Original Article

Effects of Low Amplitude High Velocity Thurst Manipulation as Compare to Grade III Maitland Mobilization of Thoracic Spine on Mechanical Neck Pain and Disability

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ABSTRACT

OBJECTIVE: To determine the effectiveness of thrust mobilization and Maitland grade III mobilization in reducing Neck pain and its disability index

METHODOLOGY: This was a randomized clinical trial study. The data was collected at Mayo Hospital Lahore from December 2017 to May 2018. Total 40 patients were included in the study with primary complaint of mechanical neck pain and disability. That 40 patients were assigned to mobilization group (group A, N=20) and thrust group (group B, N=20). Both groups received 6 sessions, 3 sessions per week of respective therapy along with conservative treatment. Pre, mid and post evaluations were measured on Numeric Pain Rating Scale (NPRS) and NDI (Neck Disability Index). The data was compared with baseline data. Repeated measurement ANOVA test and independent t test ware used for the within group and between groups analysis respectively. SPSS Version 20.0 was used statistical analysis.

RESULTS: Repeated measurement ANOVA and independent t tests were used for the within group and between groups analysis respectively. No significant difference was found in any of the outcome measure between thrust and Maitland mobilization ($p<0.05$). Statistically significant improvement was found in both groups.

CONCLUSIONS: This study concluded that both thrust and Maitland mobilization of thoracic spine were effective but thrust manipulation had superior effects in reducing neck pain and disability.

KEY WORDS: Mechanical Neck Pain, Maitland mobilization, Thrust manipulation.

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INTRODUCTION

Mechanical neck pain (MNP) is a generalized neck pain which presents with and without shoulder pain that provoked by sustained neck posture, movements and by palpation of muscles. The main features of mechanical neck pain are pain in the neck region along with reduced range of motion (ROM) and functional limitations[1]. This limited range of motion and pain may accompany subjective feeling of stiffness, which is often precipitated or aggravated by neck movements or sustained neck postures[2]. This leads to reduce efficiency in individual's work and causes economic burden to the society. It is the second largest cause of being absent from work, after low back pain. Etiology of the neck pain is poorly understood but its derivation involve many factors including poor posture, anxiety and depression, neck strain, occupational injuries and sport injuries[3]. When body undergoes any kind of mechanical stress, injury and asymmetry, it causes change in other components related or unrelated to source[4].

A typical risk factor for the neck pain is occupation related neck posture which involves prolonged flexion of cervical spine. The most common cause of neck pain is muscle strain, tension and bad posture. The increase incidence of neck pain in recent years is due to popularization of computers, sitting at a desk or computer for a long time, use of desk or chair which is not appropriate for the physique, a bed that is unsuitable for maintenance of a good posture and lack of exercises which results in alteration of the posture also called bad posture.

Due to bad posture muscle length tension/flexibility relationship disturbs which disrupts normal biomechanics and muscles go in spasm and ROM in all directions become limited and painful.

The most common postural adaptation in patients with neck pain is forward head posture. Patients with neck pain along with shoulder pain have more severe forward head posture and scapular acromion protrusion. As there is biomechanical relationship present between thoracic and cervical spine, so the reduced mobility in the thoracic spine can affect the neck pain and mobility. Spinal manipulation is a passive technique "during which three- joint intricate is carried far off the normal physiological range without passing the limits of structural integrity" [5]. Manipulation involves thrust which is low amplitude and high velocity technique which differ thrust from other techniques that involve oscillatory maneuver.

Non thrust mobilization includes Maitland mobilization, a passive technique which involves oscillations, on hypo mobile vertebral level[6]. There is growing evidence which describe the manipulation involving thoracic spine and its effectiveness in the mechanical neck pain[7].

This Study was aimed to determine the effects of low amplitude high velocity thrust manipulation as compared to grade III mobilization of thoracic spine on mechanical neck pain and disability.

METHODOLOGY

This was Randomized controlled trial study. The data was collected from Mayo Hospital Lahore during December 2017 to May 2018. Data was collected after the approval from the Ethical Review committee, providing information to patients and after taking the informed consent from the patients. The study was conducted in patients who were presented to physiotherapy department of mayo hospital, Lahore. Total 40 subjects were included on the bases of selection criteria. After taking the informed consent, patients of either sex with age range 25 to 40 years were included in the study. It was assured that the patients were not taking any pain killer. Subjects were excluded from study on the basis of identification of any medical signs suggestive of a non-muscular etiology, history of whiplash injury within 6 week of examination, cervical spinal stenosis, prolapsed intervertebral disc, vertebral fracture, previous cardiothoracic surgery, and patient with history of any comorbid diseases[8].

