

EFFECTS OF MANUAL MOBILIZATION ON PAIN, RANGE OF MOTION, AND FUNCTION IN PATIENTS WITH ACUTE AND SUB-ACUTE NON-SPECIFIC NECK PAIN: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Neck pain is one of the most common problems of patients presenting with musculoskeletal conditions in outpatient physical therapy departments. This pain results in limited neck mobility, compromised daily activities, reduced work efficiency, and poor health-related quality of life. **Objective:** To determine the effects of manual mobilization of cervical spine on reducing pain, and improving range of motion and function in patients with non-specific acute-subacute neck pain. **Methods:** This quasi-experiment study was conducted at two private outpatient physiotherapy clinics in Lahore from August 2021 to March 2022. A total of 96 patients of both genders between 16 to 55 years of age, with primary complaints of recent onset of non-specific neck pain, were recruited through purposive sampling. They were divided into two groups on an alternate basis. Control group (A) was given conventional physiotherapy. The experimental group (B) was given postero-anterior manual mobilization and conventional physiotherapy. Pain intensity was measured through the Numeric Pain Rating Scale, range of motion by goniometer, and functional disability by Neck Disability Index. **Results:** Out of 96 patients, there were 54 (56%) females and 42 (44%) males with a mean age of 43.0 ± 12.98 years. The pain score was significantly reduced in group B as compared to group A ($p=0.00$). Cervical flexion, extension, and rotation were improved significantly ($p=0.00$) in the experimental group than the control group. No significant difference was observed in cervical lateral bending for the left ($p=0.88$) and right sides ($p=0.23$). The disability score was also found statistically significant ($p=0.00$). **Conclusion:** Manual mobilization along with conventional physiotherapy is found effective in reducing pain, improving cervical ROM, and minimizing disability in patients with non-specific acute-subacute neck pain.

Keywords: Acute, Conventional Physiotherapy, Function, Manual Mobilization, Non-specific Neck Pain, Postero-anterior Mobilization, Range of Motion, Sub-acute

INTRODUCTION

Neck pain is one of the most common problems of patients presenting with musculoskeletal conditions in outpatient physical therapy departments. It is a major cause of disability on an individual level or at the workplace that leads to a huge

economic burden on society¹. Almost every individual experience non-specific neck pain once in his / her life. The prevalence of neck pain ranges from 14.2% to 75% globally whereas the advancing age, female gender, high BMI, poor working and

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sleeping postures, prolonged static activities and sedentary lifestyles are the associated risk factors².

Non-specific neck pain also known as mechanical neck pain³, is the pain in the posterior and lateral cervical region between the superior nuchal line as the upper boundary and a horizontal imaginary line running through the spinous process of first thoracic vertebrae inferiorly that does not exhibit any pathological signs and symptoms of nerve compression or injury⁴. This pain results in limited neck mobility, compromised daily activities, reduced work efficiency, and poor health-related quality of life. It may resolve by itself but usually needs some physical treatment. Despite the good prognosis, a high proportion of individuals observed recurrence of symptoms. According to a study, it is estimated that around 23% of individuals recovering from the condition may experience a second episode in a subsequent year⁵.

Acute or sub-acute non-specific neck pain is usually managed conservatively through rest, prescribed analgesics, and physical therapy⁶. There are several treatment options in physical therapy including education, electrotherapy modalities, therapeutic exercises, and manual therapy techniques. Manual mobilization is a passive technique, which involves low-velocity oscillatory or sustained movements applied with varying amplitude at intervertebral joints. It is used to decrease the pain and inflammation at the joint and related structures⁷.

The passive gliding given in manual mobilization reduces the pain through neurophysiological mechanisms as it stimulates the mechanoreceptors that override the nociceptive stimulation to the spinal cord and brain^{8,9}. In addition, the oscillatory or sustained movements cause the stretching of peri-articular structures and inhibit the muscle guarding and resulting spasm. Moreover, the to and fro inter-vertebral movements facilitate the flow of synovial fluid bring nutrients to the joint cavity, and negate the effects of immobilization of joint and related structures¹⁰.

