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Surabi Somasundaram
BPT Student, PPG College of Physiotherapy Affiliated to the Tamil Nadu Dr M.G.R Medical University, Chennai, Tamil Nadu, India

Siyam Prakash Balamurugan
MPT Student, PPG College of Physiotherapy Affiliated to the Tamil Nadu Dr M.G.R Medical University, Chennai, Tamil Nadu, India

Pradeepa Mani
Vice Principal, PPG College of Physiotherapy Affiliated to the Tamil Nadu Dr M.G.R Medical University, Chennai, Tamil Nadu, India

Sivakumar Chinnusamy
Principal PPG College of Physiotherapy Affiliated to the Tamil Nadu Dr M.G.R Medical University, Chennai, Tamil Nadu, India

Correspondence Author;
Surabi Somasundaram
BPT Student, PPG College of Physiotherapy Affiliated to the Tamil Nadu Dr M.G.R Medical University, Chennai, Tamil Nadu, India

Effectiveness of trigger release with ultrasound therapy versus positional release with ultrasound therapy on neck pain and cervical range of motion in long term computer users with upper Trapezitis -a comparative study

Surabi Somasundaram, Siyam Prakash Balamurugan, Pradeepa Mani and Sivakumar Chinnusamy

Abstract

Background of the study: Upper Trapezitis is the one of the common inflammatory conditions. Most frequently reported condition in long term computer users. The trigger release focuses on reducing the pain by easing the tension and tightness in trigger points. The positional release is the technique that provide relaxation to the muscle and remove the inflammatory exudates. The ultrasound waves are absorbed by tissues and they are converted into the heat, remove the traumatic exudates, reduces pain, and helps in healing. The study determines reduction of pain and improvement of Cervical range of motion occurs after trigger release with ultrasound therapy compared with positional release with ultrasound therapy.

Objectives: The study's primary objective was to find out the effectiveness of trigger release with ultrasound therapy versus positional release with ultrasound therapy on neck pain and cervical range of motion in long term computer users with upper trapezitis.

Subjects and Methods: The study design was a comparative study. A criterion-based randomized sampling was used. The study was conducted in the Ashwin multispeciality hospital, Coimbatore. 30 patients were diagnosed with the upper trapezitis and selected based on the selection criteria. The selected patients were divided into two groups by lot system, Group A with 15 patients given trigger release with ultrasound therapy for three days/week for six weeks and Group B with 15 patients performed positional release with ultrasound therapy for three days /week for six weeks. The outcome measure are visual analogue scale (VAS) and goniometer. For all subject pre and post-test values were measured.

Results: The statistical analysis showed that the calculated 't' value using the Paired 't' test in Group A and Group B for VAS 11.6 and 9.13, for cervical flexion ROM 14.3 and 20.1, for cervical extension ROM 32.2 and 7.97, for cervical lateral flexion (right side) ROM 11.03 and 22.6, for cervical flexion (left side) ROM 23.8 and 10.3, for cervical rotation (right side) ROM 38.4 and 14.9, for cervical rotation (left side) ROM 29.5 and 13.5 respectively which was greater than the table value of 2.145 with $p<0.05$. when comparing between the group using unpaired 't' test, the calculated 't' value of post -post comparison of VAS 3.134, for cervical flexion ROM was 4.96, for cervical extension ROM was 6.8, for cervical lateral flexion (right side) ROM 3.71, for cervical lateral flexion (left side) ROM 5.92, for cervical rotation (right side) ROM 4.58, for cervical rotation (left side) ROM 3.46 respectively which was greater than the table value of 2.048 with $p<0.05$. Thus, the resultant of this study shows that there were improvements in both the groups eventually, but Group A (Trigger release with ultrasound therapy) showed more statistically significant improvement when compared to Group B (Positional release with ultrasound therapy)

Conclusion: Thus, the study concluded that both the groups A and B (Trigger release with ultrasound therapy versus positional release with ultrasound therapy) had shown improvement in cervical range of motion and reduces neck pain among the individual but trigger point release with ultrasound therapy Showed to be more effectual in these participants when compared to positional release with ultrasound therapy.

