



ORIGINAL RESEARCH PAPER

Physiotherapy

THE SHORT-TERM EFFECT OF MAITLAND'S MOBILIZATION ON PAIN AND FUNCTIONAL DISABILITY IN YOUNG ADULTS WITH ACUTE MECHANICAL LOW BACK PAIN

KEY WORDS: Maitland's Mobilization, Mechanical Low Back Pain, Functional Rating Index, Visual analogue scale, Pain Pressure Threshold.

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ABSTRACT

Background: Over 70% of people in resource-rich countries will experience LBP at some time in their lives. Back pain and the resulting disability constitute a major public health problem in Western as well as Indian societies.

Objective: To study the short-term effect of Maitland's Mobilization on pain and functional ROM in patients with acute mechanical LBP.

Methods: 30 participants were divided into 2 groups. Group A underwent Maitland's mobilization with therapeutic exercises and Group B underwent therapeutic exercises. Outcome measures taken were VAS, Pain-Pressure threshold AND functional rating index. Pre and Post treatment and 24- hour post treatment measurements were taken.

Results: Results showed that there was significant improvement in VAS, PPT and FRS in group A.

Conclusion: It has been concluded that Maitland's Mobilization along with conventional therapy is effective than Conventional exercise therapy alone in improving pain and functional disability in Acute Mechanical LBP.

INTRODUCTION

Low back pain (LBP) is defined as pain localized between the twelfth rib and the inferior gluteal folds, with or without leg pain,¹ and is defined as acute when pain persists for less than 12 weeks.²

Up to 90% of all adults suffer at least once in their life from an LBP episode, in the majority of cases a nonspecific lumbago.³ LBP is a common problem with point prevalence ranging from 12% to 33%, 1- year prevalence 19-65% and lifetime prevalence 11-84%.⁴ Prevalence rates from different country range from 13% to 44%.³ while LBP is usually self-limiting it can persist resulting in substantial personal, social and economic burden.⁵

The back pain and disability are the most common causes of chronic sickness in males and females under the age of 45 years in the UK.⁶ Back pain and the resulting disability constitutes a major public health problem in Western societies.^{7,8}

A variety of treatment for LBP have introduced into clinical practice, including educational interventions, exercise, weight reduction, various classes of analgesics, non-steroidal anti-inflammatory drugs, physical therapy, spinal manipulation, other complementary and alternative therapies and surgery.⁹

Spinal manipulation has a prominent role in all national guidelines on the management of back pain.^{10, 11} However, the recommendations in these guidelines vary. In most countries, spinal manipulative therapy is recommended for acute low-back pain.

Maitland et al advocated to examine the immediate effects of each intervention to detect changes in pain and spinal motion.¹² In addition, immediate changes in pain and motion have been shown to predict intervention outcome.¹³ Very few studies have been done on the short-term effect of mobilization which become the motivating factor for the current study and hence the short-term effects of Maitland's Mobilization were studied current study in acute mechanical LBP.

Methodology

Study Design

An Interventional study.

Study Setting:

This study was conducted in BITS Institute of Physiotherapy, BITS education campus, Varnama, Vadodara. All patients clinically diagnosed of mechanical LBP were referred from Orthopaedic Out- patient Department to Physiotherapy Department.

Sample Design

30 young adults with mechanical low back pain were selected by convenience sampling according to the selection criteria and divided into two groups viz. Group A (Clinical trial Group) and Group B (Control Group). Both the groups were treated with hot pack and back exercises and Group A was additionally given Maitland's mobilization grade 1 and 2.

Selection Criteria

INCLUSION CRITERIA:¹⁴

1. Age group: 18-35 years
2. Both genders (male and female) are included
3. Mechanical LBP <12 week
4. Localized LBP at or above the waist level
5. Patients who are able to comprehend commands
6. Willingness to participate in the study

EXCLUSION CRITERIA:¹⁵

1. Disk Herniation
2. Patient having previous spinal surgery
3. Patient having spinal instability (osseous or ligamentous)
4. Patient having tumors of the nervous system and spinal cord
5. Patient having cauda equina injury symptoms
6. Spondylolisthesis
7. Patient having severe osteoporosis
8. Patient having history of psychological or psychiatric illness
9. Pregnancy

Materials:

1. Consent Form
2. Assessment Form
3. Functional Rating Scale
4. Pain Pressure Algometer
5. Examination Table
6. Hot pack
7. Paper, Pencil, Scale, Couch, Stool, Measuring tape
8. Weighing machine
9. Height scale

Assessment:

- Thirty young adults were taken for the study with acute

mechanical LBP.