Most studies on the benefits of manual mobilization in terms of pain management and functional improvement have been conducted on chronic neck

and back pain, and radiculopathy, however, its effects on the management of acute and sub-acute non-specific neck pain are still lacking because of missing data on level of provocation of pain in acute-subacute phase^{11,12}. Therefore, this study aims to determine the effects of posteroanterior (PA) cervical manual mobilization of grades II & III on pain, ROM, and function in patients suffering from non-specific acute-subacute neck pain.

MATERIALS AND METHODS

This single-blinded, quasi-experimental study was conducted at two outpatient physiotherapy clinics; Ehsan's Rehab and Kazi Hospital, in Lahore, Pakistan; for eight months from August 2021 to March 2022. Ethical approval was taken from the Institutional Review Board of the University of South Asia, Lahore (IRB-USA-/919-I/2021). A detailed consent form was duly signed by each participant willing to participate in the study. The purpose of the study was explained to each participant. The anonymity and confidentiality of data were ensured and the right to withdraw from the study was reserved.

The sample size of 96 (48 in each group) was estimated using a 5% level of significance, and 80% power of study with an estimated value of mean in the Physical therapy group as 5.8 and in the Manual therapy group as 5.5¹³. The dropout rate was 15%. After initial screening, a total of 96 participants selected through the non-probability purposive sampling technique, fulfilling the inclusion criteria were invited to participate in the study. The statement of Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) was used for participant enrollment and treatment allocation^{14,15} explained in Figure 1.

Participants of both genders of age between 16 to 55 years, who presented with a primary complaint of non-specific neck pain of recent onset of fewer than 12 weeks in the area between the superior nuchal line to first thoracic vertebrae, with pain score at NPRS ≥ 3 and restricted cervical ROM primarily diagnosed by orthopedic surgeon/physician were recruited in the study¹⁶. The participants were excluded from the study; if they were previously

taking NSAIDs or any other muscle relaxant that may interfere with the findings of this study. Moreover, those who present with red flags or serious pathology including systemic infection, malignancy, whiplash, signs of radiculopathy, congenital anomalies or previous fracture involving the cervical spine, and chronic use of steroids¹⁷. After recruitment, participants were allocated to treatment groups on an alternate basis, odd numbers were given to Group A, and even numbers were assigned to Group B. On the first appointment, demographic data was obtained and baseline measurements were taken from the participants by the assessor including pain intensity at the Numeric Pain Rating Scale (NPRS), Cervical Range of Motion (ROM) through universal goniometer and neck functional status through Neck Disability Index (NDI).

Group A was treated with conventional Physiotherapy (CT); which includes the application of a

moist heat pack along with interferential therapy to the cervical region followed by active ROM, neck stabilization and submaximal resisted isometric neck exercises and shoulder shrugs. Hot packs and inferential currents were applied for 15 minutes each, and 10 repetitions of each exercise were performed. Group B includes conventional physiotherapy along with postero-anterior (PA) Manual Mobilization (CT+MM). Patients in this group were given low-velocity large amplitude oscillatory movements of grade II-III, up to the limit of the range applied to the cervical spine with 3 sets of 10 repetitions each. The total duration of a session was 45 minutes in each group and the treatment was given six days per week for two weeks. After 12 sessions, post-treatment scores on NPRS, cervical ROM, and NDI were again taken by the assessor who was blinded to the group allocation. A home exercise plan was given to all participants of the study.

