

ORIGINAL RESEARCH

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EFFECT OF POSITIONAL RELEASE TECHNIQUE IN SUBJECTS WITH SUBACUTE TRAPEZITIS

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ABSTRACT

Background: Trapezius stretching combined with positional release technique (PRT) have found effective in trapezitis, studies are limited to find which technique has shown effective over the other due to lack of control group. The purpose of the study is to find the effect of PRT on pain intensity, functional disability and range of motion in subjects with subacute trapezitis.

Method: An experimental study design, selected subjects with subacute trapezitis was randomized into Study and Control group. Total 40 subjects, 20 subjects in each group; data was collected who completed the study. Control group received passive trapezius muscle stretching while Study group received positional release technique with passive trapezius muscle stretching for 8 sessions in 2 weeks. Outcome measurements such as Visual Analogue scale, Neck disability index and cervical Range of motion were measured.

Results: There is statistically significant difference ($p < 0.05$) showing improvement in means of VAS, NDI and Range of motion before and after intervention within the groups and there is statistically significant difference when the post-intervention means after 2 weeks of treatment were compared between Study and Control group.

Conclusion: It is concluded that the Positional Release Technique with trapezius stretching found to be significantly more added effect than trapezius stretching alone in improving pain, functional disability and cervical movements for subjects with subacute trapezitis.

Key Words: Trapezitis, muscle pain, stretching, positional release technique, visual analog scale, neck disability index, range of motion.

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Introduction:

Trapezititis is defined as inflammation of trapezius muscle. The upper trapezius muscle is designated as postural muscle and it is highly susceptible to overuse.¹The pain is present even during rest and is aggravated by activity; it may be referred to other area from the site of primary inflammation. Passive range of motion may be painful and restricted due to pain and protective spasm in antagonist groups of muscles.²

Recent studies have hypothesized that the trapezititis pathogenesis results from the overloading and injury of muscle tissue, leading to involuntary shortening of localized fibers. The areas of stressed soft tissue receive less oxygen, glucose, and nutrient delivery, and subsequently accumulate high levels of metabolic waste products. The end result of this cascade of events is the creation of altered tissue status, pain, and the development of Trigger Points (TP). TPs have been associated with hyperalgesia and limited range of motion (ROM) and are therefore clinically important to identify as these possess the potential to restrict functional activities.²

Positional Release technique (PRT) is a soft tissue technique, also known as Strain Counter strain (SCS) is a gentle manual treatment for muscle pain and spasm which involve resetting muscle tone and enhancing circulation.³This approach involves identification of the active TPs, followed by the application of pressure until a nociceptive response is produced. The area is then positioned in such a manner as to reduce the tension in the affected muscle and subsequently reduce pain in the TP. When the position of ease/pain reduction is attained, the stressed tissues are felt to be at their most relaxed and a local reduction of tone is produced.⁴

Studies have found that Positional Release Therapy with conventional physiotherapy is useful in alleviating the neck pain and improve the functional ability. Another Study on conventional treatment with PRT or conventional treatment with taping found equally effective and produced significant pain relief in tender point of unilateral upper trapezius muscle. Electromyographic analysis of positional release therapy on upper trapezius trigger points shown gradual decrease in pain after each session because of reduced muscle tension in the upper trapezius and with consequent improvement of posture and daily life activities.⁵

SCS technique shown greater strength increase in forearm pronation and supination muscle comparing to passive sham positioning in a healthy population with muscle tenderness.⁶When SCS technique combined with stretching technique found to have benefit in pain reduction more than stretching technique on active myofascial pain syndrome.⁷ SCS technique when combined with manipulation techniques found

immediate relief or discomfort, helped the body regain normal function and range of motion that limited by chronic myofascial dysfunction.⁸

Studies have found trapezius stretching combined with positional release technique (PRT) have found effective in trapezititis but studies are limited to find which technique has shown effective over the other due to lack of control group. Hence, this study with Research Question whether positional release technique does have an effect in reducing pain and improving range of motion and functional disability in subjects with sub-acute trapezititis? Hence, the purpose of the study with objective is to determine the effect of positional release therapy in the treatment of subacute trapezititis on pain intensity, cervical ROM, and functional disability. It was hypothesized that there will be a significant effect of positional release technique on improvement of pain, cervical ROM, and functional disability for subjects with subacute trapezititis.

