Original Article
Comparison of Maitland's mobilisation and McKenzie therapy in patients with non-specific low back pain

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ABSTRACT

Objective: To compare the effects of Maitland’s mobilization & McKenzie therapy on all parameters in patients with acute non-specific low back pain (NSLBP). Methodology: It was an experimental study. After screening 139 patients visiting the outpatient department, sample of convenience of 60 participants (35 males and 25 females) between the age group of 18-45 years diagnosed as non-specific low back pain was included. Patients were divided into 3 groups by simple randomization. Group A (conventional therapy and McKenzie mobilisation) Group B (conventional and McKenzie therapy). Group C (conventional therapy) Results: Group B had significant (p < 0.05) alleviation in pain as compared to Group A & Group C. There was highly significant (p<0.01) improvement in lumbar flexion & extension in pre & post treatment measurements in Group A & Group B. But Group B showed highly significant (p<0.01) improvement as compared to Group A & Group C. While Group A & Group C showed very minimal reduction in disability score as compared to Group B. Conclusion: McKenzie therapy with an adjunct to conventional therapy resulted in greater alleviation of Pain, improvement in Lumbar ROM & also more reduction of Disability as compared to Maitland’s mobilization & only conventional treatment in patients with non-specific low back pain.

Background

Low back pain is a condition that continues to place a great deal of stress on the healthcare system. Globally one out of three people suffer from low back pain. Lifetime prevalence of low back pain is estimated to be at least 60-70%.

In India approximately 35% population suffers from low back pain which significantly hamper their daily routine. Men & women are equally affected. According to National Institute of Occupational Health, Ahmedabad prevalence of disorder ranges from 70% of urban population who led sedentary life. For individuals younger than 45 years, non-specific low back pain represents most common cause of work related injury. The current guidelines suggest performing a diagnostic triage to classify patients with low back pain into three distinct groups.

First, caused by "red flags" of serious disease e.g., tumour, infection, fracture or serious medical disease (<2%) second, caused by nerve root compression (<10%) or third caused by "non-specific" mechanical factors (85-90%).

There is growing concern about the effectiveness of treatment techniques for low back pain. The effective intervention of low back pain is essential for preventing development of disability in later stage. In 1981, McKenzie proposed a classification system & classification based treatment for low back pain labelled 'Mechanical Diagnosis & Treatment (MDT)' or simply McKenzie method. A key concept of McKenzie approach is that the patients receive individualised treatment based on clinical presentation. The method is founded on active patient involvement and education which ultimately empowers each individual to prevent recurrences long term. While according to G. Maitland (1986), treating low back pain with manipulation is more like a game of chess where different ‘pieces’ can be moved in many different & specific ways & where plans are made & destroyed or changed until the goal is achieved.

Need and Significance: As non-specific low back pain mainly interferes in activities of the younger working population or involved in acts like repetitive lifting, prolong sitting in bad posture, mechanical vibration it is essential to explore the effect of these techniques in alleviating pain & reducing disability of this class. The evidence for the relative benefit of these treatments is limited & questions concerning the most appropriate type of intervention remain unanswered. Hence this study aims to the relative efficacy of McKenzie therapy & Maitland’s spinal mobilization in patients with non-specific low back pain.

OBJECTIVES: 1. To study the effects of Maitland’s mobilization on Pain, Range of motion & Disability in patients with acute non-specific low back pain (NSLBP).

2. To study the effects of McKenzie therapy on Pain, Range of motion & Disability in patients with acute non specific low back pain (NSLBP).

3. To compare the effects of Maitland’s mobilization & McKenzie therapy on Pain, Range of motion & Disability in patients with acute non specific low back pain (NSLBP).
Null Hypothesis (Ho)- There is no significant difference in improvement between McKenzie therapy & Maitland’s mobilization in patients with non-specific low back pain.

Alternate Hypothesis (H1) - There is significant difference in improvement between McKenzie therapy & Maitland’s mobilization in patients with non-specific low back pain.

Materials and Methods
All study procedures were approved by the research and ethical committee of the institution, and all participants voluntarily signed the informed consent form before participating in the screening process.

Setting and Participants
It was an experimental study carried out at College of physiotherapy, Pravara institute of medical sciences. After screening 139 patients visiting the out patient department, sample of convenience of 60 participants (35 males and 25 females) between the age group of 18-45 years diagnosed as non-specific low back pain was included. Subjects with traumatic injury to spine, any neurological involvement, Radiculopathy, infective conditions of spine &autoimmune disorders, malignancy, any history of spinal surgery, loss of lordosis &/or listing suggestive of inter-vertebral disc prolapse, spinal deformity & osteoporosis were excluded.

