



## Original Article

## Comparison of Thoracic Manipulation and MET (Muscle Energy Technique) on Chronic Mechanical Neck ache: A Randomized Control Trail

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## ABSTRACT

Chronic mechanical neck ache is one of the most disabling condition in general population which affects individuals' Activities of Daily Living (ADLs). **Objective:** To compare the effectiveness of thoracic manipulation and MET on chronic mechanical neck ache. **Methods:** It was a single blind randomized clinical trial registered at ClivicalTrial.gov under trial registry no# NCT05138199. Non-probability simple random sampling was used to recruit over 30 patients. This study was conducted at Rawal General and Dental Hospital, Islamabad and at the Physiotherapy Clinic Rawalpindi. Two groups were made, group "A" was termed as control group and received MET (2 sessions/week) and group "B" was termed as experimental group and received thoracic manipulation (1 session/week), for six weeks each. Effect of these interventions were evaluated on frequency of pain, duration of pain and Numeric Pain Rating Scale (NPRS). As data were not normally distributed, we employed Wilcoxon Rank test for intra-group analysis and Man Whitney U test for inter-group analysis. **Results:** Both groups mean  $\pm$ SD of age, gender, and marital status was 26.27 $\pm$ 8.55 and 1.60 $\pm$ 0.49, 1.20 $\pm$ 0.40, respectively. Wilcoxon Rank test showed marked difference within both groups as p-value was <0.05 and "r value >0.05" showed larger effect of interventions. Man-Whitney U test showed no significant difference between groups as p-value was >0.05. **Conclusion:** Both manipulation and MET are effective for management of chronic mechanical neck ache and both have same impact on NPS.

## INTRODUCTION

Neck ache is the second most commonly occurring musculoskeletal condition in general as well as in medical population after backache, roughly with 10 to 12 months of prevalence among the general as well as in occupational populations of 40% to 55% [1]. Therefore, frequent physical therapy visitations are common due to neck ache. In clinical studies general classification of mechanical neck ache includes idiopathic pathoanatomic cause, while the patients with neurological deficits, cervicogenic headache, systemic inflammatory disorders, and osteoporosis as well as pregnancy are excluded [2]. The

ligaments and muscles of body are put into stress due to long term adoption of abnormal posture which leads towards neck ache development. Etiological factors of neck ache due to mechanical causes are typically multifactorial which include anxiety, depression, bad posture, strain in neck ligaments, and sports or occupational activities [3]. Moreover, the mechanical neck ache has following symptoms; limited Range of Motion (ROM), muscle stiffness and tenderness, spasm or muscle's lengthening, cervical region pain aggravated by movement of neck. Due to text neck posture, extensor muscles of

cervical region become tight and deep flexors of neck develop lengthening because of biomechanical changes [4]. Janda reported that postural muscles of cervical region have predisposition to get shorten, in both pathological as well as in normal conditions [5]. Most common among such postural muscles are upper trapezius, scalene, and levator scapulae which have the shortening tendency. In addition, deep neck flexors (e.g. longus colli and longus capitis) have crucial role in postural sustenance and their impaired stimulation put stress into these deep muscles due to which patients develop mechanical neckache [6]. Mechanical restriction between vertebrae, can be due to pain, contracture, cervical vertebrae ankylosis or spasm of cervical muscles lead to ROM reduction. The general clinical definition of mechanical neck ache explains that the neck pain must be aggravated by motion. Also, there is inconsistency among various studies, however, the patients that are classified with mechanical pain in neck have been investigated, there is no consensus treatment as a gold standard within the literature [7]. In literature, one approach used for conservative treatment of neck ache is mobilization of cervical spine and thrust manipulation [8-10]. The probable complications which can arise by High Velocity Low Amplitude (HVLA) thrust manipulation of the cervical spine is Vertebral Basilar Artery (VBA) injury which has greater possibility to occur, is discussed extensively in literature [11, 12]. The reported cases of VBA dissection are rare. Due to this reason, different screening tools have been proposed to recognize the patients who are at greater risk of developing adverse effects from this HVLA thrust manipulation and their use is endorsed, despite some deficiency in supportive evidence for its validity. Besides, in literature, recommendations are present to avoid manual therapies at end of ROM and precautions have briefly explained about the practice of cervical high velocity thrust manipulation due to the apparent risk of serious VBA complications, exclusively in explicit subgroups of the population [13]. On the other hand, thrust manipulation of thoracic spine may effectively target the mechanical neck ache. Recently, there is a growing body of knowledge in regard to the evaluation of the clinical efficacy of thrust manipulation of thoracic spine for patients with mechanical neck ache [14, 15]. The theory about hypomobility in the upper thoracic spine might be the primary cause of mechanical neck ache. Several studies explained that there is a significant relation between hypomobility at junction of cervical & thoracic vertebrae (C7-T2) and the presence of mechanical neck ache. In patients with mechanical neck ache, cervical thrust manipulation or mobilization targeted to the Atlantoaxial (AA) joint (C1-2) and the upper thoracic spine

