Effects of Muscle Energy Technique in Patients with Tension Type Headache; A Randomized Control Clnicial Trial

Rabia Sohail
The University of Lahore
Huma Riaz
Riphah International University
Muhammad Akhtar (a.hunjra@gmail.com)
The University of Lahore
Asim Raza
The University of Lahore
Kinza Shabbir
The University of veterinary and Animal Sciences
Ashfaq Ahmad
The University of Lahore

Research Article

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Abstract

Background: Tension type headache is claimed to be one of top ten disabling conditions in the world. The purpose of the study was to determine the effects of muscle energy technique on pain, range of motion at cervical spine and disability related to tension type headache.

Methods: A randomized control trial was conducted on 48 participants of both genders whose age was 18 to 40 years with complain of tension type at Rehabilitation and Injury Management Department of Medcare International Hospital Gujranwala, from July to December 2019. Participants were randomly selected and allocated into two groups (experimental and control group). The experimental group received both muscle energy technique and myofascial release technique on trapezius and sternocleidomastoid of both sides. The intervention was applied for 6 weeks (3 sessions per week). Assessments were done at baseline, 4th week and 6th week. Numeric pain rating scale (NPRS), Headache disability inventory (HDI), headache impact test (HIT) and cervical range of motion with the help of Inclinometer were tools for assessment. Data analysis was done using SPSS (version 21).

Results: The mean age of experimental group was 26.5±5.42 and control group was 27.7±5.70. The experimental group was shown significant improvement in terms of pain and flexion and side flexion range of motion with p-value ≤ 0.05.

Conclusion: It is concluded that muscle energy technique is effective treatment for tension type headache; it is associated to decreased range of motion at cervical spine and disability related to TTH.

Trial registration: IRCT20190121042445N2, Registered 07-02-2021.

Introduction

According to World health organization headache disorders are classified as the ten top disabling conditions in the world and 46% population is affected by this(1). Tension-type headache (TTH) was the third most prevalent disorder (2). Prevalence of tension type headache is 42% in adult population (1).

The first episode of TTH in maximum number of people is 20 years and maximum occurrence in the ages of 30 to 39 years (3). Active treatment methods that consist of voluntary contraction of muscle in a defined and controlled direction while an opposite force is applied by the therapist are called as muscle energy technique (MET) (4).

Evidence is present regarding association of trigger points (Trps) in these muscles in patients of TTH. Studies also proved the effects of muscle energy technique (MET) on relieving trigger points and little evidence regarding positive impact of myofascial release technique (MFR) on relieving TTH. Purpose of study was to determine the effects of muscle energy technique on headache related disability.

Objective

Tension type headache is claimed to be one of top ten disabling conditions in the world. The purpose of the study was to determine the effects of muscle energy technique on pain, range of motion at cervical spine and disability related to tension type headache.

Subjects And Methods

Study design

A prospective randomized clinical trial study was arranged between 1st July to 31st December 2019.

Sample Size

Initially, total sample size of the study was 48 , (experimental=24 and control group=24) that was calculated online using Open Epi tool with confidence interval 95%, power of 80% (5). And, a non-response rate of 10% was taken.

'Ethics approval and consent to participate'

Ethical approval was taken from Medcare Sports Injury Clinic, Medcare International Hospital, Gill Road, Gujranwala with reference No. **MSIC/329**. The written informed consent was obtained from all participants with the following consent statement.

Participants

A total of 48 patients were selected from Rehabilitation and Injury Management Department of Medcare International Hospital Gujranwala Figure 1. Patients of both gender of age 18-40 years with diagnosis of ETTH and CTTH were included. And other inclusion criteria regarding TTH were (1). At least 10 episodes occurring on ≥1 day per month for at least 3 months (2). Headache episodes lasting from 30 minutes to 7 days (6).Headaches has at least two of them; Bilateral location of pain, Pressing tightening (non-pulsating) quality, Mild or moderate intensity, Pain provocation on trigger point palpation, Headache that does not aggravate by routine physical activity, No nausea or vomiting in ETTH , Not attributed to another disorder, Subjects being under pharmacological control. Patients with Headache that is aggravated by head movements, musculoskeletal and metabolic disorders with symptoms homogenous to headache (rheumatoid arthritis), previous neck trauma, Vertigo, dizziness, arterial hypertension, Malignancy, infection, trauma, bone deformities were excluded from the study.