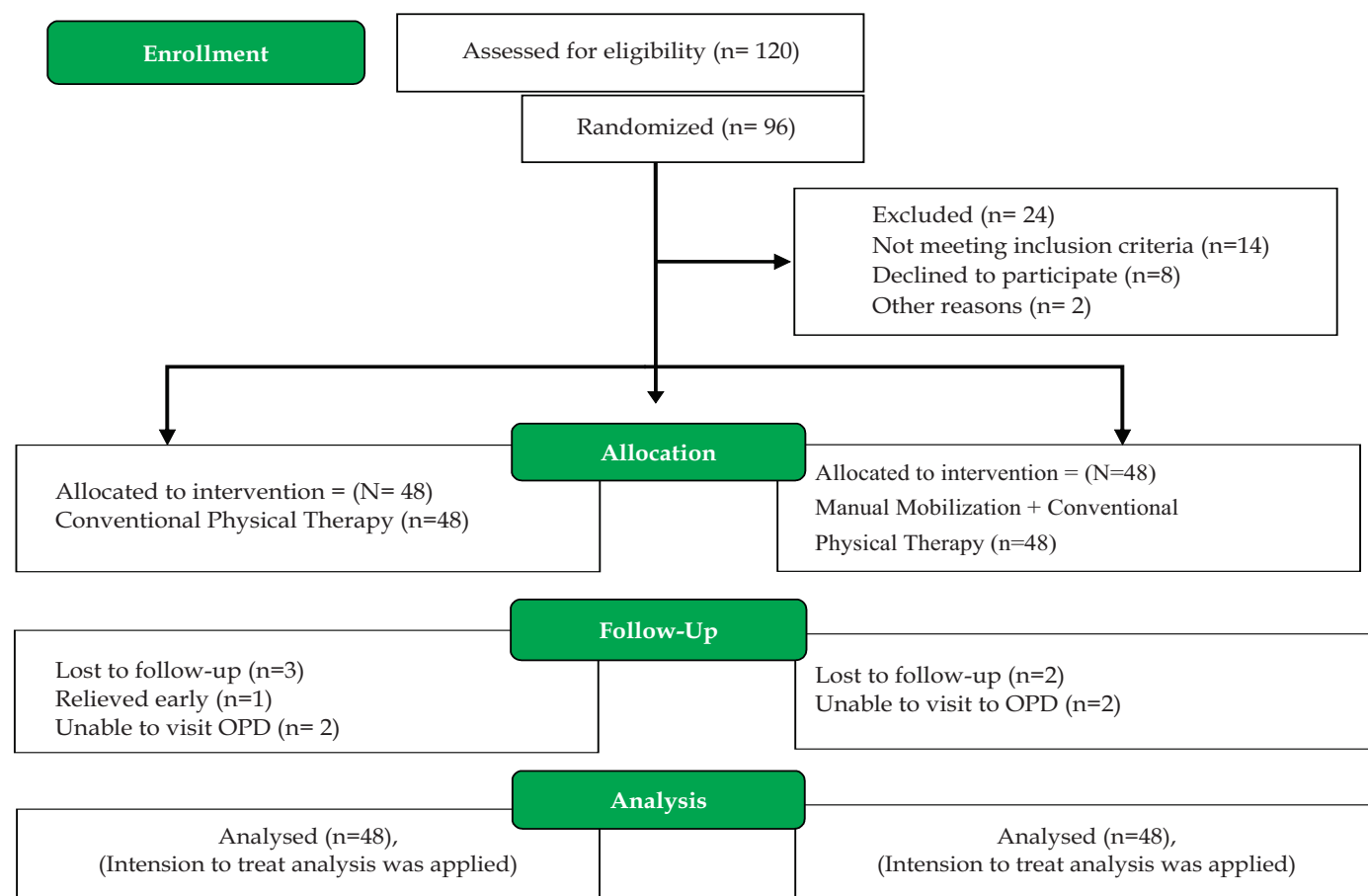


Figure 1. Flow Diagram for participant enrollment and treatment allocation

Statistical Analysis

Data was entered and analyzed using Statistical Package of Social Sciences (SPSS) version-23. The normality of data was checked by the Kolmogorov-Smirnov test and an independent sample t-test was used to measure between-group differences in outcome scores. Paired sample t-test was applied to determine pre- and post-intervention differences within the same group. Mean and standard deviation were the measures to express the outcome scores. Missing data was managed using intention-to-treat analysis (ITT). However, p value was significant at 0.05.

RESULTS

The mean age of participants was 43.0 ± 12.98 years,

there were 28 (58%) females and 20 (42%) males in group A, and 26 (54%) females and 22 (46%) males in group B. Among female participants, 15 (28%) were job holders, 5 (9%) were self-employed, and 34 (63%) were housewives, whereas, among male participants, 20 (48%) were doing jobs and 22 (54%) were self-employed. The comparison of baseline characteristics of pain intensity at NPRS, cervical ROM through goniometer, and disability score at NDI is presented in Table 1, which shows the groups were equal at the start of the study with $p > 0.05$.

There was a statistically significant difference observed with $p=0.00$ in the mean score of all the outcome variables between the two groups, except for the cervical lateral bending towards the right and left side with $p > 0.05$ as shown in Table 2.

