Research Article

Effects of positional release technique on myofascial trigger points of the upper trapezius in computer users having forward head posture

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ABSTRACT

Background: Forward head posture is associated with the upper trapezius myofascial trigger points and cause pain, restricted range of motion, and referred pain in the arm. The positional release technique is likely to focus on evaluating the efficacy of this manual therapy approach.

Objective: To determine the effects of positional release technique for myofascial trigger points of the upper trapezius with forward head posture

Method: A randomized control trial study was conducted in the Physiotherapy Department of THQ Hospital Wazirabad, Pakistan, from February 2021 to June 2021 with a sample size of n=32 male participants. Participants were recruited with pain intensity of at least 3 points on the Visual Analogue Scale at baseline, at least one active TrP in the upper trapezius that was diagnosed using the method described by Travel and Simon, and computer users who spend at least 6 hours per day in a sitting posture and are between the ages of 18 and 45. All subjects were randomly and equally allocated into the Positional Release Therapy (PRT) group and a conventional Physical Therapy group. A total 12 treatment sessions were given with 3 days a week for consecutive 4 weeks. The data was collected at the baseline and after the 12th session. The outcome measures for trigger point sensitivity were pain pressure threshold (PPT), visual analogue scale (VAS), active contra lateral flexion (ACLF), cranio-vertebral angle (CVA), and neck disability index (NDI). Data analysis was done through SPSS version-27.

Results: The mean age of 34.3±6.57 years. The positional release therapy post-intervention results showed more significant improvement ($p \leq 0.05$) in all outcomes PPT, VAS, ACLF, CVA, and NDI between the groups with large effect size.

Conclusion: Positional release therapy (PRT) is superior to conventional therapy in decreasing pain intensity and threshold with disability in patients of upper trapezius trigger points

Keywords: cranio-vertebral angle; forward head posture; neck disability index; pain pressure threshold; positional release therapy; trigger points; upper trapezius; visual analogue scale.

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INTRODUCTION

Forward head posture (FHP) is defined as a postural abnormality in which forward positioning of the cervical spine from the centerline of the body[1]. Females are more prone to develop FHP than males as females usually keep their cervical position in slight 20 -30 flexion[2]. The prevalence of FHP in male and female students was 63.96%. [3] Almost the same percentage 63% was found among students aged 12-16 with equal gender distribution[4]. Neck pain is increasing day by day and in adults up to 45 to 54 % of people experience cervical and shoulder pain. One of the causes of neck pain is having a myofascial trigger point (MTrP) in the neck muscles[5]. The MTrPs are the hyper-irritable points present in muscles that can be responsible for referred pain patterns to other parts of the body[6]. If the head posture is untreated for a long duration, it leads to unusual stress on the neck, which causes pain, tightness, and faulty posture. All these factors affect not only the upper body but also induce adverse effects on the whole body by reducing joint proprioception which leads to posture imbalance[7]. The upper trapezoidal TrPs are more commonly occurring TrPs, thus causing painful patterns in the posterior laterally cervical and ear. TrPs develop in the trapezius due to immediate injury by falling down through a great highness, abnormal position of the body, inadequate ergonomic furniture, and immovability for a long time[8].

The patients with neck pain had a markedly increased forward head positioning (FHP) combined with increased upper trapezius stiffness. Links between FHP and work-related neck disorders (WRNDs) cervical spine curvature, muscle length, and load of intervertebral discs and joints have been reported in the literature. There are pathophysiologic mechanisms that could have contributed to the increased muscle tissue stiffness in the studied subjects with work-related neck pain. The accumulation of muscle metabolites in homo- and heteronymous muscles during prolonged static postural contractions of neck muscles which in turn increases muscle tone and perhaps stiffness. [9]. The individuals aged between 30-50 years with forward head posture have decreased cervical flexion and other ROM. The evidence shows that FHP is also responsible for carpal tunnel syndrome headaches and neck pain[10]. The forward head posture altered rib cage mechanics that decreased thoracic mobility. This reduced mobility of the thorax reduces the effectiveness of the diaphragm, intercostals, and abdominal muscles in terms of ventilation[11].