Randomization

Participants were selected through Non probability convenient sampling technique as per inclusion and exclusion criteria. Patients of TTH were randomly allocated into 2 equal groups (Group A=24 and Group B=24) and randomization was done by lottery method. It was single blinded study in which assessor of data was blinded.

Interventions

Muscle energy technique along with myofascial release technique on upper trapezius and sternocleidomastoid was applied on patients of group A. Only myofascial release technique was used on upper trapezius and sternocleidomastoid muscle to group B.

Treatment Protocols

Group A

Muscle energy technique along with myofascial release technique on upper trapezius and sternocleidomastoid was applied on patients of group A.

Protocol 1:

Muscle Energy Technique on upper trapezius

The patient places in a moderate opposed exertion (20% of the accessible solidarity) to convey the decent shoulder to the ear (a shrug movement) and the ear to the shoulder. There ought to be a moderate level of duty and no uneasiness ought to be experienced. The compression goes on for 7-10 seconds and when the exertion is totally loose (7).

Muscle energy technique on sternocleidomastoid

Patient is approached to lift a little degree to the roof the completely turned head and to hold the breath. There is no requirement for the professional to apply opposition when the head is raised as this is adequately given by gravity. Between 7-10 seconds of isometric constriction, the patient is advised to discharge the exertion (and breath) bit by bit and position the head on the table so that there is a little level of expansion (7). Moist heating pad is applied for 10 minutes before each session (8).

Protocol 2:

Myofascial release technique on upper trapezius

The muscle is put on a gentle leeway by moving the ear somewhat to the shoulder on a similar side with the patient recumbent, or presumably sitting. The whole mass of the upper trapezius is raised off the supraspinatus muscle and summit in a pincer grasp. The muscle at that point rolls firmly between the fingers and thumb to palpate for a knob and tight groups to discover Trigger point's spot delicacy (9). Treatment session longs for 10 minutes of myofascial release on each side (10).

Myofascial release technique on sternocleidomastoid

The patient sits in a low-upheld firm-sitting easy chair easily and loose with each hand's fingers snared under the seat or under the thigh. The patient's head might be supported in the administrator's hand to enable the patient to loosen up the neck muscles, with the administrator's head leaning against the

administrator's arm or chest. The patient is encouraged to rest the administrator's head weight and utilize greatest profound stomach breathing, which likewise unwinds. Therapist applies pressure on trigger points located in sternal and clavicular divisions of muscle with pincer grip. Gradually increasing the pressure and releasing the trigger points one by one. This is followed by stretching of muscle by deep inhalation, rotation of head on opposite side and rotation of chin on same side (9). Treatment session longs for 10 minutes of myofascial release on each side (10).

Group B

Treatment applied in this group is myofascial release technique for upper trapezius and sternocleidomastoid muscle. This was applied in the same way mentioned in the protocol 2 of group A interventions.

Outcome measures

Outcome variables of pain, range of motion and functional level of patients were measured at Baseline, 4th and 8th week by measuring scales of NPRS, inclinometer, Headache disability index and headache impact test respectively.

Numerical pain Rating scale (NPRS)

NPRS value is 0-10 and each number describes the level of discomfort and pain, “0” indicates no pain and “10” show worst or maximum pain.

Headache Disability Index (HDI)

HDI is a reliable and valid tool (12) to measure the disability due to headache.

Headache Impact Test (HIT-6)

HIT-6 is a valid and reliable tool for the impact of headache on activities of daily life (ADLs) (13).

Cervical range of motion (CROM Inclinometer)

CROM inclinometer is used to assess cervical range of motion.

Statistical analysis

The data were entered and analyzed using SPSS (Version 21.) Shapiro Wilk test was applied to check the normality of data. Non-Parametric test were applied for the significance. Mann Whitney U test was applied for the comparison of between groups for variable of pain, headache impact test, headache disability index and flexion, extension and lateral flexion at cervical spine. For within group analysis at 3 different levels (Baseline, 4th and 8th week) Friedman test was applied. Wilcoxon signed rank test was used within group comparison analysis in control group and experimental group for the variable of pain

and all variables mentioned above. All results were calculated at 95% confidence level and p-value ≤0.05 was considered as significant value.

