

Effect of Myofacial release combined with muscle energy technique on Neck disability to improve Ergonomics – A Case SeriesDevi Manju ¹, Anujot Kaur², Swati ³¹Assistant Professor, Department of Physiotherapy, Lovely Professional University² Assistant Professor, Department of Physiotherapy, Lovely Professional University³Assistant Professor, Department of Physiotherapy, Lovely Professional University

Corresponding author

Manju Devi

Assistant Professor

Department of Physiotherapy

Lovely School of Physiotherapy and Paramedical Sciences

Lovely Professional University, Phagwara

Email: manju.23207@lpu.co.in

Phone:9056382268

Abstract**Study Design:** Case Series with experimental design**Background and purpose**

Neck pain could be a common manifestation among computer work professionals including university faculties commonly termed as work related musculoskeletal disorder WRMDs. Trapezius muscle pain and spasm is the one of the leading cause of neck disability. Thus, this study aimed to determine the effects of combination myofacial realease and muscle energy technique on neck pain and function among workstation teaching professionals to improve ergonomics.

Case Descriptions:

The five participants in this series showed clinical evidence of pain in neck and shoulders along with presence of trigger points on upper trapezius and each underwent a treatment protocol consisting of combination of two interventions myofacial release followed by muscle energy technique on upper trapezius bilaterally. In addition to this all participants were given consultation to improve ergonomics at their work station.

Outcomes

All the participants demonstrated decreased pain on VAS, improved scores on neck disability scale (NDI) and increased range of motion of neck side flexion on goniometric evaluation. In addition to this there was marked improvement seen in neck and thorax posture.

Results

The results of this case series suggest that The findings of the study showed statistical and clinical significance for improved ergonomics at neck. The length of neck muscles improved along with reduction in neck pain and disability.

Conclusion: Workstation professionals including teaching faculties are prone for poor ergonomics at neck, Shoulder and arm functions. The 4 week physiotherapeutic interventions including myofascial release, muscle energy technique along with ergonomics advises may be effective to improve the neck functions making it ergonomically more efficient to control WRMDs.

KeyWords:

Neck pain, myo facial release, muscle energy technique, ergonomics, neck disability

INTRODUCTION

Work related neck pain is one of the major concern of workers belonging to different domains related to computer usage. [1] Excessive usage of laptop and computer in the modern world has generated various biomechanical problems. Due to improper posture and setup of workstation, neck pain has been aggravated among laptop users. Prolong sitting can lead to continuous static load on the neck muscle. Desk based workers are quite typical for adopting wrong postural habits. It leads to altered weight distribution across the body and excessive stress on the neck and shoulder muscles. Mechanical neck pain is produced when one has poor head and neck posture which causes a strain on the neck and overuse of the neck musculature. This in turn causes the users not to perform well in their job. Keeping the neck in the correct alignment will prevent the neck pain. The relationship of neck impairment with trapezius muscle trigger points have been well established by previous literature [2]. The leading factors that contribute to neck pain can be categorized into intrinsic factors including psychological stress, extreme temperature changes, static loading and repetitive movements of neck, postural muscles shortening, fascia tightness and muscle knot formations, additional strain on joints.[3] The incidence of pain in neck among computer users is 28 %. It is more in females (60%) than males (40%). [4]. Among all the factors pain in trapezius and spasm is the most widespread finding seen in prolonged computer users.[2]

Conservative interventions include ergonomic care and physiotherapeutic methods play an imperative role to relieve neck pain caused by maladapted posture. The physiotherapy

treatment has evolved over period of time for treating chronic neck pain related to postural mal-adaptation. The available treatments back up of literature includes electrotherapeutic agents like TENS, Ultrasound therapy, heat and cryotherapy that reduces pain and inflammation and increases the extensibility of fascia. Other available methods include myofascial release techniques, stretching muscle energy technique, mobilization and manipulation, taping and dry needling therapy to release fascia and muscle tightness. [1]

Myo-fascial release (MFR) is one of the widely used techniques for releasing fascia. Fascia is a sheet like structure having fiber arrangement that modifies itself according to local and tensional demand placed on it. MFR modulates pain linked with musculoskeletal lesions. Its therapeutic effects are maximized by relaxing muscles at the lesion. This technique stimulates blood circulation which helps in the relaxation of the muscles. MFR provides credibility and scientific evidence for treating taut fascia. [5]