- On the first visit, a complete assessment was done. Those who fulfilled the inclusion criteria were taken up for the study. The whole procedure of the study was explained to all the subjects. A written informed consent of all the subjects was taken prior to the study.
- Pre participation evaluation form consisted of descriptive data for age, sex, height, weight, duration of symptoms medications, history, chief complaints, Visual Analogue Scale (VAS) score and Pain Pressure Threshold (PPT) for pain, range of motion, manual muscle testing, Functional Rating Index (FRI) for functional disability, etc. Consent form given in Appendix I and Assessment form is given in Appendix II.

Outcome measures:

Visual Analogue Scale:^{16, 17}

The VAS is form of patient perception outcome assessment that has been described as “generally relevant, valid, reliable, responsive and safe.” With VAS, patients are asked to place a mark on the horizontal line, 10 cm in length, to indicate the severity of their pain. Operationally, VAS is usually a horizontal line, 100 mm in length. The left end of line represents no pain and the right end represents severe or unbearable pain. The patient marks on the line the point that they feel represents their perception of their current state. The VAS score is determined by measuring in millimetres from the left hand end of the line to the point that the patient marks and give it a numeric value. In this way, assessment can be measured and compared.

Pain Pressure Algometer:^{18, 19}

Algometry has been shown to be an effective way of quantifying pressure pain threshold (PPT). PPT assessment by algometry is a reliable, both within-session and between-sessions, measure of a subject's pain. Assessments revealed good within-session reliability (80 assessments) (ICC > 0.91) and good between-session reliability (ICC > 0.87). Accuracy: ± 0.3%. Area of Flat rubber tip is 1 cm². The PPT is a reliable measure, and repeated algometry does not change pain threshold in healthy muscle over 3 consecutive days. Reliability is enhanced when all measurements are taken by one examiner.

Functional Rating Index:^{20, 21}

The Functional Rating Index is a self-reporting instrument consisting of 10 items, each with 5 possible responses that express graduating degrees of disability. The Functional Rating Index combines the concepts of the Oswestry Low Back Disability Questionnaire and the Neck Disability Index and seeks to improve on clinical utility (time required for administration).

The Functional Rating Index appears to be psychometrically sound with regard to reliability, validity, and responsiveness and is clearly superior to other instruments with regard to clinical utility. The Functional Rating Index is a promising useful instrument in the assessment of spinal conditions

Procedure:

- They were conveniently divided into two groups for the study 15 in each group.
- Group A (Clinical Trial Group): Received conventional treatment for acute mechanical LBP and Maitland's Mobilization.
- Group B (Control Group): Received conventional treatment for acute mechanical LBP.

VAS and PPT readings were taken prior to starting of treatment, immediately post treatment and 24 hours post of treatment. The FRI questionnaire was filled before treatment and 24 hours after treatment. VAS was taken in standing position. PPT was taken in prone lying on the tenderest spinous process. It was repeated three times with 20 sec rest in between and the mean of all three was taken.²²

Clinical Intervention:

- Study participants were requested to continue normal activities and avoid any other forms of treatment for the duration of the study, apart from routine physician management.
- Subjects other than the designated protocol were not permitted to administer any other forms of electrotherapy or other techniques (steroids, acupuncture, or taping) during the intervention period of the trial.
- Both groups were received conventional physiotherapy in form of hot pack and back exercises.

Group B (Conventional Treatment Protocol):²³

- HOT PACK: Hot pack was given for 15 minutes to both groups.
- curl ups
- DOUBLE KNEE TO CHEST
- OBLIQUES
- PRONE PRESS UPS

Group A (Clinical Trial Group):²⁴

- In Group A, PA mobilization was administered once, with a protocol consisting of grade 1 and 2 joint oscillations for 30 seconds each. Grade 1 joint mobilization was administered consecutively to the 3 spinous processes that surround the pathological area with 30 seconds rest in between, followed by Grade 2 mobilizations performed in the same manner, for total of 6 repetitions of joint mobilization.

