervical region.

Each subject was screened as per inclusion and exclusion criteria and they will be informed about the study and intervention. Also, the purpose of the study was explained. Before proceeding to intervention, a written consent was taken from the subject.

Gender	Frequency	Percent
Female	31	44.30%
Male	39	55.70%
Total	**70**	**100%**

Condition	Frequency	Percent
BL Upper Trapezitis	21	30.00%
L Upper Trapezitis	25	35.70%
R Upper Trapezitis	24	34.30%
Total	**70**	**100%**

	Minimum	Maximum	Mean	Std. Deviation
Age	20	45	31.34	8.925

The study included use of goniometers for range of motion, standardized questionnaires like the McGill Pain Questionnaire, and pain measures like the Numerical Pain Rating Scale. Participants in the study were asked to mark their responses on the questionnaire and scores, and the therapist will measure their range of motion. Every outcome measure was documented as a pre-assessment at baseline (day 1) and as a post-assessment following the last treatment session.

The study consisted of Group A (Active Release Technique) and Group B (Manual Trigger Point Release). **Group A** received Active Release Technique and **Group B** received Manual Trigger Point Release. The Conventional Physiotherapy management was given to both the exercises and will be carried out for 6 Session per week for 2 weeks.

The data collected for all study variables were entered into Microsoft Excel to prepare the master sheet. Quantitative variables, including age, pre- and post-treatment MPQ scores, NPRS scores, and ROM values, were expressed as Mean ± Standard Deviation (S.D.). Categorical variables such as age group, gender, and condition were presented in terms of frequency and percentage. Statistical analysis of the study data was performed using the t-test. All statistical analyses were carried out using Microsoft Excel 2016 and SPSS software version 28.

Result

Table no. 1: Age of participants

The age of the participants ranged from a minimum of 20 years to a maximum of 45 years. The mean age of the participants was 31.34 years, indicating that most individuals belonged to the young to middle adult age group. The 8.925 standard deviation shows that the individuals' ages varies significantly. Overall, the age distribution shows that the sample is representative of a large adult population with minimal variation.

Table no. 2: Gender of participants

31 of the 70 participants were female, totaling up 44.30% of the sample, and 39 were male, totaling up 55.7%. This suggests that the number of male participants was slightly more than that of females. However, both genders were reasonably represented in the study, ensuring a balanced sample for analysis.

Table no. 3: Condition of participants

Out of the total 70 participants, 21 individuals (30.00%) had bilateral upper trapezitis. Left-sided upper trapezitis was observed in 25 participants (35.70%), while 24 participants (34.30%) had right-sided involvement. This indicates that left-sided upper trapezitis was slightly more common among the participants, although the distribution between left and right sides was almost equal. Overall, all three conditions were fairly represented in the study, ensuring a balanced distribution for analysis.

Table no. 4: Pre and Post Parameters in Group A

Parameters	Assessment Period	Mean	Std. Deviation	p-value
NPRS	Pre	7.66	1.11	<0.001*
	Post	3.74	1.29	
McGill	Pre	28.94	3.65	<0.001*
	Post	13.66	4.65	
C. Flexion	Pre	38.09	4.66	<0.001*
	Post	49.14	5.04	
C. Extension	Pre	36.26	4.59	<0.001*
	Post	47.31	5.77	
Side Flex L	Pre	26.77	4.78	<0.001*
	Post	37.63	5.09	
Side Flex R	Pre	26.11	3.89	<0.001*
	Post	37.03	4.48	
Rotation L	Pre	50.57	6.03	<0.001*
	Post	61.63	6.56	
Rotation R	Pre	51.23	5.98	<0.001*
	Post	62.29	7.18	

A comparison of Group A's pre- and post-interventional results is shown in the data. The p-value was less than 0.001, which is regarded as highly significant for all parameters (NPRS, McGill, and ROM). This shows that the use of ART in Group A led to a statistically significant improvement in cervical range of motion and pain reduction.