MET stands for muscle energy technique that incorporates stretching as well as activation of muscles and at the same time helps in reducing tension in muscles and increasing ROM.[6-7]

Numerous studies have been done over ergonomics to reduce pain and improve ROM but there is paucity of literature on combined effects of muscle energy technique and myofascial release on pain and ROM in people with neck disability. Thus, this study aimed to report the outcome on pain, neck side flexion range and neck disability, as well as to frame a clinical physiotherapy protocol by using MFR, MET to improve quality of function and ergonomics of desk based workers.

MATERIALS AND METHODS

A study was done to research the effectiveness of ergonomics and physiotherapy interventions in workstations for patients with disability in neck. The study was conducted on Lovely Professional University students and faculty members targeting mostly the computer users with long stay hours on a computer workstation. For this purpose 10 patients were evaluated for the presence of neck pain and forward head posture. The participants were taken from Physiotherapy OPD of Lovely Professional University, Punjab. Out of these 5 participants were selected according to the inclusion and exclusion criteria. All the participants were explained about the procedures and written consent was signed by all of them. The study was done for 3 days per week for 4 weeks.

The physiotherapy interventions included myofacial release techniques and muscle energy technique for 3 days in a week for 4 weeks period. Patients were also given ergonomics stretch exercises to perform at work stations and at home. These included maintaining an upright posture during work hours on a computer and neck stretches to perform during free time at home and work with ergonomic guidelines. All the participants performed home exercises for neck pain for 4 weeks.

All the participants were instructed to follow home exercise programme which consisted of strength training of deep neck flexors, rhomboids, trapezius and serratus anterior along with self stretching of pectoralis muscles. The exercise prescription varied according to symptoms of individual patients.

The inclusion criteria were the following- age between 20-45 years both males and females, non-reluctant to participate, one or two trigger points, patient is not taking any medical and physiotherapy treatment, minimum 3 years of laptop and desktop user, minimum 3 hours of regular laptop/computer user. The exclusion criteria were the following:, hyperlordosis of lumbar spine and medical history of idiopathic scoliosis, symptoms of musculoskeletal injuries, stenosis, migraine, discomfort before the use of laptops, history of traumatic injury or neck surgery, cervical radiculopathy/ neurological sign, shoulder pathology, carpal tunnel syndrome.

Diagnostic criteria were the following: 1. palpable tensed band in the neck musculature 2. Presence of one or two nodules in the tensed band 3. Local brisk contraction provoked by snapping palpation 4. Production of the typical referred pain pattern after applying pressure on the tender spots. Spontaneous presence of the typical referred pain pattern. If only four criteria were satisfied, the trigger points were considered latent, and if all were satisfied, the trigger points were considered active. After evaluating the participants at baseline for VAS, passive neck range of motion for cervical flexion, extension, right-left side flexion and rotations and neck disability score the physiotherapy intervention was given as follows: First of all the participants were given commercially available cervical hydrocollateral pack to relax the muscles around the neck for 7-10 minutes, followed by myo facial release technique, after which muscle energy technique was given for bilateral upper trapezius. The post treatment readings were taken for VAS, NDI, Neck side flexion ROM and forward head posture by plumline method. In addition to this, ergonomic guidelines were provided to the participants which they were asked to follow during and after working hours. For Myofacial release of Trapezius muscle patient was made to sit

with arms and legs well supported. The therapist gave MFR by applying gentle pressure on the base of the neck while standing behind the participant. In this technique 3-4 firm glides were given using forearm or ulnar border of palm from base of neck towards the scapula. While performing the MFR the participant was asked to do side bending and to turn the head in opposite direction while maintain the upright sitting posture[8]. Similarly for muscle energy technique postisometric relaxation technique was used for upper trapezius muscle for five repetitions using 20% of maximal isometric contraction. Stretch was held beyond resistance barrier for 20 seconds[2].

Table 1 The ergonomic guidelines that were given to the participants were as follows

Sr no.	Ergonomic guidelines
1	The laptop/desktop screen should be at eye level
2	The work desk must be modified as proper arm rests of chair, feet should be supported on ground.
3	The lower back should be well supported
4	After every one hour self stretching of neck muscles
5	Shoulder rotations inwards and outwards

The outcomes were assessed at the baseline before the intervention and after 4 weeks post intervention.