RESULTS

The present study is conducted to see the effectiveness of Maitland's mobilization technique along with other therapeutic exercises on pain and functional disability in patients with acute mechanical LBP. The study comprised of total 30 patients with mechanical LBP; 15 subjects in each group.

Data was analysed using statistical software Graphpad Instat 3. Before applying statistical tests, data was screened for normal distribution. All the outcome measures were analysed at baseline, immediately after treatment and 24 hrs after treatment using appropriate statistical test. Level of significance was kept at 95%. Changes in outcome measures were analysed within group as well as between groups.

Table Below displays the group statistics of Age Distribution among the 30 subjects. The mean age of the 15 patients in Group A was 28.86 years with standard deviation 7.16. In the Group B, the mean age was 32.06 years with standard deviation 6.01.

Gender	Group A	Group B	Total
Female count	7 (46.67%)	6 (40.00%)	15
Male count	8 (53.33%)	9 (60.00%)	15

Group	Mean	+ SD
Group A	28.86	+ 7.16
Group B	32.06	+ 6.01

Nonparametric Repeated Measures ANOVA (Freidman's) test and Repeated Measures ANOVA were applied to analyze the difference of VAS IN STANDING pre, immediate post treatment and 24 hours post treatment.

Table: Mean changes in VAS IN STANDING in Group A and Group B

Group	Pre Mean + SD	Immediate post treatment Mean + SD	24 hours post treatment Mean + SD	Fr/F Value	P value
Group A	5.96 + 1.81	3.16 + 1.51	2.88 + 1.51	Fr=19.28	<0.0001
Group B	4.76 + 1.53	4.06 + 1.38	4.46 + 1.81	F=2.195	=0.1268

Repeated Measures ANOVA test was applied to analyze the difference of PPT in pre, immediate post treatment and 24 hours post treatment for both groups.

Table: Mean changes in PPT in Group A and Group B

Group	Pre Mean + SD	Immediate post treatment Mean + SD	24 hours post treatment Mean + SD	F Value	P value
Group A	09.14 ± 4.52	12.46 ± 6.04	13.31 ± 6.36	19.07	<0.0001
Group B	11.02 ± 4.75	11.85 ± 5.17	11.86 ± 5.71	4.28	=0.0208

DISCUSSION

The study was aimed to see the short term effectiveness of Maitland's mobilization on pain and functional disability along with Hot pack and therapeutic exercises in acute mechanical LBP.

Group A patients were given Maitland's mobilizations along with Hot pack and therapeutic exercises, while group B patients were given only Hot pack and therapeutic exercise.

Results of the present study show positive findings with statistically significant improvement in pain and functional disability as compared to baseline in both the groups. Moreover, comparison of the two treatment strategies revealed Maitland's mobilization to be better than conventional therapy alone in improving pain and function.

Both the groups showed significant improvement in VAS IN STANDING in group A (Fr = 19.28, p<0.0001), and group B (F=2.25, p=0.1268), PPT in group A (F=19.07, p<0.0001), and group B (F=4.283, p=0.0208) And significant improvement in FRI was seen in group A (t=9.614, p<0.0001) and group B (t=2.827, p=0.0067).

There was a significant difference found in between two groups in VAS IN STANDING in immediate post treatment (t=5.455, p<0.0001), post 24 hours treatment (t=5.797, p<0.0001); PPT in immediate post treatment (t=5.321, p<0.0001) post 24 hours (U=14.500, p<0.0001) and FRI after 24 hour post treatment (U=0.000, p<0.0001).

As both the groups received Hot Pack and therapeutic exercises, the role of these interventions cannot be neglected in relieving pain and function. The rationale for achieving therapeutic goals through heating is to alter the viscoelastic properties of connective tissues.

The results of the present study show statistically significant improvement in pain; immediate post treatment (t=5.455, p<0.0001), and 24 hours post treatment (t=5.797, p<0.0001) as measured by VAS IN STANDING in both the groups.

The findings of this study are consistent with the findings of CHRISTOPHER et al²⁵ They studied the effect in reducing pain with standing extension and increasing lumbar extension following single treatment session. On average, subjects reported 41% reduction in pain following Postero-anterior mobilization.