region (T1-2) are very frequently practiced by certified chiropractors, PT and osteopaths. However, there is no solid evidence about the efficacy of HVLA thrust manipulation in the patients with mechanical neck ache. The HVLA thrust manipulation technique acts as a natural analgesic to the body because it has some neurophysiological as well as mechanical and motor effects. Other approaches which are used for treatment of mechanical neck ache includes Proprioceptive Neuromuscular Facilitation (PNF) [16], stress alleviation techniques, postural advice (i.e. ADLs, IADLs work place and hobbies, pillow, and various techniques like yoga & pilates), among these Alexander techniques (for improving posture, Moist Hot Pack (MHP), KT taping, strengthening exercises, endurance training and, other coordinative exercises), and cervical traction. According to previous studies, muscle energy technique is considered to be more effective for patients suffering from mechanical neck ache. Rationale of this study was to observe which of above mentioned technique is more effective for alleviation of pain on NPRS along with frequency and duration of pain. The purpose of this study is to compare the effectiveness of thoracic manipulation and MET in patients with chronic mechanical neckache.

## METHODS

The patients of chronic mechanical neck ache visiting the Rawal General and Dental Hospital (RGDH), Islamabad and at the Physiotherapy Clinic Rawalpindi. At Clinicaltrial.gov, we registered our study and NCT05138199 was the clinical trial registry number. It was a randomized control trial. A sample of 30 patients was considered for the completion of this study. The duration of study was of six months from 16th August 2021 to 15th March 2022. Two groups were made and individuals were equally divided into both groups. The sampling technique used in the study project was convenience sampling technique. Group "A" was named as control group and group "B" was designated as experimental group. Those individuals included in control group received muscle energy technique as treatment intervention & individuals in experimental group or group "B" received thoracic manipulation as treatment intervention. Total 12 sessions were given in MET group (2 sessions/week) and in experimental group only six sessions (1 session/week) of Thoracic Spine Manipulation (TSM) for six weeks were administered. Pre-test and post-test readings were taken for duration of pain, intensity of pain, and frequency of pain along with Numeric Pain Rating Scale (NPRS). Following individuals were included in this study; a) Male and female patients with mechanical neck pain having age group of 30 to 50 years, b) Mechanical neck pain individuals having activities of daily living, and c) Mechanical neck pain affecting sleep. Those individuals

presented with following complaints were excluded from this study; a) Osteoporosis, b) Radiculopathy, c) Pregnancy, d) Systemic inflammatory condition, e) Neurological deficit, f) Arthritic conditions, and g) Head injuries. Normality of data was checked by Shapiro-Wilk test. As data was not normally distributed, we employed Man Whitney U test for between groups analysis. <0.05 value was set as significant. IBM SPSS version 21.0 was employed along with Microsoft Excel for data analysis and entry respectively. Mean +SD was used for descriptive statistics & median for Man Whitney U test.

## RESULTS

Out of 30 patients, 63.3% ranged between 18-25 years, 20% between 26-30 years, 6.7% between 31-35 years, 3.3% between 36-40 years, 3.3% between 41-45 years, and 3.3% between 56-60 years. Gender distribution out of 30 patients, 40% were male while 60% were female. 20% were single and 80% patients were married. 3.40 +1.95 was the mean +SD of frequency of pain in experimental group before treatment and 3.40+2.05 was of control group. After the intervention, mean +SD of experimental group and control group was 4.53+1.55, 4.93+1.83, respectively. Mean +SD of duration of pain before and after treatment in experiment and control group were 2.27 +1.28, 2.73 +1.33 and 1.53 +0.63, and 1.60+0.91, respectively. Numeric Pain Scale mean +SD of experimental group and control group before intervention were 4.67 +0.97 and 5.50 +0.98 respectively but after intervention mean +SD of experimental group was 2.66 +1.83 & of control group was 2.46+2.55, Table 1.

Variable	Group	Mean+SD
Age	Both	26.27+8.55
Gender	Both	1.60+0.49
Marital status	Both	1.20+0.40
Frequency of pain before intervention	Experimental	3.40+1.95
	Control	3.40+2.05
Frequency of pain after Intervention	Experimental	4.53+1.55
	Control	4.93+1.83
Duration of pain before treatment	Experimental	2.27+1.28
	Control	2.73+1.33
Duration of pain after treatment	Experimental	1.53+0.63
	Control	1.60+0.91
NPS before treatment	Experimental	4.67+0.97
	Control	5.50+0.98
NPS after treatment	Experimental	2.66+1.83
	Control	2.46+2.55

**Table 1:** Mean +SD of variables.

In control group z value of frequency of pain, duration of pain and NPS was 2.05, 2.52, and 2.93 and p-values were 0.04, 0.01, and 0.00\* and R-values were 0.52, 0.61, and 0.75. As p-value of each variable is <0.05 which had shown significant difference in outcomes and also R-value were

also greater than 0.5 in each variable which had also shown larger effects of treatment. In experimental group post treatment frequency of pain, duration of pain & NPS z-values were 2.05, 2.37, and 2.83 and p-values were <0.05 in each variable, and R-values were >0.5 which had shown greater effect of intervention.(Table. 2).