CASE DESCRIPTION

The 5 participants in this case series were evaluated at baseline and 4 weeks after treatment. For each patient , demographic data, problem list, relevant history and examination findings are provided in table 2. The evaluation consisted of an assessment of posture, tenderness and spasm around shoulder for bilateral trapezius and rhomboids, range of motion , pain and functional limitations assessed with neck disability index.

All participants presented with pain in neck and heaviness in shoulders. All of them fall under chronic category as the pain range from 5 months to 4 years. All the participants

were selected according to the following parameters: (1) pain in neck for more than 3 months (2) using minimum 2 years of laptop and 3 years of desktop work experiences (3) Work should involve minimum 3 hours of regular desktop/laptop usage (4) age between 20-45 years. (5) Both males and females were included.

The neck pain was assessed using Visual analogue scale, The tenderness was evaluated according to clinical grading of tenderness as per David J Magee, The range of motion was assessed using Universal goniometer and function was checked using neck disability index. The trapezius muscle tightness was assessed using trapezius shortness test.

Table 2 Participants Information

Sr no.	Age,y	Gender	Problem list	Examination Findings
1	24	F	pain on both sides of the upper aspect of the shoulder since 5 months	• Forward head posture • Trigger points bilaterally in trapezius • Grade 2 Tenderness on bilateral trapezius • Trapezius and pectoral muscle tightness bilaterally • VAS 6 on rest, 8 on using laptop • NDI Score : 18%
2	25	F	Pain and stiffness in neck since 5 months	• Forward head posture • Trigger points bilaterally in upper trapezius muscle • Grade 1 tenderness • VAS score 6 on using laptop • NDI Score:24%

3	22	F	pain over her shoulders and neck since 4 years	• Forward head posture • Grade 1 tenderness on Trapezius • VAS score 8 on using laptop • NDI Score:24%
4	23	M	Pain over shoulders and neck since 2.5 years	• Forward head posture • Restricted passive range of motion of neck side flexion • VAS 7 on using laptop • NDI Score: 66%
5	21	M	Pain and neck in shoulders since 1 year	• Forward head posture • Restricted passive range of motion of neck side flexion • VAS 7 on using laptop • NDI Score: 56%

CASE STUDY 1

A female participant with 24 years of age had pain on both sides of the upper aspect of the shoulder. The patient reported pain increases while using laptop for long time, carrying a bag and during anxiety. The pain evaluation was done VAS rating of 6 at rest, while using laptop 8, carrying a bag 8 and during anxiety 9 on first day of assessment. On observation patient was seen having gothic shoulders tightness of the upper trapezius fibers. On palpation muscle knots were found in the both upper trapezius fibers and tenderness of grade 2. The ROM in neck flexion was 0-60 degree, extension 0-40 degree, side flexion right 0-30 degree, left side 0-35 degree, rotations left side 0-80 degree, right side 0-80 degree.

CASE STUDY 2

A female with 25 years of age, had pain and stiffness in her neck. Patient was apparently well before 4 months but as she start doing her thesis work which include working on laptop, carrying laptop daily to college, from then on she is having a neck pain and stiffness in her neck and restricted range of motion . According to the NPRS scale her pain was rated 6 with the tenderness grade 1 (over upper trapezius). While observing, the patient having a forward neck posture, during examination the patient had restricted ROM of neck.

CASE STUDY 3

A female patient with 22 years of age, a student of Lovely Professional University, was having pain over her shoulders and neck especially while carrying her heavy bag for the past 4 years. She came with chief complaints of being unable to use her computer for long period due to pain in her neck and radiating pain to the shoulders while carrying a back pack. Her pain intensity using VAS (Visual analogue scale) was on 8/10, and her ROM was restricted.

CASE STUDY 4

A male 23 years old was having pain over shoulder and neck while using laptop and carrying heavy objects on his back for past 2.5 years. Patient came with complaint that she is unable to use laptop for long period due to pain. Pain was assessed using VAS scale is 7/10, on assessment his range of motion was mildly restricted.