Clinical implication: Trigger release with ultrasound therapy is found to produce a significant improvement in reduction of pain and cervical range of motion when compared to positional release with ultrasound therapy in long term computer users with upper trapezitis.

Keywords: Upper Trapezitis, positional release, Ultrasound, trigger release, visual analogue scale

Introduction

Trapezitis is the inflammation of trapezius muscle and it is one of the common inflammatory

conditions occurs mainly in people who are working at the computers for the long period of time. It caused due to repetitive movements, forward head posture, sitting without back support, working without arm support, wrong body biomechanics, prolong typing keyboard etc., trapezitis leads to the stress pain which is known as neck pain or stiffness around neck or shoulder, the pain around the neck present even at the rest and it is aggravated by activity. The range of motion are usually restricted due to pain and spasm [2].

The overloading and injury of the muscle tissue leading to involuntary shortening of localized fibres. The area of the stressed soft tissue receives less oxygen, glucose and nutrients supply, it leads to the accumulation of the high level of metabolic wastes, it results in pain and development of the trigger points. Trigger points has potential to create pain, limits range of the motion and restrict functional ability. In long standing cases there can be entrapment of the spinal accessory nerve is the major motor supply to the trapezius muscles. This creates limited range of motion [2].

The upper trapezitis is the most common type of musculoskeletal disorder involving in desk job workers using computers exceeding 4-6hrs. (3) Electromyographic studies revealed that the muscles of the neck like upper trapezius had constant loading throughout typing and mouse use. About two third of the people experiencing neck pain at some points of their lives. (4) Most research concluded that 44% of computer work alone increase the risk of trapezitis, the persistent form of trapezitis shows a higher prevalence in women with middle age are affected more than males. The overall prevalence of neck pain among trapezitis subjects ranges between 0.4 to 86.8% and point prevalence ranges from 0.4% to 41.5% [5, 6].

The upper trapezius muscle function in the neck flexion, extension. Rotation, and side bending. Tightness of the muscle may lead to decrease in the range of motion of the neck so it negatively affect the mobility of the cervical joints. Poor ergonomics work habit such as prolong constrained work position with persistent neck or spine flexion may imply the risk. Maintaining the poor posture for the long period of time Can result in muscle fatigue, discomfort or pain [9].

The continuous contraction of the muscle knots in the muscle are created due to overload these are known as trigger points leading to pain. The trigger points are the hyperirritable site, usually within a taut band of the skeletal muscle or in the muscle by fascia which is painful on the Compression and give rise to referred pain and motor dysfunction. Trigger point develop usually in muscles that help in maintaining posture. Trigger points develop within the muscle sarcomeres, sarcomere are the basic building blocks of the muscle consisting of the actin and myosin myofilaments; muscles move when the myofilament slide over one another. Trigger points develop when this process become attenuated and the sarcomeres becomes overactive; the actin and the myosin stop sliding over the one another. As a result, sarcomere becomes turned to the permanently 'switched- on' position leading to the state of contraction which leads to muscle hypertonia, weakness, muscle stiffness [10].

There are two types of the trigger that is active trigger points produce constant pain, decreased muscle tone, strength and range of motion, tenderness on palpation and have referred pain. the other one is the latent trigger point which usually creates pain on only stimulation and the pain is not spontaneous. An increased release of inflammatory chemical substances including prostaglandins, histamine, serotonin, and bradykinin is observed at the trigger point site affecting the membrane of polymodal nociceptive receptors [11].