Variable	Z	p	r
<b>Control group</b>			
Post treatment frequency of pain	2.05	0.04	0.52
Post treatment duration of pain	2.52	0.01	0.61
Post treatment NPS	2.93	0.00*	0.75
<b>Experimental Group</b>			
Post treatment frequency of pain	2.05	0.04	0.52
Post treatment duration of pain	2.37	0.01	0.61
Post treatment NPS	2.83	0.00*	0.73

**Table 2:** Wilcoxon rank test in both groups

Man Whitney U test was employed for between groups analysis. Median and U values for frequency of pain, duration of pain, and NPS were 5 (96), 1 (109.5), and 2 (99), respectively. As p-value of each variable was >0.05 which demonstrated that there was insignificant difference between the interventions. This revealed that both interventions were equally effective for chronic mechanical neckache.(Table. 3).

Variable	Groups	Md (IQR)	U	P
Frequency of pain	Exp	4(2)	96.00	0.48
	Control	5(4)		
Duration of pain	Exp	1(1)	109.5	0.88
	Control	1(1)		
NPRS	Exp	2(3)	99.50	0.58
	Control	2(6)		

**Table 3:** Man Whitney U test

## DISCUSSION

This study was conducted to compare the efficacy of thoracic manipulation and MET in patients suffering from chronic mechanical neck ache. NPRS was used to evaluate the effectiveness of both treatments and their effect on frequency & duration of pain. It was concluded from results that both treatments are equally effective for the management of chronic mechanical neck ache. A systemic review and meta-analysis was conducted by Michael Masaracchio et al. to observe the effectiveness of TSM in comparison to cervical manipulation, standard treatment & thoracic mobilization. They searched PubMed, Cochrane library, CINAHL, and PEDro etc. on for this purpose. They included only RCTs in their analysis. Out of 1717 search result only 14 articles met the inclusion criteria. Result of their study showed that TSM is much effective with respect to pain and disability when compared with above mentioned techniques. This study also supports our result that TSM is an effective treatment for MNP (mechanical neck pain) [16]. An RCT conducted by Phadke A et al. to

compare the effects of static stretching and MET on individuals suffering from mechanical neck pain. They randomized 60 subjects into two equal groups. Experimental group was given MET and control group received Static stretching. Neck Disability Index (NDI) and Visual Analogue Scales (VAS) were used to measure the disability and pain of patients respectively. After 6 days of treatment intervention comparison was done between baseline and at 6th day. Results showed improvement in both groups but MET group depicted better results on NDI & VAS as compared to static stretching. Our results are also supported by this study [17]. An RCT was conducted on 33 patients by Yadav H et al. to compare the efficacy of conventional treatment, MET and DNF stretching. Randomization was done by sealed envelope and subjects were divided into 3 equal groups each containing 11 individuals. Group A received conventional treatment such as MHP, static stretching exercises, cervical spine active ROM exercises, mobilization, and other postural exercises. DNF training with conventional treatment was given to group B. Group C received MET in combination with conventional treatment. Functional disability was primary outcome measure at baseline, day 7 and day 14. Repeated measure ANOVA revealed significant difference between group B and C at various intervals. But MET showed better results. As great effect size as compared to other interventions. So, our results that MET is an effective treatment for the management of MNP [18]. A systemic review conducted by Bu-Kyung Son et al. in year 2019 to evaluate the effectiveness of MET for cervicalgia in literature as compared to other treatment interventions. They searched different databases for RCTs on cervicalgia and MET. Only 6 studies met their inclusion criteria. Biasness was reduced by using Cochrane Risk of Bias tool (RoB). Results of their review depicts that MET has far better effects for the management of neck aches compared to various manual medicines. Our study is also supported by these results that MET is effective for MNP [19]. Ian De Coulter et al. conducted a systemic review & meta-analysis to compare the effects of thoracic manipulation and mobilization for non-specific neck ache. They included 47 studies containing 4460 participants, conducted between year 2000 to 2017 on non-specific neck pain. 37 studies out of 47 were unimodal in which only manipulation or mobilization was used for management of neck ache. 10 other studies were on multimodal approach. Results of multimodal studies demonstrated that neck pain can be managed more effectively when manipulation is used in combination with some other techniques. Our study is also supported by these results that thoracic thrust manipulation is an effective technique for neck pain [20]. Our study is also supported by research conducted by

González-Iglesias J et al. In a double blinded randomized trial 45 patients were assigned into experimental and control groups. Control group was given electrotherapy and experimental group received TSM along with electrotherapy. 100mm VAS was used to assess the pain and disability of patients. Five treatment sessions were administered to both groups but only three TSM was given consecutively to patients for three weeks. Results were assessed at 2nd and 4th week follow-up. Experimental group revealed greater improvement in pain and disability of 26.5mm on VAS as compared to control group which showed only 16.8 mm. So, it was concluded that TSM is more effective as compared to conservative therapy [21].

## CONCLUSION

Hence, it is concluded that both manipulation and MET are effective for management of chronic mechanical neck ache. And both have same impact on Numeric pain rating scale (NPS). A larger Scale study should be conducted and it should be double blinded clinical trial. Results must be taken at more intervals during treatment. Duration of study must be more than 6 months.

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