Ethical approval

The research was completed after the Ethical approval of institutional review board at Medcare International Hospital, Gill Road, Gujranwala.

Informed consent

Informed consent was taken from all the participants which were part of this study.

Results

Baseline characteristics of participants in study. Total 48 participants were selected in the study, among which male participants were 14(29.17%) and female were 34(70.83%). Individually in experimental group, there were 19(79.20%) females and 5(20.80%) males and in control group there were 15(62.50%) females and 9(37.50%) males. Average age of individuals in Control group (n=24) was 27.7±5.70 while in Experimental group (n=24) was 26.5±5.42 that is presented in Table 1.

Numeric Pain Rating Scale

To compare pain score measured on NPRS between experimental and control group that was significant difference between groups at post treatment level (p=0.003) with mean rank experimental (18.67) and control (30.33) as in Table 2. According to results there was more decrease in NPRS score in experimental group as compared to control group. To further explore effects of intervention within groups at baseline, 4th and 8th week to compare pain score on NPRS. Statistically significant difference was also found in experimental and control group with P-value ≤0.05 in Table 3.

Cervical Flexion Range Of Motion

For the comparison of cervical flexion range between experimental and control group was statistically significant with P-Value=0.000 and mean rank was found 36.13 and 12.88 respectively at post treatment level. Further, cervical flexion range within groups was also significant statistical difference with P-Value=0.000 in Table 3.

Cervical Extension Range Of Motion

To compare cervical extension ranges measured with inclinometer between and within experimental and control group at baseline, 4th and 8th week was found statistical significant difference with p value 0.00 in Table 3.

Cervical Side Flexion Range Of Motion

For the between and within comparison of cervical side flexion right and left side at baseline, 4th and 8th week in control and experimental groups was statistically significant difference with p value 0.00 in both right side flexion and left side flexion. The mean rank value of right side flexion in experimental group was 32.67 and in control group was 16.33. In left side flexion the mean rank value in experimental group was 34.4 and in control group were 14.56 in Table 3.

Headache Disability Index (HDI)

HDI between experimental and control group were statically remarkable with p value 0.002. The mean rank in control group was (30.77) versus (18.23) in experimental group, at post treatment level. For within group analysis, control group was significant difference with p-value=0.00 and mean ranks were 18.9, 15.5 and 11.92 at baseline, 4th and 8th week respectively. While, mean ranks of experimental group at baseline, 4th and 8th week were found 18.4, 14.2 and 8 respectively and difference was statistically significant with p-value=0.00 in Table 3.

Headache Impact Test

Headache impact test score between experimental and control was significant difference at 8th week with p-value=0.000 and mean rank of experimental (14.8) and control (34.17) as in Table 2.According to results there was more decrease in headache impact test score in experimental group as compared to control group. Furthermore, effects of intervention within experimental and control group was also found statistically significant difference with P-Value=0.00 in **Table 3.** Multiple comparisons at different time points were shown in Table 4. Results indicate that there was a statistically significant difference with P-value$\leq$0.05, mainly significance pair (baseline-8th week) in which a makeable difference was present.

Discussion

The main purpose of the study was to analyze the effect of muscle energy technique in tension type headache. Also that the myofascial release technique alone has better outcome as compared to addition of muscle energy technique with it. The present study shows that muscle energy technique is effective in reducing the intensity of pain in tension type headache patients. It specifies that there was statistically significant ($p<0.05$) improvement in terms of pain in both experimental and control group. However the results showed that there was more decrease in pain score in experimental group as compared to control group. When these results were compared to older studies, it must be pointed out that in current study females were 70.3% and males were 29.2% which is supported by study of Ilya Ayzenberg that number of females suffering from TTH are more as compared to males(14).

This result ties well with result of present study that myofascial release shows improvement in general pain condition but less effective to other techniques, i.e. MET. A study by Kuba Ptaszkowski et al in 2015 also supports the results of this study in regards of pain relief as a result of application of muscle energy technique(15).