It is important to relieve pain and improve the function. The physiotherapy is the choice of treatment for the upper trapezitis which includes different treatment techniques such as massage, stretching etc, along with some other modalities such as ultrasound, interferential therapy, TENS, heat application, cryotherapy, and active treatment such as exercise therapy. There is various soft tissue manipulation technique like muscle energy technique, ART, MFR etc., which is also used in relieving pain and muscle spasm [12].

Methodology

Study design: A comparative study design with pre and post-test evaluation to compare the effectiveness of trigger release with ultrasound therapy versus positional release with ultrasound therapy on neck pain and cervical range of motion in long term computer users with upper trapezitis.

Subjects: 30 workers using computer for the past 4-5 years with upper trapezitis were screened for this study, based on the selection criteria. These patients usually suffered from the neck pain and restricted Cervical range of motion. The selected patients received a clear explanation about the training procedure prior to the study. The selected patients were allocated into two groups (Group A and Group B) using lot method, each group consist of 15 subjects.

Methods: The selected patients were divided into two groups by lot system, Group A with 15 patients given trigger release with ultrasound therapy for three days/week for six weeks and Group B with 15 patients performed positional release with ultrasound therapy for three days /week for six weeks. The outcome measure are visual analogue scale (VAS) and goniometer. For all subject pre and post-test values were measured.

Description of intervention

Trigger release

Patients position -High sitting on the chair with back supported comfortably. The therapist position was beside the patient. At beginning of the intervention, the active trigger point was identified in the trapezius muscle by pincer palpation method.

The total of five slow and sufficient compression by the thumb to the trigger point given until a subject reports a "moderate but easily tolerable pain". The duration of each compression was maintained until the softening of the trigger point nodule are detected, or a maximum of 60s. A 15s rest was given between compressions, The total duration of the intervention was approximately 8 min. The manual trigger point release technique session carried for six weeks, 3days per week.

Positional release:

Patient position-The patient in the supine lying. Therapist position: Standing at the head side of the table. Procedure: The trigger points in the trapezius muscle was identified by pincer palpation method and the points were noted by dots. The patients were made relax by maintaining the cervical spine in a neutral position. The head and neck moved into lateral flexion towards trigger points. A steadily increased pressure applied on the noted trigger point by thumb, A new

relaxed position was achieved which usually exert less tension with pain reduction up to 80% in which the pain was dropped. The involved side elbow of the patient placed against the chest or abdomen of the therapist. the arm moved to flexion, horizontal adduction and abduction. Sustained for 90s passively by the therapist. Duration- 3 days/week for six weeks. 4 repetitions with 20s rest interval in between.

Ultrasound therapy

Patient position: High sitting with forearm supported over the pillow Therapist position: standing by the side of the patient on the affected side. Skin has been washed and hair at the site has been removed. Local contraindication was been checked, the nature of treatment, need for the couplant was explained to the patient. The treatment head is moved continuously over the surface while even pressure is maintained in order to iron out irregularities in the sonic field. The emitting surface kept parallel to the skin surface to reduce reflection and pressed sufficiently firmly to exclude any air. The method of application is concentric circle, overlapping circle, were been performed.

Technique of application: direct contact method Mode: continuous mode

Frequency: 0.75 to 1MHZ (Penetrate deeply) Intensity: 0.1 – 0.25 W / cm^2

Duration: 8 minutes

Home programme

Shoulder blade squeeze: Stand with good posture. Slowly squeeze the shoulder blades together and hold for 3 seconds. Slowly release the shoulder blades back to their relaxed position, 10 repetition.

Shrug: Raise the shoulder as high as you can get them, as if attempting to touch ear with shoulders. Hold for 3 counts, release them back into their relaxed positions.20 repetition.

Pushup: Put the hands flat on the floor or wall. Lower the body toward the hands while keeping the back straight and stomach tight. Do not head drop keep the neck in line with the rest of the spine. Lower the body until close to floor or wall, and then push back into an upright position. Inhale as you go down and exhale as you push up.10 repetition.