Methodology:

Pre to post test experimental study design with two group- Study and Control group. As this study involved human subjects the Ethical Clearance was obtained from the Ethical Committee of KTG College of Physiotherapy and K.T.G. Hospital, Bangalore as per the ethical guidelines for Bio-medical research on human subjects. This study was registered with University No. : 09_T031_39062. The study was conducted at K.T.G Hospital, Bangalore. Subjects included were both male and female, with age 20-40 years, history of subacute trapezius pain of less than 3 months duration, Unilateral trapezititis, Subjects with grade 3 and 4 trapezius muscle Tenderness based on "Tenderness grading scale" which is a proposed grading system for the soft tissue tenderness and its grading as follows:⁹ 0- No tenderness; 1- Tenderness to palpation without grimace or flinch; 2- Tenderness with grimace & or flinch to palpation; 3- Tenderness with withdrawal (+ "Jump sign"); 4- Withdrawal (+ "Jump sign") to non-noxious stimuli (i.e. superficial palpation, pin prick, gentle percussion), Subjects who are willing to participate. Subjects were excluded with history of recent surgery to neck or upper back, cervical spine or shoulder pathologies like radiculopathy or myelopathy or fibromyalgia syndrome, open wounds in neck region, history of a whiplash injury, history of trauma or fractures in the neck or upper back or shoulder, sensory changes in the trapezius region, deformities like torticollis, scoliosis etc, All the subjects fulfilling the inclusion criteria were informed about the study and a written informed consent was taken. Proposed sample size was 40 and total 40 Subject (n=40) who completed the study in both groups data was used for analysis. Total duration of treatment was given for 2 week with total 8 sessions.

Procedure of intervention for Control Group: ⁷ received passive stretching of trapezius muscle as a control treatment. Stretching was performed on subjects supine lying while neck set in three different positions depending on the location of pain: (1) Flexion and lateral flexion to the opposite side; (2) Flexion with rotation to the same side of the pain; (3) Flexion, lateral flexion to the opposite side and rotation to the same side. Stretch force was given by therapist and it was maintained so that subject must feel mild to moderate pain during the stretch and should not have too much overpressure on the upper cervical spine. The stretch was maintained for 30 seconds with 10 seconds resting between each stretch and 15 stretches in each three direction were given per session.⁷

Procedure of intervention for Study Group:^{1,2,3} received Positional Release Technique along with passive trapezius stretching as a control treatment. Initially Positional Release Technique was given. The subjects were supine and relaxed completely. The affected area was palpated for tender points that may be associated due to referred pain. In case of multiple tender point, first highest tender point was treated. The therapist was sitting at the head side of the table and scapula of the subject elevated by taking the shoulder or scapular superior and medial to the ear, neck was rotated to the opposite side, extended and side bend to the same side to be treated. Selected tender point (TP) was palpated and patient was instructed to relax. Then passively turning and release of muscle tension was done through either the neck or shoulder movements. Pressure over the trigger point was applied by therapist thumb and was slightly released but maintained light contact over the TP to monitor the response. This position was maintained for 90 seconds. It was hold longer if patient or active trigger point is felt a therapeutic pulse, tissue tension changes or movement. After the release, subject was put back to neutral position. TP point was rechecked and the procedure was repeated upto 70% of improvement in pain level and reduced tension noticed. After 10 minutes of rest subjects received passive stretching of trapezius muscle as a control treatment.

Both the group subjects were advised to avoid any strenuous activity with the affected side so as to prevent any stress to the affected side.

Outcome Measurements:

Outcome measurements such as Visual Analogue scale for pain, Neck disability index for functional ability and cervical Range of motion using Goniometer was measured before and after 2 weeks of treatment.