The literature reported the beneficial outcomes of non-invasive therapy for MTrPs of the upper trapezius treating separately or combined with electrical muscle stimulation, therapeutic ultrasound, electrical nerve stimulation, repetitive magnetic stimulation, hot packs, cervical range of motion exercises, ischemic compression, spray and stretch, transcutaneous electrical nerve stimulation, sustained stretching, massage, cervical manipulation, and trigger point pressure release. Manual therapy is one of the main treatment options for managing myofascial trigger points. Continuous manual pressure is known as "manual pressure release" (MPR). Another manual therapy method used to treat trigger points is positional release therapy (PRT)[12].

The main effects of PRT are to remove the restriction to body movement by reducing pain, inflammation, MTrPs, and stiffness and enhancing muscle power and blood circulation. Studies have shown that Positional Release Therapy (PRT) has a wide range of advantages. PRT increases blood flow and muscle strength while reducing pain, inflammation, and stiffness. It improves motor performance by triggering muscular stretch reflexes and preventing spasms. PRT also lowers referred pain by lowering chemical transmitters and muscle stretch reflex activity, assisting in the elimination of inflammation, and enhancing biomechanical function[13]. According to published research, a 90-second therapy in a comfortable position improves blood circulation and lessens ischemia processes[14]. Through pressure release, done uniformly and consistently, TrPs can be directly targeted[15].

In this modern era, everyone is connected to technology in many ways, which indirectly alters the overall posture of our bodies. This in turn causes various pathologies including muscle imbalance and abnormal posture. There is much research done on trigger point management by different techniques. The aim of this study is to find out the efficacy of positional release therapy versus conventional therapy in male computer users with MTrPs of upper trapezius with forward head posture.

The aim of this study is to compare the effects of the position release technique with conventional therapy on myofascial trigger points of the upper trapezius of patients with a forward head posture.

METHODOLOGY

The randomized control trial (RCT) was conducted at Tehsil Head Quarter Civil Hospital Wazirabad (THQ/ERB-0119) after approval from the Research Ethical Committee of the Riphah College of Rehabilitation and Allied Health Sciences with Ref: RIPHAH/RCRS/REC/Letter-00865 from February 2021 to June 2021. The sample was calculated by the Open

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epi tool comparing mean values of post-intervention of VAS (Group A=1.36 & Group B= 1.93). The calculated sample size was n=32[16].

In this study for sample selection and randomization of groups, the non-probability convenient sampling was used. The recruitment of participants was based on the criteria. There must be pain intensity of at least 3 points on the Visual Analogue Scale at baseline. Participants should have at least one active TrP in the upper trapezius, which was diagnosed by the method explained by Travel & Simon. According to this, the TrPs should have a taut band with hypersensitive spots causing local twitch response, referred pain, and jump signs when pressure is applied manually. The participants were male computer users, doing their duty of at least 6 hours in sitting posture per day, aged between 18 and 45 years. Participants were excluded from having fibromyalgia, Rheumatoid arthritis, and radiating pain to upper limbs from the neck. History of whiplash injury and surgery of neck or shoulder.

The n=32 participants were randomly divided into two treatment groups, the Positional Release Therapy (PRT) group (n=16) and the Conventional Physical Therapy (CPT) group (n=16). Randomization of the participants was done through the sealed envelope method by using a computerized random number generator. The sequence of random allocation was done by an individual who was not directly involved in the study. Consecutive random numbers were written on index cards and placed in thick and opaque sealed envelopes before the study. After obtaining consent from the participants' legal guardians/next of kin, the treating physiotherapist opened the envelope and gave the respective treatment to the patient. The study was single-blinded as the assessing physiotherapist was blinded to the participants' intervention.