Upper trapezius stretch: Place your left hand on the right side of your head as shown Apply gentle pressure head towards your shoulders. Hold for 30 seconds and then switch to the other side; Repeat 3-5 timers per side.

Ergnomic postural correction

1. Good posture will help to take some of the strain off from trapezius muscle.
2. Sit upright with shoulder relaxed, Sit with back support and arm support
3. Thighs horizontal and Feet flat on the floor, adjust screen or laptop to bring it up to eye level.

Statistical analysis

Data were analysed using SPSS (Statistical Package for Social Sciences) for Windows, version 20.0. Related 't' test (i.e., paired t-test) was used to compare each group's pre and post-test scores separately. Unrelated 't' test (i.e., unpaired t-test) was utilized to compare the outcome measures (i.e., pre-test scores and post-test scores) between the groups. A p-value <0.05 was considered 'significant'.

Results: The statistical analysis showed that the calculated 't' value using the Paired 't' test in Group A and Group B for VAS 11.6 and 9.13, for cervical flexion ROM 14.3 and 20.1,for cervical extension ROM 32.2 and 7.97, for cervical lateral flexion (right side) ROM 11.03 and 22.6, for cervical flexion (left side) ROM 23.8 and 10.3, for cervical rotation (right side) ROM 38.4 and 14.9, for cervical rotation(left side) ROM 29.5 and 13.5 respectively which was greater than the table value of 2.145 with $p<0.05$. when comparing between the group using unpaired 't' test, the calculated 't' value of post -post comparison of VAS 3.134, for cervical flexion ROM was 4.96, for cervical extension ROM was 6.8, for cervical lateral flexion (right side) ROM 3.71, for cervical lateral flexion (left side) ROM 5.92, for cervical rotation (right side) ROM 4.58, for cervical rotation (left side) ROM 3.46 respectively which was greater than the table value of 2.048 with $p<0.05$.

Table 1: Demographical characteristics of the subjects

Demographic profile	Experimental group- i	Experimental group-ii
	MEAN	MEAN
AGE	37.5	36.5
GENDER (Male: female ratio)	6:9	5:10
No. of patients	15	15

The two outcome measures pre-treatment scores were subjected to statistical treatment using an unrelated t-test, and the obtained value is less than the required t table value at 0.05 levels [Table 2]. Hence it is inferred that the mean scores of all the dependent variables consisting of pain intensity, range of motion were identical at the Pre-intervention stage before being subjected to the selected therapeutic interventions.

Further exploration was made to ascertain whether any significant difference was observed in the dependent variables between the two-time intervals (i.e., pre-treatment phase and at the end of 6 weeks) in both experimental groups. As a result, it is found that group A showed significant reduction in the pain intensity and improvement in cervical range of motion between the pre intervention phase and at the end of sixth week of the intervention phase at 0.05 levels significance as shown in table 3.

Table 2: Comparison of pain intensity, cervical range of motion of subjects with upper trapezitis in both experimental group I and experimental group II during the preintervention stage.

Outcome measures	Groups	Mean	SD	T-value
Pain intensity	Experimental group -I	5.4	0.52	0.303
	Experimental group -II	5.3	0.43	
Cervical flexion	Experimental group -I	44.6	1.04	0.682
	Experimental group -II	44	1.5	
Cervical extension	Experimental group -I	38.4	0.89	0.300
	Experimental group- II	38.2	0.89	
Cervical lateral flexion (right)	Experimental group -I	27.9	0.92	1.25
	Experimental group- II	28.6	0.72	
Cervical lateral flexion (left)	Experimental group -I	28	0.83	0.79
	Experimental group- II	27.6	0.83	
Cervical rotation (right)	Experimental group -I	48	0.89	0.35
	Experimental group- II	48.2	0.77	
Cervical rotation (left)	Experimental group -I	47.8	0.96	1.36
	Experimental group- II	48.7	0.93	

Non- significant at 0.05 levels ($p>0.05$)