Muscle energy technique majorly works on decreasing tightness or spasm in muscle by first rearranging the spindles of muscle and restricts the muscles by firing the Golgi tendons. A study was performed by Chandani Kumari et al in 2016 that was supported that application of MET results in increase in range of motion at cervical spine(16).

Results of the present study talking about range of motion i.e. flexion, extension, right lateral flexion and left lateral flexion all of these showed statistically significant improvement between groups with the p-value 0.000 at 8th week in treatment and control groups. In present study the score of headache disability inventory (HDI) was also analyzed and showed statistically significant results with p-value 0.000 in experimental group.

Between experimental and control group significant difference was at baseline with p-value 0.077 while at 8th week this was 0.002. Within group analysis illustrated more improvement in score of HDI in experimental group as compared to control group. Experimental group showed more improvement in pre-test and post-test interval, while in control group more improvement was seen in pre-test. This was similar to previous study. In this study by Cesar Fernandez-de-las-Penas et al it is showed that HDI score drops in tension type headache patients. This drop is statistically significant and in intervals analysis showed equally drop of score in all three intervals(17).

Trial registration: IRCT20190121042445N2, Registered 07-02-2021.

Conclusions

It is concluded from the bases of the study findings that both techniques are effective in decreasing pain intensity in tension type Headache but Muscle energy technique is more effective in increasing range of cervical spine and improving the functional status.

Limitations of Study

Implicit limitation of this study was time frame, which was limited to root out the long term results of intervention. Ranges of cervical rotation were not taken. Study does not disclose the mechanism of recovery. It was a single setting study.

Disclosure statement

No author has any financial interest or received any financial benefit from this research.

Conflict of interest

The authors state no conflict of interest

Declarations

Ethics approval and consent to participate

Ethical approval was taken from Medcare Sports Injury Clinic, Medcare International Hospital, Gill Road, Gujranwala with reference No. **MSIC/329**. The written informed consent was obtained from all participants.

Consent to publish

The written consent was obtained from all participants to publish my article and images.

Availability of data and materials

- The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Competing interests

Nil

Funding

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Authors' contributions

- RS: Study conception, design and analysis, interpretation of data and drafting of manuscript.
- HR & AR: Literature search, study design, analysis and interpretation of data.
- MA & AA: Revision of the manuscript and critical appraisal for final approval to be published.
- KS: Drafting and data interpretation.

All authors have read and approved the manuscript.

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Note; All procedures were performed in accordance with relevant standard guidelines.

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Tables

Table 1. Baseline characteristics of participants in experiment and control group

Characteristics		Group A Experimental n=24	Group B Control n=24
Gender, n(%)	**Female**	19(79.20)	15(62.50)
	Male	5(20.80)	9(37.50)
Age (years), Mean±S.D		26.50±5.42	27.7±5.70

Table 2. Comparison between Experimental and Control Group

Variables	Levels	Groups	Median (IQR)	MR	P-value+
Pain (NPRS)	Baseline	Experimental	7 (2)	25.4	0.64
		Control	7 (1.7)	23.6	
	4th week	Experimental	5 (1.5)	21.88	0.17
		Control	5.5 (1.75)	27.13	
	8th week	Experimental	3 (1)	18.67	0.003*
		Control	4 (1)	30.33	
Headache Impact Test (HIT-6)	Baseline	Experimental	60 (6.5)	26.81	0.24
		Control	59 (3)	22.2	
	4th week	Experimental	54 (5)	20.48	0.04*
		Control	55 (2)	28.52	
	8th week	Experimental	43 (6.7)	14.8	0.00*
		Control	50 (1)	34.17	
Headache Disability Index (HDI)	Baseline	Experimental	54 (13.5)	25.08	0.77
		Control	57 (13)	23.92	
	4th week	Experimental	44 (13.2)	25.21	0.72
		Control	44 (10)	23.79	
	8th week	Experimental	25 (5.5)	18.23	0.002*
		Control	31 (10)	30.77	
Cervical Flexion ROM	Baseline	Experimental	22 (15)	26.6	0.28
		Control	22 (8)	22.35	
	4th week	Experimental	45 (20.7)	31.25	0.00*
		Control	31 (8.2)	17.75	
	8th week	Experimental	65 (15)	36.13	0.00*
		Control	43.5 (12)	12.88	
Cervical Extension ROM	Baseline	Experimental	20 (7)	32.48	0.00*
		Control	17 (2.5)	16.52	
	4th week	Experimental	36.5 (7.2)	35.17	0.00*