All recruited subjects were assessed for base line data. The subjects were assigned into two Groups A and B with each group containing 20 subjects. They were randomly assigned to each group following the randomization by computer generated table. Numerical pain rating scale (NPRS) and the Neck Disability Index (NDI) were described to the patients. Numerical pain rating scale (NPRS) where the patient scored the pain 0-10 describe the feeling of pain, 0 for the no pain, 3 for the mild, 5 for moderate, 7 for severe and 9+ for the unbearable pain. The neck disability index included different sections including pain intensity, personal care, lifting, reading headache, concentration work, driving, sleeping and recreation.

The subjects who were randomly assign to group A received non-thrust mobilization. Grade 3 Maitland mobilizations were given in prone position. One 30 second bout of grade 3 central posterior- anterior non-thrust mobilization at T1 spines process was performed as describe by Maitland GD 2001[9]. This process was continued sequentially in a caudal direction to T6, time require for whole intervention was almost three minutes. The subjects in group B received thrust manipulation targeting the upper and middle thoracic spine while prone position was chosen for the patient. Subject had asked to take a deep breath in and exhale. The thrust was applied on exhalation.

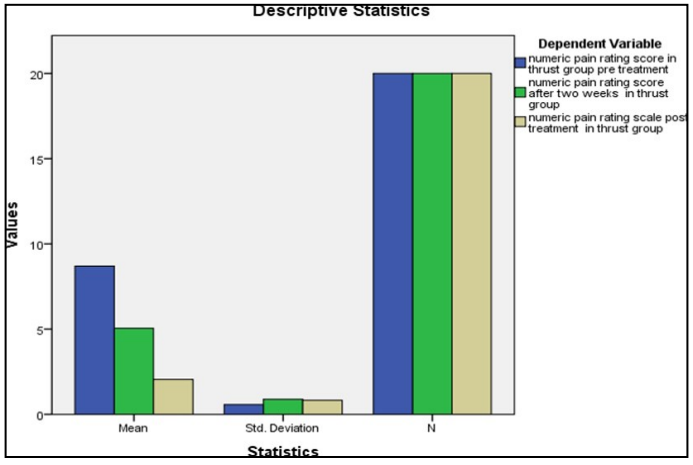
All the subjects were schedule 3 days in a week after the initial examination and intervention session. The treatment was given in 2 weeks and total 6 sessions had been given. Assessment of patients was done at 0 day, after the 3rd and at the end of 6th session. The subjects were compared with baseline data. Flow sheet shows its arrangement of the assessment to analyze of data. Tools used for outcome measures were Numerical pain rating scale (NPRS)[10] and Neck Disability Index (NDI)[11].

Repeated ANOVA test was used to analyze the pre, mid and post value of each treatment individually. Independent sample t-test was used to analyze difference in two techniques. If the value of $p<0.05$ than it shows that the results were significant and if it was greater than 0.05 the results would not be significant.

RESULTS

Total 40 patients were included in this study. Mean age of patients was 34.65±6.58 in mobilization group, with maximum age 45 and minimum age of 26 years. Mean age of patients in thrust group was 32.61±6.38 with maximum age 45 and minimum age of 25 years, our study result shows that 30% male and 70 % female patients were present in mobilization group and 55% male and 45% female patients were present in thrust group. The mean value of pain intensity on numerical pain rating scale (NPRS) pre-treatment was 8.35±0.98 in Group A (Mobilization Group) and pain intensity reduce to 4.30±0.801 at the end of complete treatment. (Graph I).

GRAPH I: NUMERIC PAIN RATING SCORES OF THE PARTICIPANTS BEFORE, IN MID AND AFTER THE TREATMENTS SESSIONS



The p value was <.05 which show that Maitland mobilization was significant technique in treating patients with mechanical neck pain. (Table I). In Group B, the mean value of pain intensity on numerical pain rating scale (NPRS) pretreatmentwas

in 8.70±.571 intensity reduce to 2.05±.826 at the end of complete treatment. The p value was <.05 which show that thrust manipulation was significant technique in treating patients with mechanical neck pain. (Table II).

TABLE I: DESCRIPTIVE STATISTICS NPRS MOBILIZATION GROUP A

Mobilization Group	M	S.D	N	Sig
NPRS pre treatment	8.35	.988	20	
NPRS AT two weeks	6.10	.718	20	.000
NPRS post treatment	4.30	.801	20	

This table shows numeric pain rating scale in our group A receiving mobilization. The data was compared with baseline after two weeks and at the end of the study.

TABLE II: DESCRIPTIVE STATISTICS NPRS THRUST GROUP B

Thrust group	M	S.D	N	Sig.
NPRS pre treatment	8.70	.571	20	
NPRS At 2 weeks	5.05	.887	20	.000
NPRS post Treatment	2.05	.826	20	

This table shows numeric pain rating scale in our group B receiving thrust mobilization. The data was compared with baseline after two weeks and at the end of the study.