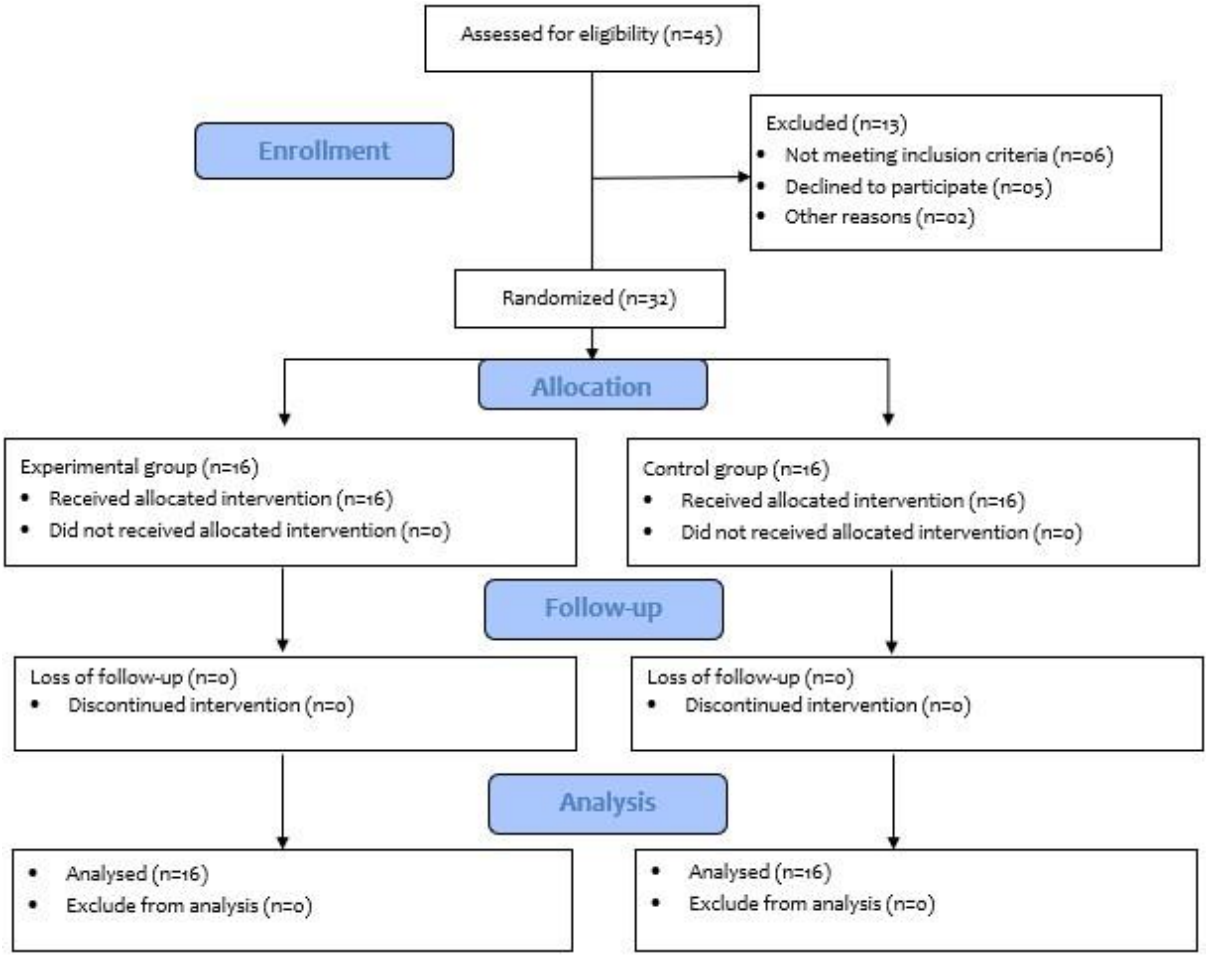

Figure:1 Consort Diagram

The outcome measures included the Neck Disability Index (NDI), Visual Analog Scale (VAS), Active Contra Lateral Flexion (ACLF), Cranio-Vertebral Angle (CVA), and Pain Pressure Threshold (PPT). The NDI is 10 10-item questionnaires, which includes specific functional tasks of daily living. It was used for evaluation before and after treatment. The total score was 50; each section was scored from 0 to 5, where 0 means "No Disability" and 5 means "Complete Disability". It had high reliability and validity r=0.93[17].