		Control	25 (5.5)	13.83	
	8th week	Experimental	48 (11)	34.19	0.00*
		Control	35 (5.25)	14.81	
Cervical Lateral Flexion Right side ROM	Baseline	Experimental	15 (6)	22.92	0.43
		Control	17 (5.2)	26.08	
	4th week	Experimental	25 (3)	27.23	0.17
		Control	24 (5)	21.77	
	8th week	Experimental	37.5 (7)	32.67	0.00*
		Control	32 (4)	16.33	
Cervical Lateral Flexion Left side ROM	Baseline	Experimental	16 (3)	25.3	0.63
		Control	16 (3)	23.7	
	4th week	Experimental	24.5 (6.7)	22.77	0.37
		Control	25 (1.75)	26.23	
	8th week	Experimental	38 (3)	34.4	0.00*
		Control	32.5 (4)	14.56	

“+” indicate that Mann Whitney U Test was used for between compare

“*” indicate the statistical significance of results

Table 3. Comparison within Experimental and Control Group

Variables	Levels	Experimental Group			Control Group		
		Median (IQR)	MR	P-Value++	Median (IQR)	MR	P-Value++
Pain (NPRS)	Baseline	7 (2)	3	0.00*	7 (1.7)	3	0.00*
	4th week	5 (1.5)	2		5 (1.8)	2	
	8th week	3 (1)	1		4 (1)	1	
Headache Impact Test (HIT-6)	Baseline	60 (6.5)	19.9	0.00*	59 (3)	20.67	0.00*
	4th week	54 (5)	17.9		55 (2)	19.31	
	8th week	43 (6.7)	15.02		50 (1)	17.9	
Headache Disability Index (HDI)	Baseline	54 (13.5)	18.4	0.00*	57 (13)	18.9	0.00*
	4th week	44 (13.2)	14.2		44 (10)	15.5	
	8th week	25 (5.5)	8		31 (10)	11.92	
Cervical Flexion ROM	Baseline	22 (15)	7.92	0.00*	22 (8)	7.4	0.00*
	4th week	45 (20)	15.06		31 (8)	13.7	
	8th week	65 (15)	20.58		43 (12)	17.4	
Cervical Extension ROM	Baseline	20 (7)	7.31	0.00*	17 (2.5)	5.4	0.00*
	4th week	36 (8)	12.48		25 (6)	9.7	
	8th week	48 (10.3)	16.4		35 (5.3)	14.2	
Cervical Lateral Flexion Right	Baseline	15 (6)	4.71	0.00*	17 (5.3)	5.33	0.00*
	4th week	25 (3)	8.42		24 (5)	8.65	
	8th week	37 (7)	13.06		32 (4)	12.6	
Cervical Lateral Flexion Left	Baseline	16 (3)	5.19	0.00*	16 (3)	4.9	0.00*
	4th week	24 (7)	7.81		25 (2)	8.6	
	8th week	38 (3)	12.56		32 (4)	12.63	

"++" indicate that Friedman Test was used for within experimental and control group comparison