The findings demonstrated statistically significant improvements in pain intensity, functional pain measures, and cervical range of motion following the intervention. The mean NPRS score decreased from 7.66 ± 1.11 during the pre-assessment period to 3.74 ± 1.29 post-treatment, indicating a substantial reduction

in pain intensity ($p<0.001$). Similarly, the mean McGill pain score reduced from 28.94 ± 3.65 to 13.66 ± 4.65, reflecting significant improvement in pain perception and quality ($p<0.001$).

Significant improvements were also observed in cervical range of motion (ROM). Cervical flexion improved from a pre-treatment mean of 38.09 ± 4.66 to 49.14 ± 5.04 post-treatment ($p<0.001$), while cervical extension increased from 36.26 ± 4.59 to 47.31 ± 5.77 ($p<0.001$). Left side flexion improved from 26.77 ± 4.78 to 37.63 ± 5.09, and right side flexion increased from 26.11 ± 3.89 to 37.03 ± 4.48, both showing statistically significant differences ($p<0.001$).

Furthermore, cervical rotation also demonstrated marked improvement after treatment. Left rotation increased from 50.57 ± 6.03 to 61.63 ± 6.56, whereas right rotation improved from 51.23 ± 5.98 to 62.29 ± 7.18, with both changes being highly significant statistically ($p<0.001$). Overall, the results suggest that the intervention was highly effective in reducing pain and enhancing cervical mobility among the study participants.

Parameters	Assessment Period	Mean	Std. Deviation	p-value
NPRS	Pre	7.54	1.04	<0.001*
	Post	4.49	1.50	
McGill	Pre	27.34	3.61	<0.001*
	Post	16.60	3.60	
C. Flexion	Pre	37.71	4.85	<0.001*
	Post	44.60	5.39	
C. Extension	Pre	38.00	4.41	<0.001*
	Post	44.89	4.93	
Side Flex L	Pre	27.11	4.76	<0.001*
	Post	34.00	5.21	
Side Flex R	Pre	27.60	5.24	<0.001*
	Post	34.49	5.05	
Rotation L	Pre	50.17	6.27	<0.001*
	Post	57.06	7.05	
Rotation R	Pre	50.00	7.41	<0.001*
	Post	56.89	7.92	

Table no. 5: Pre and post parameters in Group B

The pre- and post-assessment values for Group B treated with Manual Trigger Point Release are compared in the table. Every parameter displays a p value of less than 0.001, suggesting that the improvements are statistically significant.

The mean NPRS score decreased from 7.54 ± 1.04 during the pre-treatment assessment to 4.49 ± 1.50 post-treatment, indicating a significant reduction in pain severity ($p<0.001$). Similarly, the mean McGill pain score reduced from 27.34 ± 3.61 to 16.60 ± 3.60, reflecting considerable improvement in pain perception and associated symptoms ($p<0.001$).

Significant enhancement was also observed in cervical range of motion (ROM). Cervical flexion improved from 37.71 ± 4.85 pre-treatment to 44.60 ± 5.39 post-treatment ($p<0.001$), while cervical extension increased from 38.00 ± 4.41 to 44.89 ± 4.93 ($p<0.001$). Left side flexion improved from 27.11 ± 4.76 to 34.00 ± 5.21, whereas right side flexion increased from 27.60 ± 5.24 to 34.49 ± 5.05, both showing statistically significant improvements ($p<0.001$).

Furthermore, cervical rotational movements demonstrated marked improvement after treatment. Left cervical rotation increased from 50.17 ± 6.27 to 57.06 ± 7.05, while right cervical rotation improved from 50.00 ± 7.41 to 56.89 ± 7.92, with both changes being highly statistically significant ($p<0.001$). Overall, the findings indicate that the intervention was effective in reducing pain and improving cervical mobility among the participants.