Visual Analog Scale for intensity of trapezititis pain: The VAS is a 10 cm long horizontal line with polar descriptors of 'no pain' and 'worst pain' possible. A visual analog scale (VAS) was used to grade their level of neck pain. Subjects

indicated their pain by placing a vertical line at the point that represented their current level of symptoms.¹⁰

Neck Disability Index for functional disability: The patients were given a detailed explanation about the Neck Disability Index. Questionnaire consists of 10 sections that designed to enable the patient to understand how much the pain has affected their ability to everyday activities. Patient has to choose only one that most applies. Each of the 10 sections scored separately and then added up. If all 10 sections are completed, simply double the patients score. If a section is omitted, divide the patient's total score by the number of sections completed times.¹¹

Goniometer for Cervical ROM measurement:

To measure cervical lateral flexion the examiner centers the body of the goniometry over the subjects 7th cervical vertebra. The freely movable proximal goniometry arm hangs so that it is perpendicular to the floor. At the end of the lateral flexion ROM, the examiner maintains alignment of the proximal Goniometry arm and measurement is taken.

To measure cervical rotation, the examiner stands at the back of the patient, who is seated in a low chair. The examiner Centers the Goniometry fulcrum on the top of the subjects' head and aligns the proximal Goniometry arm parallel to an imaginary line between the subjects' Acromion process. The examiner uses left hand to align the distal Goniometry arm with either the tip of the subject's nose or the tip of the tongue depressor. At the end of the right cervical rotation the examiners left hand maintains alignment of the distal Goniometry arm with the tip of the subject's nose or with the tip of the tongue depressor. The examiners right hand keeps the proximal arm aligned parallel to the imaginary line between the acromion process.^{12,13}

Statistical Methods:

Descriptive statistical analysis was carried out in the present study. Out Come measurements analyzed are presented as mean \pm SD. Significance is assessed at 5 % level of significance with p value was set at 0.05 less than this is considered as statistically significant difference. Paired 't' test as a parametric and Wilcoxon signed rank test as a non-parametric test have been used to analysis the variables pre-intervention to post-intervention with calculation of percentage of change. Independent 't' test as a parametric and Mann Whitney U test as a non-parametric test have been used to compare the means of variables between two groups with calculation of percentage of difference between the means. Statistical software: The Statistical software namely SPSS 16.0, Stata 8.0, MedCalc 9.0.1 and Systat 11.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Results:

The table-1 shows that in study group there were 20 subjects with mean age 30.85 years and in control group there were 20 subjects with mean age 31.15 years. In table-2 and table-3 shows that when means were analyzed from pre intervention to post intervention within the groups there is a statistically significant ($p < 0.05$) change in means of Visual analog score, NDI and ROM within study group and within control group. There is negative percentage of change in pre to post means showing that there is decrease in the post means and

positive percentage change showing there is increase in post means. There is a clinical significant improvement with large effect size in both groups. The table-4 shows that when pre-intervention means were compared between the groups there is no statistically significant ($p > 0.05$) difference in means with small effect size. The table-4 shows that when post-intervention means were compared there is a statistically significant ($p < 0.05$) difference in means of VAS, NDI and cervical ROM between the groups.

Table 1: Basic Characteristics of the subjects studied

Basic Characteristics of the subjects studied		Study Group	Control Group	Between the groups Significance ^a
Number of subjects studied (n)		20	20	--
Age in years (Mean± SD)		30.85± 5.96 (22-40)	31.15± 6.26 (20-40)	p= 0.765 (NS)
Gender	Males	9	8	p=0.763 (NS)
	Females	11	12	
	Within Group Significance	P=0.000**	P=0.000**	
Side	Right	12	10	p=0.527 (NS)
	Left	8	10	
Within Group Significance		P=0.000**	P=1.000(NS)	

a - Pearson Chi-Square

Table 2: Analysis of VAS, NDI, and ROM within study Group (Pre to post test analysis)