A visual analog scale (VAS) was a measuring tool that attempted to quantify pain which was likely to

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encompass a range of quantitative numbers and was not directly simply measurable. It could easily be attempted by participants because it was simple, efficient, and had validity. It ranks as 0 to 10, where "0" stands for "No Pain" and "10" means "Severe pain".

Both ACLF and CVA were measured by goniometer in degrees (unit). It is a reliable tool for measuring active cervical ROM[18]. The side bending occurs in the frontal plane and the normal range is 450. For measuring ACLF, the patient was in a seated position, palpated the C7 spinous process for placing the fulcrum, the stationary arm was perpendicular to the ground along with the moving arm of the goniometer placed in line with an external protuberance of the occiput, then ask the patient to touch his right ear to the right shoulder and vice versa. For measuring CVA, the patient was in a seated position, palpated the C7 spinous process and drew an imaginary horizontal line, then drew another imaginary line from the neural spine (spinous process) of C7 to the tragus of the ear. Where these two lines meet forms the craniovertebral angle. The normal CVA angle is 49.90, and less than normal is considered a Forward Head Posture. The analogue Baseline model algometer was used which be measured either in kilograms or pounds. It was used to measure the pain sensation by applying perpendicular pressure on a specific muscle. Algometer is highly reliable and valid [19].

Three treatment sessions were given per week for consecutive 4 weeks. Each session lasted for 30 minutes. The position-release therapy was applied to the experimental group and conventional therapy (Passive Stretching Technique) to the control group and moist heat (Hot Packs) was applied to each group before applying position-release therapy and conventional therapy.

In the experimental group, the therapist located the trigger point in the upper trapezius by using pincer palpation and marking a circle around it, then for applying the Positional Release Technique the patient was asked to lie in the supine position. The patient was asked to fully relax his body and the therapist applied a gradually increasing pressure on the trigger point by thumb to the extent that the patient became uncomfortable and felt a pain sensation. There, the therapist modified the posture of the patient in such a way that the pain was reduced by up to 60-70%. The position formed by the therapist was to make neck extension, with the side bending to the involved side or towards the trigger point and then the neck rotated to the opposite side. The patient's shoulder was then placed passively in abduction and the new position was adopted for 90 sec. This technique was continued for 3 repetitions with a 10-second relaxation period in between them, three sessions per week for consecutive four weeks[20].

In the control group, the therapist performed passive stretching of the upper trapezius. To perform stretching the therapist asked the patient to sit fully body relaxed, the therapist supported one shoulder and then passively placed the head in a side bending position opposite to the involved side for stretching the upper trapezius muscle. Slow and gentle stretches are applied with a 10-second hold, and 5 repetitions are performed with a 10-second relaxation time between them[21].

The data included lateral flexion of cervical and CVA angle in degrees (unit), PPT in pounds (lbs), and questionnaires of VAS and NDI. The data analysis was made through SPSS-27. The data was checked for normality by using the Shapiro-Wilk Test and then the mean and standard deviations were calculated. As data was normally distributed, an independent sample t-test was used for the analysis of the difference between the two groups, and a paired t-test was performed for within-group analysis. $p<0.05$ was considered significant and Cohen's d was used to determine the effect size.