Parameters	Group	Mean	Std. Deviation	p-value
NPRS	A	3.74	1.29	0.030*
	B	4.49	1.50	
McGill	A	13.66	4.65	0.004*
	B	16.60	3.60	
C. Flexion	A	49.14	5.04	<0.001*
	B	44.60	5.39	
C. Extension	A	47.31	5.77	0.063
	B	44.89	4.93	
Side Flex L	A	37.63	5.09	0.004*
	B	34.00	5.21	
Side Flex R	A	37.03	4.48	0.029*
	B	34.49	5.05	
Rotation L	A	61.63	6.56	0.006*
	B	57.06	7.05	
Rotation R	A	62.29	7.18	0.004*
	B	56.89	7.92	

Table no. 6: Group Comparison between A and B

The intergroup comparison of post-treatment outcomes demonstrated that Group A showed significantly better improvement than Group B in most study parameters. The mean NPRS score was lower in Group A (3.74 ± 1.29) compared to Group B (4.49 ± 1.50), indicating greater pain reduction in Group A, with the difference being statistically significant ($p=0.030$). Similarly, the mean McGill pain score was significantly lower in Group A (13.66 ± 4.65) than in Group B (16.60 ± 3.60), suggesting superior improvement in pain quality and perception ($p=0.004$).

Regarding cervical range of motion (ROM), Group A demonstrated significantly greater improvement in cervical flexion, with a mean value of 49.14 ± 5.04 compared to 44.60 ± 5.39 in Group B ($p<0.001$). Left side flexion was also significantly higher in Group A (37.63 ± 5.09) than in Group B (34.00 ± 5.21) ($p=0.004$), while right side flexion showed a similar

significant difference favoring Group A (37.03 ± 4.48 vs. 34.49 ± 5.05; p=0.029).

Furthermore, cervical rotational movements showed significantly greater improvement in Group A. Left rotation was higher in Group A (61.63 ± 6.56) compared to Group B (57.06 ± 7.05) with a statistically significant difference (p=0.006). Right rotation also demonstrated superior outcomes in Group A (62.29 ± 7.18) than in Group B (56.89 ± 7.92) (p=0.004).

Although cervical extension was greater in Group A (47.31 ± 5.77) compared to Group B (44.89 ± 4.93), the difference was not statistically significant (p=0.063). Overall, the findings suggest that Group A was more effective than Group B in reducing pain and improving cervical ROM in participants with upper trapezitis.

Discussion

The goal of the current study was to examine how well individuals with upper trapezitis responded to Active Release Technique (ART) and Manual Trigger Point Release Technique (MTPR) in terms of pain reduction and range of motion. NPRS, McGill Questionnaire (pain), and cervical range of motion were among the outcome variables in this study where both groups demonstrated statistically significant ($p < 0.001$). This implies that both MTPR and ART are effective treatment approaches for upper trapezitis.

The combined mechanical and neuromuscular effects of the Active Release Technique (ART) on the injured muscle are responsible for the improvement shown in the ART group. In order to break down adhesions, increase tissue elasticity, and restore normal muscle length, ART applies tension combined with dynamic movement. As a result, tense and painful muscles are lessened. Furthermore, ART improves neuromuscular coordination and blood circulation, both of which increase cervical range of motion and general function. However, the Manual Trigger Point Release (MTPR) group also demonstrated a discernible improvement in mobility and pain. This method mainly reduces localized muscular soreness and nociceptive input by applying continuous pressure over trigger sites. Moreover, it enhances local blood flow and facilitates muscle relaxation. However, MTPR mainly focuses specific trigger points rather than the muscle and surrounding tissues as a whole.

The outcomes of this study are in line with earlier research that indicates both manual therapy approaches are effective for treating musculoskeletal conditions. However, the ART group's greater effect on the soft tissues might be the reason for the larger improvement seen in that group.

Moreover, prolonged static postures, poor ergonomics, and repetitive movements involving the neck and shoulder region make people with upper trapezitis prone to experience pain and restricted movement. Therefore, techniques like Active Release Technique (ART), which focus on soft tissue restriction and muscle tightness, may be effective in this population.