	Pre intervention (Mean±SD) min-max	Post intervention (Mean±SD) min-max	Percentage of change	Z value ^b (Non parametric significance)	t value a (Parametric)	Parametric Significance P value	95%Confidence interval of the difference		Effect Size (r)
							Lower	Upper	
Study Group									
VAS in cm	6.57± 0.96 (5.0- 8.1)	1.48±0.77 (0.0- 2.8)	-77.47%	-3.923 p=0.000**	31.711	P <0.000**	58.21	64.08	+0.94 (Large)
NDI in %	63.50± 11.62 (44- 88)	9.10± 3.81 (0-14)	-85.66%	-3.922 p=0.000**	21.343	P <0.000**	39.73	42.48	+0.95 (Large)
Rotation affected side	58.45± 6.43 (45- 68)	71.90± 3.85 (64-78)	23.01%	-3.922 p=0.000**	-11.465	P <0.000**	-15.90	-10.99	+0.78 (Large)
Rotation unaffected side	53.70± 7.01 (27- 37)	71.50±5.71 (60- 80)	33.14%	-3.925** p=0.000**	-13.160	P <0.000**	-20.63	-14.96	+0.81 (Large)
Lateral flexion affected side	35.90± 3.33 (32- 45)	42.75± 2.19 (38-45)	19.08%	-3.719** p=0.000**	-6.956	P <0.000**	-8.91	-4.78	+0.77 (Large)
Lateral flexion unaffected side	32.90± 2.77 (28- 38)	42.90± 2.10 (39-45)	30.39%	-3.928** p=0.000**	-13.452	P <0.000**	-11.55	-8.44	+0.89 (Large)

** Statistically Significant difference $p < 0.05$; NS- Not significant; a. Pared t test. b. Wilcoxon Signed Ranks Test

Table 3: Analysis of VAS, NDI, and ROM within Control Group (Pre to post test analysis)

Control Group	Pre intervention (Mean±SD) min-max	Post intervention (Mean±SD) min-max	Percentage of change	Z value ^b (Non parametric significance)	t value ^a (Parametric)	Parametric Significance P value	95%Confidence interval of the difference		Effect Size (r)
							Lower	Upper	
Control Group									
VAS in cm	6.42± 0.95 (4.5- 8.3)	3.20±0.76 (4.5- 8.3)	-50.15%	-3.923 p=0.000**	11.308	P <0.000**	2.62	3.81	+0.88 (Large)
NDI in %	52.55± 12.20 (34- 78)	23.10± 7.00 (12-38)	-56.04%	-3.922 p=0.000**	11.402	P <0.000**	24.04	34.85	+0.82 (Large)
Rotation affected side	60.05± 5.01 (45- 66)	68.00± 4.89 (58-78)	13.23%	-3.868 p=0.000**	-7.111	P <0.000**	-15.90	-10.99	+0.62 (Large)
Rotation unaffected side	54.65± 6.45 (38-64)	64.05±4.69 (52- 69)	17.20%	-3.923 p=0.000**	-10.745	P <0.000**	-20.63	-14.96	+0.64 (Large)
Lateral flexion affected side	36.25± 2.90 (30- 40)	39.30± 1.59 (36-42)	8.41%	-3.660** p=0.000**	-5.451	P <0.000**	-8.91	-4.78	+0.54 (Large)
Lateral flexion unaffected side	33.05± 2.50 (28- 38)	39.25± 2.46 (35-43)	18.75%	-3.930** p=0.000**	-10.633	P <0.000**	-11.55	-8.44	+0.78 (Large)

** Statistically Significant difference p<0.05; NS- Not significant; a. Pared t test. b. Wilcoxon Signed Ranks Test

Table 4: Comparison of means of VAS, NDI and ROM between study and control Groups (PRE INTERVENTION COMPARISION)