CASE STUDY 5

A male patient with 21 years of age studying M.sc Economics in LPU, had pain in the neck and shoulders since 1 year. He reported with chief complaint of being unable to use the laptop while typing for thesis due to the pain in the neck and unable to carry his laptop bag, his pain intensity was at 7/10 using the NPRS (Numerical Pain Rating Scale) on examination his initial assessment recorded a decrease in his neck range of motion and some restrictions in his shoulder movement.

OUTCOMES

All participants received treatment intervention of 3 days per week for 4 weeks. Each participant generally progressed well through the treatment program. The first participant has shown maximum pain relief and increased function in neck. The pre and post findings of pain and disability have been described in table 3 and the passive neck side flexion range of motion has been depicted in table 4.

Table 3 Pre and Post Treatment findings of Pain and neck disability index

	PRE-TREATMENT		POST -TREATMENT		MEAN DIFFERENCE	
Sr No.	Neck Disability*	Pain Score**	Neck Disability*	Pain Score**	Neck Disability*	Pain Score**

Participant 1	18%	8	2%	4	16	4
Participant 2	24%	4	10%	2	14	2
Participant 3	24%	6	4%	2	20	4
Participant 4	66%	6	14%	2	52	4
Participant 5	56%	6	18%	4	38	2
Mean	38%	6	10%	3	28	3
SD	0.21	1.41	0.06	1.09	0.15	0.32

*Neck Disability by NDI score,**Pain Score by VAS.

Table 4 Pre and Post intervention findings of Goniometric assessment of Passive Neck Side flexion (degree)

Sr No.	LEFT SIDE FLEXION (degree) Starting from 0 degree			RIGHT SIDE FLEXION (degree) Starting from 0 degree		
	Baseline ROM	Post Intervention ROM	Mean Difference	Baseline ROM	Post Intervention ROM	Mean Difference
Participant 1	35	45	10	30	45	10
Participant 2	40	55	15	30	40	10
Participant 3	40	45	5	45	45	0
Participant 4	30	45	15	30	45	5

Participant 5	35	35	0	20	30	10
Mean difference	36	45	9	31	41	7

DISCUSSION

This small case series presents with the findings of using a combination of myofascial release and muscle energy technique on patients having neck disability. All 5 participants were able to improve their daily functions after getting 4 weeks of treatment intervention. The participants were compliant to follow the ergonomic guidelines and home exercises protocol provided to them in the form of a handouts. The changes in pain and range of motion were related to improved function in daily activities. The first objective of this study was to investigate the reduction of pain in the neck. All the participants have depicted reduced VAS score with a mean difference of 3. This may be related to the reduction in trigger points and muscle relaxation after the intervention. This case series supports the successful outcomes of other studies of same intensity. A study conducted by Michelle Pereira et,al (2019) [9] concluded that a workplace intervention given in combination of ergonomics and neck-specific exercises provided benefits to the office workers. The second objective was to analyze the improvements neck lateral flexion range of motion. All the participants have shown clinical improvement in the neck side flexion ranges which may be due to reduction in pain. Once the pain is reduced the length of the muscle increases. Apart from this marked improvement was seen in forward head posture. As the muscles of neck were strengthened in the home exercise program and muscle imbalance was reduced by active posture correction and ergonomic advises, the plum line evaluation depicted improvement in neck posture. Due to improvement in all parameters a collective improvement was seen in NDI score. The findings of this study are similar to a study conducted by Namvar et al (2016) in which they found that myofascial release technique is beneficial in improving pain, tenderness and disability in chronic neck patients [10]. In the same vein another research highlighted the positive effects of muscle energy technique on mechanical neck pain. They evaluated VAS and NDI for pain and neck

disability respectively after giving intervention for 6 consecutive days. [8]

In addition this literature also supports that myofascial release has proved to be effective in treating trapezius pain by effecting the trigger points [11].

In addition to this, improving the ergonomics was another objective of this study. The ergonomic advises given to the participants for active posture corrections, neck stretching and work station modification were provided to them in the form of handouts. All participants have depicted reduced score of NDI. This finding is similar to Prashant et al (2017) in which they concluded that ergonomic advises are beneficial in improving pain and neck function [12].