RESULTS

The mean ± SD of the age of participants was 34.3 ± 6.57 with age ranges from 18 to 45 years. It was observed that the group analysis showed significant improvement in the experimental group which received positional release therapy (PRT) as compared to the conventional physical therapy group when comparing the active contra lateral cervical flexion, cranio-vertebral angle (CVA), pain on VAS and neck disability on NDI. (Table 1)

When observing the changes between pre-post assessment, PRT and CPT both groups showed significant improvement ($p<0.001$) in PPT, active contra lateral cervical flexion, cranio-vertebral angle, and neck disability. (Table 2)

DISCUSSION

The primary objective of this study was to compare the effectiveness of Positional Release Therapy (PRT) and Conventional therapy in the treatment of Myofascial Trigger Point of Upper Trapezius with Forward Head Posture. The results of the present study showed a significant difference while comparing the outcome measures between groups experimental or control group and making a comparison within the group. During pre-post-intervention results showed that both the groups had improvement in pain, range of motion, cranio-vertebral angle, PPT, and NDI. However, results revealed that Positional Release Therapy is superior to conventional therapy.

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Table 1: Analysis Between Groups

Variable	Intervention	Group		Mean Difference	P value	Effect Size
		Experimental	Control			
PPT (Lbs)	Pre	3.10± 0.69	3.79± 0.59	0.69	0.006**	0.90
	Post	5.78± 0.73	5.10± 0.77	0.68	0.02*	
VAS	Pre	6.93± 1.09	6.80± 1.08	0.13	0.74	1.00
	Post	1.46± 0.99	2.46± 0.99	-1.00	0.01*	
ACLF (Degree)	Pre	25.53± 5.95	25.06± 4.58	0.46	0.81	0.78
	Post	40.20± 4.73	36.53± 4.59	3.66	0.04*	
CVA (Degree)	Pre	35.40± 3.94	33.26± 4.16	2.13	0.16	1.28
	Post	44.73± 2.93	40.53± 3.58	4.20	0.00***	
Total NDI	Pre	29.80± 7.47	31.86± 7.98	-2.06	0.47	1.56
	Post	4.53± 3.79	10.46± 3.77	-5.93	0.00***	

*Level of significance: p<0.001***, p<0.01**, p<0.05*; ACLF: Active Contra Lateral Flexion, CVA: Cranio-vertebral Angle, NDI: Neck Disability Index, PPT: Pain Pressure Threshold, VAS: Visual Analog Scale*

Table 2: Within Groups Analysis

Variable	Group	Intervention		Mean Difference	P-value
		Pre	Post		
PPT (Lbs)	Experimental	3.10± 0.69	5.78± 0.73	2.68	0.00***
	Control	3.79± 0.59	5.10± 0.77	1.31	0.00***
VAS	Experimental	6.93± 1.09	1.46± 0.99	-5.47	0.00***
	Control	6.80± 1.08	2.46± 0.99	-4.34	0.00***
ACLF (Degree)	Experimental	25.53± 5.95	40.20± 4.73	14.67	0.00***
	Control	25.06± 4.58	36.53± 4.59	11.47	0.00***
CVA (Degree)	Experimental	35.40±3.94	44.73± 2.93	9.33	0.00***
	Control	44.73± 4.16	40.53± 3.58	-4.2	0.00***
Total NDI	Experimental	29.80± 7.47	4.53± 3.79	-25.27	0.00***
	Control	31.86± 7.98	10.46± 3.77	-21.4	0.00***

*Level of significance: p<0.001***, p<0.01**, p<0.05*.*
ACLF: Active Contra Lateral Flexion, CVA: Cranio-vertebral Angle, NDI: Neck Disability Index, PPT: Pain Pressure Threshold, VAS: Visual Analog Scale

Regarding PPT in this study, there was a significant increase in PPT and pain reduction because trigger point sensitivity decreased in response to the application of the PRT. In this method, following the release of pressure on TrP, tissue blood and lymphatic circulation of that area increases which eliminates hypoxic conditions and results in cellular metabolism leading to the removal of inflammatory chemical substances such as prostaglandins, histamine, and bradykinin; therefore, reduction of sensitization of nociceptors occurs. Also, one of the advantages of PRT is breaking the cycle of pain-spasm pain, so PRT is effective in increasing PPT and pain reduction [20, 22].