	Percentage of difference	Z value ^b (Non parametric)	t value ^a (Parametric)	Significance P value	95% Confidence interval of the difference		Effect Size r
					Lower	Upper	
PREINTERVENTION							
VAS in cm	-2.31%	Z= -0.474 p=0.635	0.512	P =0 .612(NS)	-0.45	0.76	+0.07 (Small)
NDI in %	-18.87%	Z= -2.696 p=0.007	2.905	P =0.006(NS)	3.32	18.58	+0.41 (Medium)
Rotation affected side	2.70%	Z= -0.869 p=0.385	-0.877	P=0.386 (NS)	-5.29	2.09	+0.13 (Small)
Rotation unaffected side	1.75%	Z= -0.299 p=0.765	-0.446	P=0.658 (NS)	-5.26	3.36	+0.07 (Small)
Lateral flexion affected side	0.97%	Z= -.884 p=0.377	-0.354	P=0.725 (NS)	-2.35	1.65	+0.05 (Small)
Lateral flexion unaffected side	0.45%	Z= -0.165 p=0.869	-0.180	P=0.858 (NS)	-1.84	1.54	+0.02 (Small)

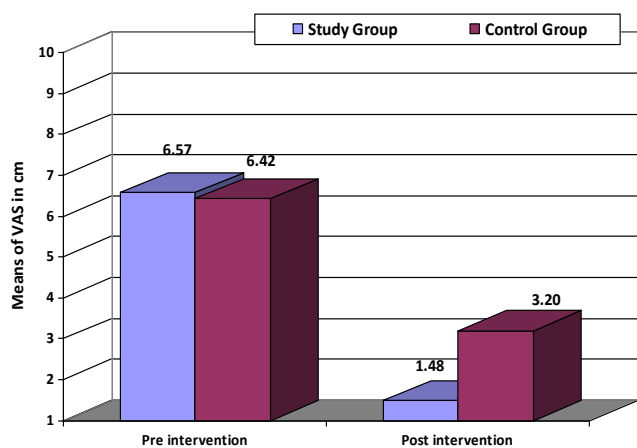
** Statistically Significant difference p<0.05; NS- Not significant a. Independent t test b. Mann-Whitney Test

Table 5: Comparison of means of VAS, NDI and ROM between study and control Groups (POST INTERVENTION COMPARISON)

POST TEST COMPARISON	Percentage of difference	Z value ^b (Non parametric)	t value ^a (Parametric)	Significance P value	95% Confidence interval of the difference		Effect Size r
					Lower	Upper	
POST INTERVENTION							
VAS in cm	73.50%	Z= -4.905 P=0.000**	-7.089	P =0.000**	-2.21	-1.22	+0.74 (Large)
NDI in %	22.91%	Z= -5.188 P=0.000**	-7.853	P =0.000**	-17.60	-10.39	+0.77 (Large)
Rotation affected side	-5.57%	Z= -2.685 P=0.007**	2.799	P =0.008**	1.07	6.72	+0.40 (Medium)
Rotation unaffected side	-10.99%	Z= -3.540 P=0.000**	4.503	P =0.000**	4.10	10.79	+0.58 (Large)
Lateral flexion affected side	-8.40%	Z= -4.234 P=0.000**	5.685	P =0.000**	2.22	4.67	+0.67 (Large)
Lateral flexion unaffected side	-8.88%	Z= -3.959 P=0.000**	5.037	P =0.000**	2.18	5.11	+0.62 (Large)

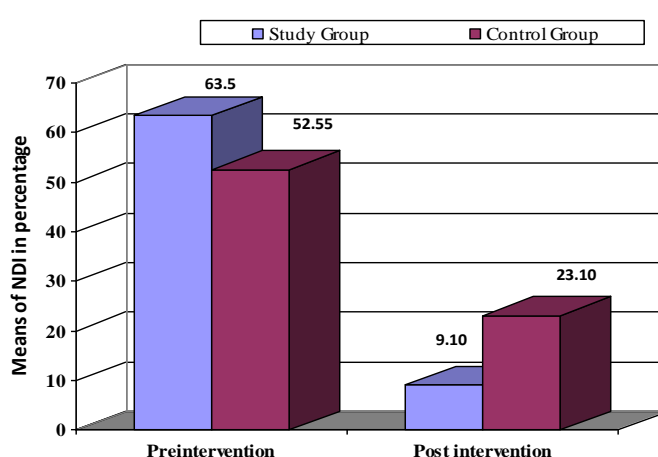
** Statistically Significant difference p<0.05; NS- Not significant a. Independent t test b. Mann-Whitney Test