Table 3: Comparison of pain and cervical range of motion of subjects with upper trapezitis among two experimental groups between the pre-intervention and post-intervention phase

Dependent variables	Groups	Pre -intervention stage		Post-intervention stage		T-value
		Mean	SD	Mean	SD	
Pain intensity	Experimental group -I	5.4	0.52	2.8	0.64	13.2
	Experimental group -II	5.3	0.43	3.8	0.44	14.3
Cervical flexion	Experimental group -I	44.6	1.04	53	1.2	21.3
	Experimental group -II	44	1.5	51.2	1.1	20.1
Cervical extension	Experimental group -I	38.4	0.89	47.6	0.8	18.8
	Experimental group- II	38.2	0.89	45.9	1.6	18.1
Cervical lateral flexion (right)	Experimental group -I	27.9	0.92	36.6	0.89	21.8
	Experimental group- II	28.6	0.72	34.6	0.83	23.2
Cervical lateral flexion (left)	Experimental group -I	28	0.83	37	0.44	16.2
	Experimental group- II	27.6	0.83	33.7	0.87	12.3
Cervical rotation (right)	Experimental group -I	48	0.89	57.6	0.92	17.3
	Experimental group- II	48.2	0.77	53	2.3	18.2
Cervical rotation (left)	Experimental group -I	47.8	0.96	57.2	1.04	19.6
	Experimental group- II	48.7	0.93	54.8	1.08	22.5

Significant at 0.05 levels ($p<0.05$)

Further, a significant difference is observed between the two experimental groups while analysing the effect of 6 weeks of therapeutic intervention on the two dependent variables such as pain intensity and cervical range of motion. Furthermore, while considering the mean score of all the two outcome variables, experimental group –I is better than the experimental group –II (Table 4)

Table 4: Comparison of pain intensity, Cervical range of motion of subjects with upper trapezitis at the end of post-intervention stage

Outcome measures	Groups	Mean	SD	T-value
Pain intensity	Experimental group -I	2.8	0.64	3.134
	Experimental group -II	3.8	0.44	
Cervical flexion	Experimental group -I	53	1.22	4.96
	Experimental group -II	51.2	1.18	
Cervical extension	Experimental group -I	47.6	0.83	6.8
	Experimental group- II	45.9	1.64	
Cervical lateral flexion (right)	Experimental group -I	36.6	0.89	3.71
	Experimental group- II	34.6	0.83	
Cervical lateral flexion (left)	Experimental group -I	37	0.44	5.92
	Experimental group- II	33.7	0.87	
Cervical rotation (right)	Experimental group -I	57.6	0.92	4.58
	Experimental group- II	53	2.3	
Cervical rotation (left)	Experimental group -I	57.2	1.04	3.46
	Experimental group- II	54.8	1.08	

Significant at 0.05 levels ($p<0.05$)

From table 4, it is inferred that the experimental group I which was exposed to the treatment combinations of trigger release with ultrasound therapy showed a better reduction in pain intensity and improvement in cervical range of motion than the experimental group –II that was exposed to the treatment combinations of positional release with ultrasound

therapy at 0.05 levels of significance.

Discussion

Upper trapezitis is defined as inflammation of trapezius muscle. The trapezius muscle is the postural muscle that involves in the head and neck posture. Restricted range of motion and neck pain affect the maintenance of posture.

The mechanical neck pain is the common problem within our society affecting individual's physical and social functioning and daily activities are also affected. Probably most of the patients suffers from pain and decreased neck motion is due to upper trapezitis trigger points. Trigger release stimulate the mechanoreceptors which influence pain gate mechanism thus leading to reduction in the pain, it relieves tension in the muscle. Eliminates hypoxic condition and finally flushes out the inflammatory chemical substance such as prostaglandin, histamine, and bradykinin (pain metabolites). When compression is released, it results in hyperaemia in the local reaction due to counterirritant effect or spinal reflex mechanism that produce reflex relaxation of involved muscle and increased lymphatic drainage improves range of motion.

