RESEARCH ARTICLE

Effects of cervicothoracic mobility programme on pain, range of motion and function in patients with chronic back pain

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Abstract

Objective: To determine the effects of the cervicothoracic mobility programme on pain, range of motion and function in patients with chronic back pain.

Method: The randomised controlled trial was conducted from April to November 2022 at the Physiotherapy Department of Syed Medical Complex, Sialkot, Pakistan, and comprised patients of either gender aged 18-50 years who had a minimum of 6 months of chronic back pain with moderate disability. They were randomly allocated to experimental group A and control group B. Group A subjects received cervical and thoracic mobilisation with conventional physical therapy, while group B subjects received conventional physical therapy alone. The treatment duration was 45 minutes per session, with 3 sessions per week for 3 weeks. Numeric Pain Rating Scale, Oswestry Disability Index and a goniometer was used to assess pain, disability and for the range of motion. Data was analysed using SPSS 25.

Results: Of the 44 patients, 22(50%) were in each of the 2 groups. Group A had 14(63.6%) females and 8(36.4%) males with overall mean age 36.45±10.80 years, while group B had 16(72.7%) females and 6(27.3%) males with overall mean age 35.77±11.05 years. There was a significant inter-group difference in terms of pain, function and flexion ($p<0.05$), while the difference was not significant in terms of extension, right and left lateral rotation ($p>0.05$). Intragroup analysis showed significant improvement in both groups ($p<0.05$).

Conclusion: Cervicothoracic mobilisation was more effective in improving pain, functionality and range of motion in patients with chronic low back pain.

ClinicalTrial gov Identifier: NCT05347251.

Keywords: Back pain, Physical therapy modalities, Muscle stretching exercise, Range of motion, Exercise therapy.

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Introduction

Back pain is the most frequent type of pain experienced among all chronic pains.[1,2] According to estimates, back pain affects 70-80% of adults at some point in their lives.[3] Pain in the lumbar region is a frequent problem due to which people visit a clinical therapist.[4] Working-age adults are considered the very high-risk group for pain in the lower back. Lower back pain (LBP) due to ergonomics exposure affected 21.8 million.[5] In both men and women, obesity and overweight are the risk factors for LBP, which can be prevented by maintaining a healthy body with the help of a healthy lifestyle.[6] Factors such as lifestyle and physical workload reduce the danger of LBP and lumbar radicular pain. Physical exercise, walking and cycling have the potential to help in the prevention of LBP.[7]

Pain in the lower back might be connected to the thoracic region, tendons, nerves, spinal cord, upper back muscles, and the abdominal area. Pain in the upper area of the back might be because of disorders of the aorta, chest tumours and spine inflammation.[8] But if back pain symptoms are associated with bowel problems, like inability to control the bowel or peeing, coughing, or weakness in legs, all of these require immediate consultation.[9] The socioeconomic burden has increased because of the increasing number and demand of management modalities.[10] The pain can be reduced by traditional medication and drug administration.[11]

The first-line medication for chronic pain in the lower back is acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs). Biomechanics of the lumbar region can be improved by manual therapy and kinesio taping.[12] Usually, pain in the lower back improves with some rest, painkillers and physiotherapy. LBP is universally treated by spinal manipulative treatment, which has been used as first-line therapy in a few countries.[13] According to Canadian clinical guidelines, spinal manipulative treatment is a primary treatment for pain in the lower back as it relieves pain and incapacity in patients with chronic pain in the lumbar region.[14] In a systematic review, spinal manipulative therapy compared to other treatments decreased pain and improved functionality.[13]

Manipulation and mobilisation are known to be essential

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parts of physiotherapy treatment, but some physiotherapists find mobilisation to be safer than manipulation.[15] Maitland mobilisation techniques are known to positively affect patients with mechanical pain in the lumbar.[16] The multifaceted treatment essentially includes managing chronic pain in the lumbar region. Chronic back pain is treated with a variety of conservative therapies and modalities. These techniques also help improve pain as well as psychological and functional status.[17] Stretching and strengthening exercises are also very helpful in improving mobility and decreasing pain in the lower spine.[18]

The current study was planned to determine the effects of cervicothoracic mobility programme on pain, range of motion (ROM) and functionality in patients with chronic LBP.

Patients and Methods

The single-blind randomised controlled trial (RCT) was conducted from April to November 2022 at the Physiotherapy Department of Syed Medical Complex, Sialkot, Pakistan, and was registered in ClinicalTrial.gov Identifier: NCT05347251.

After approval from the ethics review committee of Riphah International University, Lahore, Pakistan, the sample size was calculated using Epitool software[19] in the light of literature.[16] The final sample was adjusted for 10% attrition.