SEAN HANRAHAN et al²⁶ also studied the short term effects of joint mobilizations on acute mechanical low back dysfunction. They found significant decrease in pain measured by VAS and McGill Pain questionnaire. They also found significant increase in force production capacity of the paraspinal muscles as measured by a handheld dynamometer.

Chiradejnant et al²⁷ reported 56% reduction in pain following two 1 min bouts of spinal mobilization in subjects with nonspecific LBP. The results of the present study show statistically significant improvement in pain; immediate post

treatment (t=5.321, p=0.0001), and 24 hours post treatment (U=14.500, p<0.0001) as measured by PPT in both the groups. The findings are in accordance with Frayer G et al²⁸ who studied manipulation and mobilization on pain pressure thresholds in thoracic spine in asymptomatic subjects. Both produced a statistically significant increase in PPT but mobilization was appeared to be more effective for pain reduction, producing greater immediate improvement in PPT levels.

Sterling M, Jull G, and Wright A²⁹ also studied the effect of spinal manipulative therapy on subjects with mid to lower cervical spine pain of insidious onset. The results indicated that the cervical mobilisation technique produced a hypoalgesic effect as revealed by increased pressure pain thresholds on the side of treatment (P=0.0001) and decreased resting visual analogue scale scores (P=0.049).

Both mechanical and neurophysiological mechanisms have been described to explain pain reduction and improved mobility following joint motion or mobilization, and it is conceivable that both mechanisms played a role in the findings of the present study. For example, passive motion has been reported to selectively stretch contracted tissues without damaging healthy adjacent tissues.³⁰ In addition, repetitive movements are thought to distribute synovial fluid over the articular cartilage and disk, resulting in less resistance to motion.³¹ With less resistance to motion, subjects may have felt free to move and thus may have experienced less pain.

In addition to the mechanical explanation as to how mobilization and exercise may influence pain and motion, recent studies have suggested a neurophysiological explanation. For example, dorsal horn activation from a painful stimulus has been shown to decrease following joint mobilization.³² This finding could explain the observations of several authors who have reported that passive movements applied to the spine^{33, 34} or the extremities³⁵⁻³⁷ elevated pain thresholds to various mechanical stimuli.

The significant decrease in pain of the experimental group may be attributed to the stimulation of mechanoreceptors at the facet joint and its relationship to the surrounding musculature. Stimulation of mechanoreceptors within the joint capsules of the facet inhibits the nociceptive fibers in the area, thereby disrupting the pain spasm cycle.³⁸ A close relationship exists among the neurologic structures that supply the ligamentous, muscular, and cutaneous tissues at the lumbar spine and the pain spasm cycle.^{39, 40} Therefore, the inclusion of manual therapy techniques may influence the joint receptors and disrupt or modulate the pain-spasm cycle. Many authors have reported functional deficits in patients with mechanical LBP. The patients usually complain of difficulty in trunk motion, lifting weight, driving for prolong period, standing for prolong time.⁴⁰ These findings indicate the importance of functional measurement in patients with mechanical LBP. FRI is a frequently used measurement of functional disability in patients with LBP.

The present study assessed FRI scores at baseline and post 24 hours of treatment. The results of the present study indicate significant decrease in scores of FRI in both the groups; group A (t=9.614, p<0.0001) and group B (t=2.309, p=0.0183). as compared to baseline values and maitland group showed significantly (U=66.50, p=0.0290) more decrease than control group in FRI scores.

Joint mobilization techniques for the lumbar spine add only minimal time to a treatment plan and will be beneficial for the patient over time with regard to decreasing pain.

CONCLUSION

The immediate effects of Maitland's mobilization were

examined in patients with acute mechanical LBP. Following intervention subjects in both groups reported significantly less pain measured by VAS and PPT and improvement in functional disability. There were significant differences in VAS, IN STANDING, PPT and FRI in between groups

Findings of this study suggest that Maitland's Mobilization can have an immediate effect on pain symptoms and functional disability in patients with acute mechanical LBP.

It has been concluded that Conventional exercise therapy along with Maitland's Mobilization is effective than Conventional exercise therapy alone in improving pain and functional disability in Acute Mechanical LBP.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Yes

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