Ultrasound therapy is the effective in repairing tissue and it removes the inflammatory exudates, so that it involves in reducing the inflammation of the muscle. Ultrasound therapy promotes the blood circulation, faster wound healing, improves range of motion and it reduces the pain-by-pain gate mechanism.

Positional release works on resetting the muscle spindles, that helps in increasing tone, length of sarcomere in contracted knotty area. In this application the sort of positioning the muscle leads to relaxation of the tissue, which improves the vascular circulation and removes the chemical mediators that is the root of inflammation process. It eradicates the peripheral and central sensitization. Additionally, it plays an important role in breaking the vicious cycle of pain and spasm in the muscle.

Saham A.M, Magdalen M *et al*., 2013 [18] did a study on "Effectiveness of Manual trigger point release versus positional release in reducing pain, improving cervical range of motion and neck function on with upper trapezitis. They took 30 subjects and divided into two groups; Group A with 15 subjects administered trigger release and Group B with 15 subjects administered positional release. The treatment session for each group was given for 3 weeks 4 days per week. The outcome measures were numerical pain rating scale for measuring Pain intensity, goniometer for measuring cervical range of motion neck disability index for neck function. The result of this study shows a significant difference between group A&B with $P<0.05$. This study concluded that trigger point release is more effective than PRT in relieving pain, improving range of motion and neck function [18].

Pinakin Godse, Seema sharma.2014 *et al*., they did the study to find out the efficacy of positional release technique on pain and functional restriction due to active myofascial trigger points in subjects with upper trapezitis .24 subjects were taken for this study using convenience sampling technique and the patients with open wound, sutures, healing fracture were excluded. Therapist were treated for 6 days consecutively by positional release technique. Data was analysed using paired 't' test for neck disability and visual analogue scale. The results reveals that there was statically significant reduction in pain and improvement in neck function. As per result, the study concluded that positional release is effectual among the patient with upper trapezitis [19].

In this study 30 patients were selected based on selection criteria of the age group of 25–35-year-old both male and female, they were randomly allocated into two groups using the lot method. Group A consisting of 15 subjects with upper trapezitis were treated with trigger point release technique with ultrasound therapy and Group B consisting of 15 subjects with upper trapezitis were treated with positional release technique with the ultrasound therapy. Subjects of the both groups received treatment of one session per day, 3 days per week for the total of 6 weeks. The Pre and post test score were measured by visual analogue scale and universal goniometer and the values were recorded. The statistical analysis of paired 't' test and unpaired 't' test shows that there was significant improvement in cervical range of motion and reducing pain after the application of the intervention of both groups, but group A (Trigger release with ultrasound therapy) shows more improvement than Group B (Positional release with ultrasound therapy) among long term computer users with upper trapezitis.

Limitation

- The study was screened only for the computer users.
- Immediate effect was not measured.

Suggestions

- To make the result more valid long-term study may be carried out.
- A similar study may be extended with large sample size.
- The Neck pain and cervical range of motion are restricted, Which affects functional ability, So Further studies can be carried out with other functional disability scales.

Conclusion

Thus, the study concluded that both the groups A and B (Trigger point release with ultrasound therapy versus Positional release with ultrasound therapy) had showed statistically significant improvement in cervical range of motion and reduces neck pain among long term computer users with upper trapezitis, but Group A (trigger point release with ultrasound therapy) Showed highly significant improvement in CROM and reduce pain when compared to Group B (Positional release with ultrasound therapy).

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Author's contribution

I understand my agreement to participation in this study and I am not waiving any of my legal rights. I confirm that Ms. SURABI S.G / Mr. E. MOHANAKUMAR ASSISTANT PROFESSOR have explained me the purpose of study, the study procedure and possible risk that I may experience. I have read and I have understood this concern to participate as a subject in this study.

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