LIMITATIONS AND RECOMMENDATIONS

This case series has been done on 5 participants for pain and disability in neck. Similar studies with more participants, may enhance the validity of the findings, which may enhance the confidence of the physiotherapists. For specific and elaborated evaluation pain pressure algometer may be used to evaluate tenderness, muscle strength can be evaluated by manual muscle testing. Furthermore, follow up evaluations may be added to explore the long term effect of this intervention.

CONCLUSION

This work highlights the effectiveness of a combination intervention of myofascial release and muscle energy technique along with ergonomics advises may improve the efficiency of computer based workers. Ergonomics is very important concept and need of every human on earth for better living. Most of laptop using faculty and student are in sitting position with neck in flexion for a longer time period, they must take help of physiotherapists, and they can design postural guidelines according to individual needs. It is concluded that faculty and students are unaware of their posture while doing work in workstations. For which ergonomic and physiotherapy interventions may prove to be beneficial in reducing the neck disability.

REFERENCES

- 1) Daxa Mishra, R Harihara Prakash, Jigar Mehta, Ankita Dhaduk . Comparative Study of

Active Release Technique and Myofascial Release Technique in Treatment of Patients with Upper Trapezius Spasm. *Journal of Clinical and Diagnostic Research*, 2018, Nov, Vol-12(11): YC01-YC04

2) G. Yatheendra Kumar, P. Sneha, N. Sivajyothi. Effectiveness of Muscle energy technique, Ischaemic compression and Strain counterstrain on Upper Trapezius Trigger Points: A comparative study. *International Journal of Physical Education, Sports and Health*. 2015; 1(3): 22-26

3) Kanchanomai S, Janwantanakul P, Pensri P, Jiamjarasrangsi W. Risk factors for the onset and persistence of neck pain in undergraduate students: 1-year prospective cohort study. *BMC Public Health*. 2011;11:566. Published 2011 Jul 15. doi:10.1186/1471-2458-11-566

4) Misailidou V, Malliou P, Beneka A, Karagiannidis A, Godolias G. Assessment of patients with neck pain: a review of definitions, selection criteria, and measurement tools. *J Chiropr Med*. 2010;9(2):49–59. doi:10.1016/j.jcm.2010.03.002

5) Ducnan Ruth, 2014, Myofascial Release (Hands-On Guides for Therapists) Human Kinetics, Inc.; 1 edition (23 January 2014)

6) Knudson, Duane. (2006). The Biomechanics of Stretching. *Journal of Exercise Science & Physiotherapy*. 2. 3-12.

7) B. Chakradhar Reddy , Santosh Metgud. A randomized controlled trial to compare the effect of muscle energy technique with conventional therapy in stage II Adhesive Capsulitis. *International Journal of Physiotherapy and Research*, Int J Physiother Res 2014, Vol 2(3):549-54. ISSN 2321-1822

8) Apoorva Phadke, Nilima Bedekar, Ashok Shyam,, Parag Sancheti. Effect of muscle energy technique and static stretching on pain and functional disability in patients with mechanical neck pain: A randomized controlled trial. *Hong Kong Physiotherapy Journal* (2016) 35, 5e11

9) Pereira M, Comans T, Sjøgaard G, Straker L, Melloh M, O’Leary S, Chen X, Johnston V. The impact of workplace ergonomics and neck-specific exercise versus ergonomics and health promotion interventions on office worker productivity: A cluster-randomized trial. *Scand J Work Environ Health* 2019;45(1):42-52

10) Hasan Namvar, Gholamreza olyaei, Behrouz Attarbashi Moghadam and Mohammad Hosseinifar. Effect of myofascial release technique on pain, disability, maximum isometric contraction of the extensor muscles, and pressure pain threshold in patients with chronic nonspecific neck pain: Double blinded randomized clinical trial. *International Journal of Medical Research & Health Sciences*, 2016, 5, 7S:500-506

11) Priya Kannan. Management of Myofascial Pain of Upper Trapezius: A Three Group Comparison Study. *Global Journal of Health Science*; Vol. 4, No. 5; 2012
ISSN 1916-9736 E-ISSN 1916-9744

12) Naik Prashant, Haval Pradnya, and Deodhar Pratiksha. Effect of Ergonomic Advice on Neck Pain among Engineering Students of Belagavi City, Karnataka: An Observational Study. *International Journal of Medical Research & Health Sciences*, 2017, 6(6): 77-81