“*” indicate the statistical significance of results

Table 4. Multiple pair vise comparison within experiment and control group

Variables	Levels	Experimental Group			Control Group		
		Median (IQR)	MR	P-Value#	Median (IQR)	MR	P-Value#
Pain (NPRS)	Baseline–4th week	7 (2)	12.5	0.00*	7 (1.7)	12.5	0.00*
	4th week–8th week	5 (1.5)	12.5		5 (1.8)	12.5	
	Baseline–8th week	3 (1)	0		4 (1)	0	
Headache Impact Test (HIT-6)	Baseline–4th week	60 (6.5)	12.5	0.00*	59 (3)	12.5	0.00*
	4th week–8th week	54 (5)	12.5		55 (2)	12.5	
	Baseline–8th week	43 (6.7)	0		50 (1)	0	
Headache Disability Index (HDI)	Baseline–4th week	54 (13.5)	12.5	0.00*	57 (13)	12.5	0.00*
	4th week–8th week	44 (13.2)	12.5		44 (10)	12.5	
	Baseline–8th week	25 (5.5)	0		31 (10)	0	
Cervical Flexion ROM	Baseline–4th week	22 (8)	0	0.00*	22 (8)	0	0.00*
	4th week–8th week	31 (8)	0		31 (8)	0	
	Baseline–8th week	43 (12)	12.5		43 (12)	12.5	
Cervical Extension ROM	Baseline–4th week	17 (2.5)	0	0.00*	17 (2.5)	0	0.00*
	4th week–8th week	25 (6)	0		25 (6)	0	
	Baseline–8th week	35 (5.3)	12.5		35 (5.3)	12.5	
Cervical Lateral Flexion Right	Baseline–4th week	17 (5.3)	0	0.00*	17 (5.3)	0	0.00*
	4th week–8th	24 (5)	0		24 (5)	0	

	week						
	Baseline–8th week	32 (4)	12.5		32 (4)	12.5	
Cervical Lateral Flexion Left	Baseline–4th week	16 (3)	0	0.00*	16 (3)	0	0.00*
	4th week–8th week	25 (2)	0		25 (2)	0	
	Baseline–8th week	32 (4)	12.5		32 (4)	12.5	

"#" indicate that Wilcoxon signed rank Test was used for multiple pair vise comparison within the group compare

"*" indicate the statistical significance of results

Figures

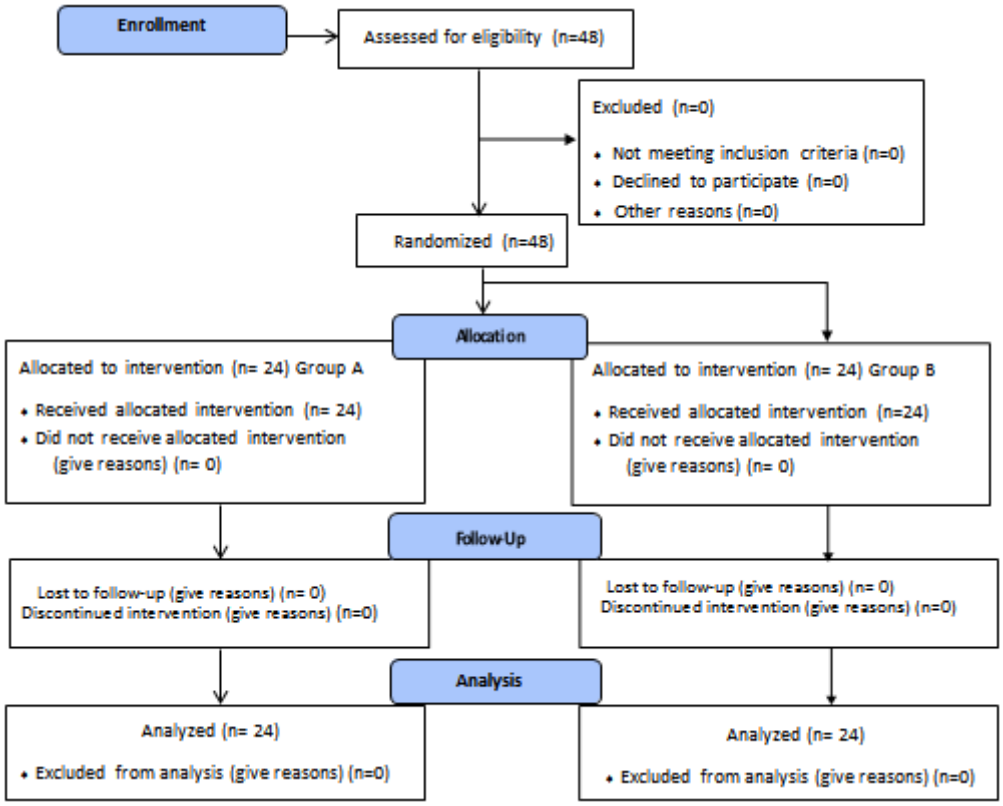

Figure 1

Flow chart of the study