The sample was raised using purposive sampling technique. Those included were patients of either gender aged 18-50 years who had a minimum of 6 months of chronic back pain, assessed as Numeric Pain Rating Scale (NPRS)[20] score >3, and with moderate disability, assessed as Oswestry Disability Index (ODI)[21] score 21-40. Patients having any radiating pain in their legs, pregnant women, those with systemic soft tissue illness and bone disease, patients who had previously undergone orthopaedic or neurosurgery, patients with any red flags, and patients who tested positive for sacroiliac joint dysfunction were excluded.

After taking written informed consent from those who met the inclusion criteria, the patients were randomised using the lottery method into experimental group A and control group B. Group A subjects received cervical and thoracic mobilisation with conventional physical therapy, while group B subjects received conventional physical therapy alone. The treatment duration was 45 minutes per session, with 3 sessions per week for 3 weeks. The outcome measures were NPRS score for pain, ODI score for functionality, ROM which was assessed using a goniometer.[22] The readings were taken at baseline and at the end of treatment.

In group A, cervicothoracic mobilisation (Maitland mobilisation) was given at cervical and thoracic levels along with conventional physical therapy.[23]

Each patient was educated about the treatment procedure, and then the patient was positioned into prone position, and a posteroanterior (PA) glide was given by placing one thumb over the spinous process of cervical vertebrae, and then the force was reinforced by the thumb of the other hand. The same procedure was carried out from C2 to C7.

Transverse glide was given by applying force at the transverse process of cervical vertebrae with one thumb, and then the force was reinforced by the thumb of the other hand. The same procedure was carried out from C2 to C7.

The control group B received only the conventional physical therapy, including the hot pack and exercise therapy, which included stretching and strengthening of the neck and upper back muscles.[24]

Neck isometric exercises were given to the patients to enhance the strengthening of neck muscles by applying resistance to every movement the patients performed. Stretching exercises of neck muscles were performed as well. Cervical flexion, contralateral side flexion and ipsilateral rotation were given for upper trapezius stretch. Sternocleidomastoid (SCM) was stretched by side-bending of the neck to the contralateral rotation to the ipsilateral side, and neck extension for the SCM stretch. Scalene stretch was given by the side flex and extending the head to the contralateral side while stabilising the shoulder.

Strengthening and stretching of thoracic muscles were performed. The patient was asked to sit on a chair, fold the hands behind the neck and perform all the advised movements. The therapist then gave overpressure to every move to produce a stretch. For strengthening, the patient was asked to stand against the wall. A foam roller was placed between the wall and the upper back of the patient, and the patient was asked to press the roller.

Data was collected using a questionnaire that had history, demographic, and outcome elements. The interventions were applied by a professional physical therapist. The outcome assessor was blinded to group randomisation. Data was collected at baseline and post-intervention.

Data was analysed using SPSS 25. Shapiro Wilk test was used for data normality. Independent t-test and paired t-test or Man-Whitney and Wilcoxon tests were applied, as appropriate. $P<0.05$ was considered significant.

Results

Of the 50 individuals assessed, 44(88%) were recruited (Figure) with mean age 36.11±10.80 years and mean body mass index (BMI) 23.96±4.06 kg/m^2. Of them, 22(50%) were in each of the 2 groups. Group A had 14(63.6%) females and 8(36.4%) males with mean age 36.45±10.80 years, while group B had 16(72.7%) females and 6(27.3%) males with mean age 35.77±11.05 years (Table 1). The study was completed by 20(91%) patients in group A and 21(95%) in group B.

Intragroup and intergroup analysis showed significant difference in NPRS and ODI results (p<0.05) (Table 2).

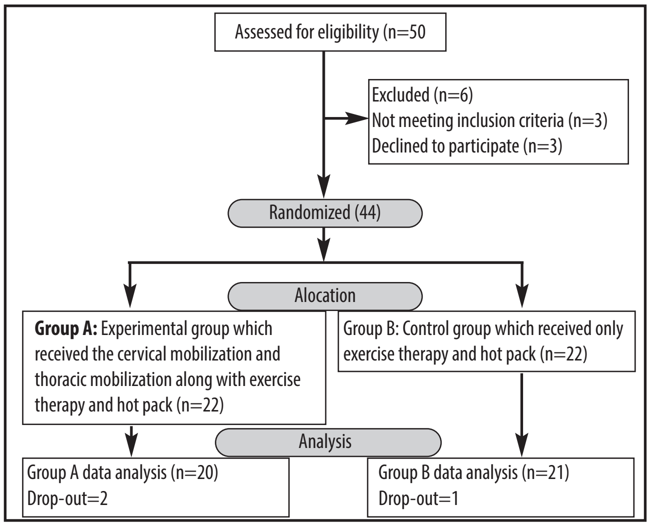

Figure: Consolidated Standards of Reporting Trials (CONSORT) Flow chart.

Table-1: Demographic characteristics.