Our study reported that PRT was more effective than conventional therapy in significant pain reduction and improvement in ACLF. It's possible that the benefits of muscular stretching exercises are what led to the improvement in conventional treatment as in the current study. The stretching paravertebral muscles and other soft tissues in the back may have lowered muscular tension and released pressure on nociceptors in the muscles and on the nerve root, breaking the cycle of pain and resulting in a considerable reduction in pain level. It also reduced paravertebral muscles' cellular connective tissues and muscular stiffness, both of which reduced discomfort.[23, 24]. The positional release technique's analgesic effects can be credited to Bailey and Dick. He put up the nociceptive notion that PRT's positional release mechanism might lessen tissue damage in malfunctioning muscles. They proposed that patients be placed in a comfortable position to facilitate local fluid perfusion (such as blood and lymph) and promote the elimination of sensitizing inflammatory mediators in order to relax the injured tissues.[23, 24]. Meseguer et al. indicated that the use of PRT may be successful in creating hypoalgesia and lowering the responsiveness of sensitive spots in the upper trapezius in participants with neck pain. This finding supports the pain reduction in the PRT group. Meseguer et al. observed in their study that there were modest differences in the VAS for pain intensity between pre and post-intervention measurements after PRT application[24]. The literature has reported that positional release therapy has significantly reduced pain and improved cervical ROM in patients of upper trapezius with MTrPs [8, 25].

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The results of the current study showed that there was a significant improvement in disability scores, but PRT was more effective than conventional therapy. A study conducted by Khyati Varshney et al stated that the patients with non-specified cervical pain, the positional release was more effective than the conventional therapeutic program with ($p<0.00$) in pain reduction and disability[26]. Data from previous Literature support the importance and effectiveness of positional release therapy but some research showed a difference to the result of the present study. So, the importance of PRT is not negligible. The present study showed prominent positive effects of positional release therapy as compared to conventional therapy in reducing pain and disability. Varshney K et al. 2019 reported that both treatment Positional release technique and conventional Physiotherapeutic program were effective in reducing pain and disability in patients with non-specific neck pain. However, the Positional release technique was more effective than the conventional Physiotherapeutic program in order to decrease pain and disability[27].

Participants were recruited with an age limit of 45 years, so the results are not generalized for older with similar conditions.

CONCLUSION

Positional Release Therapy showed superior beneficial effects as compared to conventional therapy. The PRT showed significant improvement in terms of total neck disability index, craniovertebral angle, visual analog scale, pain pressure threshold, and active contralateral flexion.

DECLARATIONS & STATEMENTS

Author's Contribution

AU: substantial contributions to the conception and design of the study.
AU and ZM: acquisition of data for the study.
ZM and ZA: interpretation of data for the study.
RK and MA: analysis of the data for the study.
SKK, AW and AA: drafted the work.
AU, ZM, ZA, RK, MA, SSK, AW and SS: revised it critically for important intellectual content.
AU, ZM, ZA, RK, MA, SSK, AW and SS: final approval of the version to be published and agreement to be accountable for all aspects.
of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed to the article and approved the submitted version.

Ethical Statement

The study was conducted at Tehsil Head Quarter Civil Hospital Wazirabad (THQ/ERB-0119) after approval from Research Ethical Committee of the Riphah College of Rehabilitation and Allied Health Sciences with Ref: RIPHAH/RCRS/REC/Letter-00865

Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Due to privacy or ethical considerations, the data presented in this study are available upon request from the corresponding author.

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None to declare.

Conflicts of Interest

The authors declare no conflict of interest.

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