Graph- 1: Comparison of means of VAS between study and control Groups (Pre and post test comparative analysis)



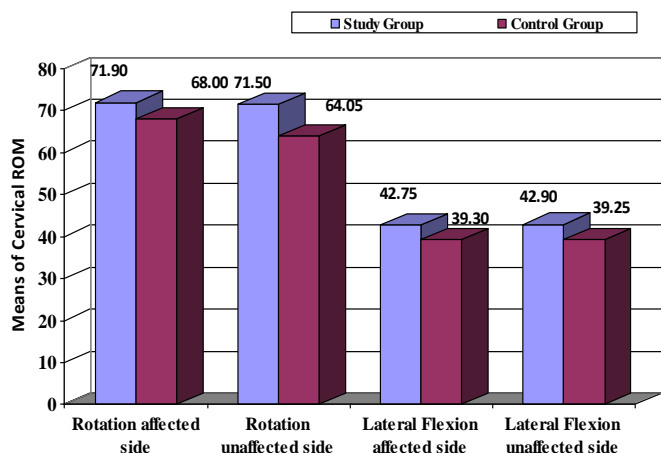
Graph 1 shows that there is a statistically significant reduction in means of VAS score when analyzed from pre intervention to post intervention within control Group.

Graph - 2: Comparison of means of NDI between study and control Groups (Pre and post test comparative analysis)



Graph 2 shows that there is a statistically significant reduction in means of NDI when analyzed from pre intervention to post intervention between study and control Group.

Graph- 3: Comparison of means of ROM between study and control Groups (Post test comparative analysis)



Graph 3 shows that when ROM means were compared post intervention between the groups there is a statistically significant difference in ROM.

Discussion

It is found that two weeks of PRT with passive stretching as a control treatment have shown statistically significant greater effect in improving pain, functional disability and cervical active rotation and lateral flexion ROM than the control group treated with trapezius stretching for subjects with subacute trapezitis.

In study group, the improvement in pain, cervical Range of motion and functional disability could be an effect of positional release technique and trapezius stretch. PRT aims at removing restrictive barriers of movement in the body. This is accomplished by decreasing protective muscle spasm, facial tension, joint hypomobility, pain, and swelling and increasing circulation and strength. As a result the patient begins to move more easily, with less pain and discomfort.^{14,15,16} PRT acts on the muscle spindle mechanism and its associated reflex mechanism (which controls spasm) to promote a more normal firing of the spindle and a more normal level of tension in the muscle, which results in a more normal relationship within the various soft tissue surrounding the area. These techniques work to reduce the hyperactivity of the myotatic reflex arc and to reduce the overwhelming afferent nerve impulses within the arc that may lead to an overflow of neurotransmitters into the associated dermatome, resulting in referred pain. This phenomenon is known as a "facilitated segment". PRT 'sets the stage' for normal process to occur more efficiently. Reduction in localized spasm increase range of motion, decreases pain, allows normal circulation and improves lymph drainage and increases the potential for more normal biomechanics. PRT strongly complements traditional therapy regimens by allowing them to be more effective.^{14,15,16} Therefore the improvement in study group could be attributed to these effects in the subjects with subacute trapezitis.