Baseline characters	**Group (A)** (n=22)	**Group (B)** (n=22)
Gender		
Males	8	6
Females	14	16
Mean Age (years)	36.45±10.80	35.77±11.05
Mean BMI (kg/m^2)	23.53±4.20	24.40±3.52

BMI: Body mass index.

Table-2: Intragroup and intergroup comparison of pain and disability scores.

	Group A (n=20)	**Group B** (n=21)	**Mean difference**	***p*-value**
NPRS				
Pre-values	4.63±1.09	4.81±0.85	0.18	0.542
Post-values	1.72±1.16	4.32±1.04	2.6	<0.001
Mean difference	2.90	0.50		
p-value	<0.001	<0.001		
ODI				
Pre-values	30.18±7.30	31.36±6.48	1.18	0.573
Post-values	16.63±7.51	27.81±7.58	11.18	<0.001
Mean difference	13.54	3.54		
p-value	<0.001	<0.001		

NPRS: Numeric Pain Rating Scale, ODI: Oswestry Disability Index.

Table-3: Intragroup and intergroup comparison of flexion, extension and lateral flexion (right and left).

	Group A (n=20)	**Group B** (n=21)	**Mean difference**	***p*-value**
Flexion				
Pre-values	43.32±6.49	42.95±6.41	0.363	0.853
Post-values	50.27±5.33	44.63±6.36	5.6	0.003
Mean difference	6.95	1.68		
p-value	<0.001	<0.001		
Extension				
Pre-values	13.95±3.42	15.59±3.97	1.63	0.151
Post-values	17.77±2.84	16.45±4.00	1.31	0.215
Mean difference	3.82	0.86		
p-value	<0.001	<0.001		
Left Lateral Flexion				
Pre-values	14.45±3.27	15.18±3.82	-0.72	0.502
Post-values	17.18±2.88	15.81±3.98	1.36	0.201
Mean difference	2.72	0.63		
p-value	<0.001	<0.001		

Intragroup analysis showed significant difference in terms of flexion, extension and right and left lateral flexion (p<0.05) in both groups, but intergroup difference was significant only for flexion (p<0.05) (Table 3).

Discussion

The current study showed that cervicothoracic mobility significantly improved pain, function and flexion when dispensed along with the conventional treatment compared to the conventional treatment alone. There was a reduction in scores of NPRS and ODI, but there was no significant difference in extension, right and left lateral flexion. The observed differential effects between flexion and other movements in response to the cervicothoracic mobility programme may be attributed to factors such as muscle tightness and imbalance, the directional specificity of techniques, biomechanical considerations, and individual variability among the patients. These factors highlighted the complexity of addressing movement restrictions in chronic LBP and the importance of tailored interventions based on individual needs and characteristics.

The results of a previous study were consistent with the current study in that they determined the effects of cervicothoracic mobilisation on deep cervical flexor strength in forward-head posture participants. The study's findings showed that the strength significantly improved on the deep neck flexor by applying cervicothoracic mobilisation.[25] Another study showed that the strengthening exercise at the upper extremity showed significant improvement in participants with chronic LBP.[26] As was the case in the current study, treatment was given to the upper spine to check the effects on the lower spine.[26]

A previous study showed that manipulative and mobilisation techniques were ineffective in treating mild to moderate chronic back pain, which was in contrast to the current findings.[27] The current study showed that mild to moderate pain can be treated by mobilisation technique. While the previous study used a larger sample size and Roland Morris Disability Questionnaire (RMDQ), while the current study yielded results through ODI on a smaller sample size.[27]

A study on the acute impact of Maitland's central PA mobility programme on young people with LBP reported that there was a remarkable improvement in muscular strength and muscular endurance of lumbar muscles, but there was no significant effect on the pain and mobility of the participants after the application of PA mobilisation.[28] The finding was in contrast to the current study.

In a previous study, group A received spinal mobility therapy, group B received sham therapy, and group C received conventional physiotherapy. The study concluded that the mobilisation technique had a more positive effect in treating chronic LBP than conventional physical therapy.[29]

Another study concluded that the participants with chronic LBP, when treated with a thoracic central PA mobility programme and combined breathing exercises, had more improvement in respiratory variables and decrease in incapacity.[30] The findings supported the current findings that cervical and thoracic region mobilisation improved back pain.

The current study had limitations as there was no long-term monitoring. The study also did not explore psychosocial barriers as well as the impact of education and resources on patient outcomes. The sample was drawn from a small population which reduced the generalisability of the findings.

Conclusion

The cervicothoracic mobility programme improved pain, function and ROM compared to conventional therapy in patients with chronic LBP.

Disclaimer: The text is based on an academic thesis.

Conflict of Interest: None.

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Author Contribution:
AN: Data collection and final approval.
SSUR: Concept, design and final approval.
GF: Data analysis, interpretation, writing and final approval.
MI: Concept, design, data analysis, interpretation, writing and final approval.