Table 1. Group-wise difference of Baseline Characteristics in both groups

Variables		Group A	Group B	p value
		Mean ± Std.*		
Age of participants		43.97 ± 11.67	42.02 ± 14.23	0.46
Pain intensity at NPRS		5.83 ± 1.38	6.31 ± 1.47	0.11
	Flexion	34.43 ± 5.54	35.22 ± 5.19	0.47
Cervical ROM	Extension	34.81 ± 5.22	35.20 ± 6.46	0.74
	Lateral bending (Right)	32. 97 ± 6.52	33.14 ± 8.03	0.91
	Lateral bending (Left)	33.52 ± 6.41	34.62 ± 6.34	0.40
	Rotation (Right)	61.66 ± 10.12	57.25 ± 15.02	0.09
	Rotation (Left)	62.04 ± 9.03	57.75 ± 14.27	0.08
Disability score at NDI		49.01 ± 17.72	49.63 ± 19.63	0.87

Table 2. Comparison of Pain Intensity, Cervical ROM, and Functional Disability in both groups at 12th day follow-up

Variables		Group A	Group B	p value
		Mean ± Std.*		
Pain intensity at NPRS		2.39 ± 1.73	1.72 ± 0.70	0.00
Cervical ROM	Flexion	40.12 ± 4.71	42.39 ± 5.37	0.00
	Extension	39.77 ± 4.59	50.50 ± 10.13	0.00
	Lateral bending (Right)	37.85 ± 5.84	39.20 ± 5.31	0.24
	Lateral bending (Left)	38.10 ± 5.41	39.89 ± 4.73	0.09
	Rotation (Right)	67.25 ± 9.21	70.87 ± 8.09	0.00
	Rotation (Left)	67.58 ± 8.50	71.22 ± 8.62	0.00
Disability score at NDI		30.64 ± 14.91	22.28 ± 13.07	0.00

DISCUSSION

Non-specific neck pain is a prevalent cause of discomfort, decreased neck movement, and restricted function of daily living. In this study, the effects of posteroanterior (PA) manual mobilization along with conventional physiotherapy were observed in comparison to conventional physical therapy alone in patients suffering from acute-subacute non-specific neck pain.

The results showed a statistically significant difference ($p=0.00$) in the mean of pain, cervical ROM, and function in the conventional physiotherapy plus manual mobilization group compared to the conventional physiotherapy-only group. The mean difference represents that the group of participants treated with manual mobilization plus CT managed pain, ROM, and disability more effectively as compared with the group of participants treated with CT only. An RCT conducted by Aguirrebeña *et al.* (2018) reported that cervical mobilization reduces pain (0.04), and improves ROM and self-perception of improvement ($p < 0.001$) among patients. They found improvement both in lateral bending ($p = 0.01$) and rotation ($p=0.04$)¹⁸. In parallel to the findings of the study of Celenay *et al.* (2016) found that the addition of manual mobilization to exercises decreased the resting and activity pain, and cervical ROM, but lateral bending was still not found significantly different ($p=0.92$)¹⁷.

Similar findings were observed in a Cochrane review of 33 high-quality trials by Gross *et al.* (2015) suggested that mobilization is only effective when done in conjunction with conventional physiotherapy and not effective when done alone¹⁹. An RCT conducted by Snodgrass *et al.* (2014) produced the positive effects of manual mobilization on acute and subacute cervical pain ($p=0.04$) and range of motion ($p = 0.01$) than the placebo, however, they recommend that manual mobilization should be dose-specific²⁰.

Although conducted with a lot of effort, there are a few limitations in this study; the subjective nature of assessment tools, the record to adherence of the home exercise plan, and the limited duration of the

study were among the limitations. Prolonged follow-up to address the long-term effects of PA mobilization on acute-subacute neck pain and other conditions with cervical pain can also be studied using PA mobilization. It is recommended that other researchers carry out studies on patient satisfaction and neuroimmune response toward manual mobilization.

CONCLUSION

It is concluded that manual mobilization is effective in decreasing pain and improving cervical range of motion and function in patients with non-specific neck pain at acute and subacute phases in addition to conventional physiotherapy.

DECLARATION

Conflicts of interest: The author declared no conflict of interest.

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