The mean value of neck disability on neck disability index pretreatment was 62.10±8.663 in Group A (Mobilization Group), mid value after 2 weeks it reduced to 47.15±7.051 and post treatment it reduced to 35.55±7.695 after treatment of four weeks. The p value was <.05 which show that Maitland mobilization was significant technique in treating patients with neck disability disturbing the ADLs. (Table III).

TABLE III: DESCRIPTIVE STATISTICS NDI MOBILIZATION GROUP A

	M	S.D	N	Sig
NDI score pre treatment	62.10	8.663	20	
NDI score after two Weeks	47.15	7.051	20	.000
NDI score post treatment	35.55	7.695	20	

This table shows Neck pain disability in our group A receiving mobilization. The data was compared with baseline after two weeks and at the end of the study

The mean value of neck disability on neck disability index pre treatment was 63.00±8.297 in Group B (thrust Group), mid value after 2 weeks it reduced to 40.95±5.934 and post treatment it reduced to 26.10±4.278 after treatment of four weeks. The p value was <.05 which show, thrust manipulation was significant technique in treating patients with neck disability disturbing the ADLs (Table IV).

TABLE IV:
DESCRIPTIVE STATISTICS NDI THRUST GROUP B

	M	S.D	N	Sig
NDI score pre treatment	63.00	8.297	20	
NDI score after two weeks	40.95	5.934	20	.000
NDI score post treatment	26.10	4.278	20	

This table shows neck disability index scoring in our group B receiving thirst mobilization. The data was compared with baseline after two weeks and at the end of the study. When comparing the both interventions results show that that Maitland mobilization of thoracic spine and thrust manipulation of thoracic spine have significant effects in reducing neck pain, disability and improving the cervical range of motion. But thrust group had superior effects than the Maitland techniques in reduction of these variables.

DISCUSSION

The aim of this study was to compare the effects of high velocity, low amplitude thrust manipulation and grade 3 Maitland mobilization of thoracic spine on mechanical neck pain and disability. The results of this study revealed that there was significant improvement in pain intensity as well as disability in response to either thrust or mobilization of thoracic spine, but in comparative effects, significant effects were in favor of thrust group .While in the studies by Ganesh GS 2015[7] on mobilization and exercises in treatment of mechanical neck pain for relief of symptoms.

The results revealed statistical significance between groups ($p > 0.05$), with time ($p < 0.00$) and no indicating any group was superior to dominant after treatment and at follow-up. The effect sizes between the treatment groups were small. Results clarified that supervised exercise therapy were better than that of Manual Therapy in reducing pain, neck disability[7,9].

It was also suggested that manual therapy with exercise regimen appeared as a favorable treatment in reduction of mechanical neck pain and disability[12,13]. In one of the study by González-Iglesias J 2009[14] in experimental trail Thoracic mobilization was more beneficial in this experimental group as compared to that electrotherapy. When comparing the both interventions results in our study shows that that Maitland mobilization of thoracic spine and thrust manipulation of thoracic spine have significant effects in reducing neck pain and disability, but thrust group had superior effects than the Maitland techniques in reduction of these variables including pain and Neck disability in our subjects. In a previous study that involved systemic review of comparing the mobilization and manipulation therapy of neck it had

mentioned.[15]

One of the study clarified that Manipulation of thoracic spine causes improvement in the biomechanically relationship between thoracic and cervical spine which leads to reduction of mechanical stress on pain generators[16]Thoracic dysfunction as a result of muscles, joints and ligaments give rise to pain in cervical region, which leads to alteration in the cervical movements[17].

The results of this study revealed that there was significant improvement in pain intensity and disability in response toeither thrust or mobilization of thoracic spine on pain, disability and cervical range of motion, but in comparative effects, significant effects in favor of group B. At the site of manipulation, muscles adjacent to the spine elicit a response. Evidence also report EMG reports in distinct areas of body in response to spinal manipulation[9]. The exact mechanism is of these effects still unknown. One possible cause is the unlocking of the facet joints results in response to thrust manipulation which reduces the muscle spasm of adjacent spinal muscles and leads to reduce pain and increasing the cervical range of motion .The study proves the efficiency of mobilization and thrust manipulation on cervical pain, range of motion and disability i.e. manipulation or mobilization the non-specific/non-painful part of body causes indirect effects on painful part rather than directly activation of the painful region.

CONCLUSION

The study proved that both Maitland mobilization and thrust manipulation of thoracic spine were effective but thrust manipulation had superior effects in reduction of pain, disability and improving the cervical range of motion

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AUTHOR CONTRIBUTIONS

Parveen S: Design, Data Collection
Zahra SR: Critical Revision, Approval of Study
Mahmood T: Conception, Interpretation of Data
Haider R: Statistical Analysis
Ayub A: Drafting, Data Collection

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