Consequently, while both ART and Manual Trigger Point Release Technique (MTPR) showed positive outcomes, ART was found to be more effective in reducing pain, improving functional mobility, and increasing cervical range of motion in individuals with upper trapezitis. The amount of tissue involvement and the application technique can be responsible for the variation in effectiveness. In order to improve muscle fiber elongation and adhesion breakdown, ART is an active intervention that combines manual pressure with specific patient movements. MTPR, on the other hand, is a more passive and localized method that relieves pain and tense muscles by applying constant pressure directly over trigger points.

Since the ART group's approach takes into consideration not only the trigger points but also the surrounding soft tissue structures and movement patterns, it may result in a more consistent and comprehensive improvement.

The mechanism of pain modulation is another significant factor. By increasing neuromuscular control, lowering muscle stiffness, and improving circulation, ART may help reduce pain. In addition to stimulating mechanoreceptors, the combination of pressure and movement may help reduce pain. MTPR, on the other hand, reduces pain by blocking pain signals at the trigger site and reducing localized soreness, however its effects might be restricted to particular regions. Both methods relieve pain, but because ART affects both mechanical and neurological components, it may have a more all-encompassing effect.

In terms of functional improvement, the ART group's increased cervical range of motion and greater pain reduction point to improved carryover into everyday activities such prolonged sitting, computer use, and neck movements. Better posture and more effective movement can result from increased tissue flexibility and decreased muscular tension. While cervical range of motion improved in all groups, the larger improvements with ART suggest the treatment is more effective in restoring normal muscle function and mobility.

The outcomes of this study further highlight how important it is to choose the right treatment approaches depending on the patient's functional needs and underlying medical condition. When treating conditions like upper trapezitis, which involve both soft tissue adhesions and muscular stiffness,

multifaceted treatments like ART can produce better long-term results than isolated ones.

However, the study's limitations should be taken into consideration. There was no long-term follow-up to evaluate the treatment effects' sustainability, and the study's duration was rather limited. The results' generalizability may be influenced by the small sample size and the study population's restriction to a particular group. Larger sample sizes, longer follow-up times, and more outcome measures could be used in future research to confirm these results.

In general, this study highlights how important it is for physiotherapists to choose their treatment methods based on evidence. While both MTPR and ART are useful in treating upper trapezitis, ART has shown better results in terms of cervical range of motion improvement and pain reduction, making it a more successful technique.

Conclusion

The present research comes to the conclusion that both Manual Trigger Point Release Technique (MTPR) and Active Release Technique (ART) significantly improve cervical range of motion and pain in individuals with upper trapezitis. The use of these manual therapy techniques led to a significant improvement in pain intensity as measured by the NPRS and McGill Pain Questionnaire, as well as an improvement in cervical range of motion. Upper trapezitis is typically associated with muscle tightness, restricted mobility, and discomfort due to prolonged static postures and repetitive strain.

Along with the decrease in pain, a significant increase in cervical mobility was noted, suggesting that the individuals' neuromuscular coordination, muscle flexibility, and stiffness had all improved. This suggests that the treatments improved overall functional ability and movement efficiency in addition to reducing pain.

These treatments different techniques of action are responsible for their effectiveness. ART improves tissue flexibility, breaks down adhesions, and restores normal muscle function by combining physical pressure with active movement. Conversely, MTPR lowers regional discomfort, encourages muscular relaxation, and enhances local blood circulation by applying prolonged pressure over trigger points.

Therefore, it can be said that both ART and MTPR are safe, effective, and non-invasive methods of treating upper trapezitis. On the other hand, ART showed slightly better results in terms of cervical range of motion improvement and pain reduction. For those with upper trapezitis, including those approaches into routine physiotherapy sessions can significantly improve functional performance, reduce pain, and improve quality of life.

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