Similarly A. Kumaresan et.,al stated in their study that both positional release therapy and the conventional treatment method showed significant difference in the intensity of pain within the groups and between the groups on the 7th day of treatment. Reduction in pain intensity was strongly significant in the positional release therapy group. Carlos Alberto Kelencz et al studied about trapezius upper portion trigger points treatment purpose in positional release therapy with electromyographic analysis and showed the results that all patients had a gradual decrease in pain after each session 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. Jagatheesan Alagesan et al studied conventional treatment with PRT or conventional treatment with taping is equally effective and produced significant pain relief in tender point of unilateral upper trapezius muscle as like the conventional treatment by moist heat and shoulder girdle exercises. Dimitrios Kostopoulos et al found trigger point compression and passive stretching significantly reduced pain perception and Spontaneous Electrical Activity, and the combination of Ischemic Compression and Passive Stretching was superior effective for trigger points in the upper trapezius muscle.¹⁷ Similarly in the present study the significant improvement is pain, functional disability and cervical range of motion could be the effect of PRT.

The improvements in the both group could be due to the effect of passive stretching. The concept behind the stretching of trapezitis is that the affected muscle is set in the lengthened position in order to activate autogenic inhibition reflex and to improve the viscoelastic property of the muscle and surrounding tissue. Cunha ACV et al found that conventional stretching and muscle chain stretching in association with manual therapy were equally effective in reducing pain and improving the range of motion and quality of life of female patients with chronic neck pain, both immediately after treatment and at a six-week follow-up, suggesting that stretching exercises should be prescribed to chronic neck pain patients.¹⁸

To know the effect of positional release technique over passive stretching that used as control treatment, Pre-intervention means of measured outcomes were compared between study group and control group found no statistically significant difference in the baseline parameters. When post-intervention means were compared there is a statistically significant difference in means of VAS for pain intensity, NDI for functional ability and cervical ROM. However, PRT along with trapezius stretch shown greater percentage of improvement than only stretching of trapezius muscle alone. Subjects receiving PRT and trapezius stretch showed improvement in their pain level by VAS of -77.47 % , NDI by change of -

85.66 %, rotation affected side 23.01%, rotation unaffected side by 33.14 % , lateral flexion affected side ROM by 19.08 % and Lateral flexion unaffected side ROM by 30.39 % in the study group and subjects receiving trapezius stretch alone reduced their pain level by VAS of -50.15% , NDI by change of -56.04%, rotation affected side 13.23%, rotation unaffected side by 17.20%, lateral flexion affected side ROM by 8.41% and Lateral flexion unaffected side ROM by 18.75% in the control group. There is clinical significant improvement in the post-intervention values with large effect size in both groups with value of +0.74 in VAS for pain, +0.77 in NDI for functional ability, +0.40 in affected side rotation ROM, +0.58 in unaffected side rotation ROM, +0.67 in lateral flexion affected side ROM and +0.62 in lateral flexion unaffected side ROM. The effect size is large in both study group and control group. This shows that PRT is found to be more effective than stretching alone.

Even though the effects were found statistically and clinical significant, the improvements were not found complete recovery of the patient in the present study. This could be because the duration of the study was for 2 week and only eight sessions were given which might have not sufficient to bring the complete recovery from sub acute trapezitis.

Findings from the study found that there is significant difference with great percentage of improvement of intensity of pain, functional disability and cervical ROM in the group who received PRT along with trapezius stretch signifying that the PRT is more effective than the stretching alone for subjects with trapezitis. Therefore the present study rejects null hypothesis.

Limitations:

Even if the study has found improvement in the outcome measurements there are limitations regarding small sample size, the findings is limited by the short-term duration without follow-up and the lasting effects of this approach were unknown.

Further study recommendation:

Further randomized controlled trail with follow-up is need to known the long term effect of PRT with large sample size with different severity and duration of trapezitis. Further studies of effect of PRT with other conventional methods of treatment are need on different myofascial muscle pain.

Conclusion:

It is concluded that Positional release technique significantly found more effective along with trapezius stretch in improving pain, functional disability and cervical range of motion than trapezius stretching alone for subjects with subacute trapezitis. It is recommended

that implementation of positional release technique alone or with trapezius stretch is clinically beneficial in the treatment of trapezitis.

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Conflicts of interest: None

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