Randomisation
All study procedures were approved by the research and ethical committee of the institution, and all participants voluntarily signed the informed consent form before participating in the screening process.

Procedure
Baseline readings of the outcome measures were recorded on 1st day before the intervention, at the end of 1week & 3week post intervention. The outcome measures were pain on Visual Analogue Scale, lumbar range of flexion and extension with inclinometer and Oswestry Disability index.

Interventions:
All the patients in Group A, Group B and Group C received lumbar traction in supine with hip & knee flexion position (90-90 position) with all the body weight traction force for 10 min.

Group A
Lumbar traction as illustrated prior to Maitland’s mobilization given to administer an effective mobilization by increasing the joint space.

Mobilization procedure
Position of therapist – Standing on right side of patient with ulnar border of hand between pisiform & hook of hamate directly over the spinous process. The therapist shoulder were directly over the point of contact of spinous process & full wrist extension was maintained with forearm in neutral between supination & pronation.

Direction: The direction of mobilization was postero-anterior.

Frequency: 6 repetitions to 3 spinous processes were given once in a day.

Follow-up: The treatment was given on alternate days, with 9 such visits over a period of 3 weeks (3 visits per week).

Group B
Lumbar traction as illustrated prior to McKenzie therapy as it stretches the shortened structures which may add to the effectiveness of McKenzie therapy.

McKenzie method: The treatment was given as per the McKenzie principles. The patient received individualised treatment depending on the clinical presentation.

Posture correction exercises included
Correction of sitting posture by teaching him 'slouch-overcorrect procedure'. Maintenance of corrected posture was achieved by advising the lumbar roll while sitting & active control of the lordosis.
Correction of standing posture by teaching posterior pelvic tilt exercise with tightening of abdominal muscles. Correction of lying posture was achieved by using a lumbar roll. Posture correction was given 3 times daily with 15-20 times in each session till the corrected posture became automatic. Patients were given flexion or extension exercises depending on their 'directional preference'. Patients preferring extension over flexion received

Lying prone 10 min
Lying prone in extension for 10 min

Extension in lying extension is progressed to maximum possible extension range, repeated about 10 times
Sustained extension with couch inclined at 1 to 2 inches for 5 to 10 min & then lowered & slowly returned to horizontal

Extension in standing
If patient was free of pain after 5 days, flexion exercises were commenced followed by extension. Patients preferring flexion over extension received
Posture correction exercises
Flexion in lying repeated for 10 times

Flexion in standing: The patient bent forward to touch his toes about 10 times. It was ensured that patients return to neutral standing after flexion. If patient was free of pain after 5 days, extension exercises were commenced followed by flexion. After mobilization each patient received hydrocollator pack to lumbar area for 10 min. as a part of conventional treatment.

Follow-up: The treatment was given on alternate days with 9 such visits over a period of 3 weeks (3 visits per week).

**Group C**

All the patients in Group C also received lumbar traction in supine with hip & knee flexion position (90-90 position) with half the body weight traction force for 10 min. After this they received hydrocollator pack to lumbar area for 10 min.

Follow-up: The treatment was given on alternate days, with 9 such visits over a period of 3 weeks (3 visits per week).

**Outcome Measures:**

1. **Visual analogue scale (VAS)**-VAS is the most common & feasible tool for the subjective assessment of pain. It is reliable & valid in assessing the intensity of pain the patient is experiencing. (Scott J, Huskisson EC-Graphical representation of pain).

2. **Lumbar Range of Motion With Inclinometer (LROM)** - The upper edge of the sacrum (S1) and the lower edge of the T12 vertebra were palpated in patients in a standing position. The non-invasive inclinometer technique proved to be highly reliable and valid (Saur, Petra M Ensink, Franz-Bernhard M. Frese, Knut, 1996). Magnetic inclinometers were positioned with their platforms on these reference points, and LROM was determined in degrees. The inclinometers were zeroed initially.

Measurements were taken first in neutral, then in maximum flexion, and finally in a maximum extension position. In neutral, the patient was asked to stand in a comfortable position with his hands hanging without any effort toward the ground. From this position, he had to perform maximum flexion followed by maximum
3) The Oswestry Disability Index (ODI) Version 2 - The ODI remains a valid and vigorous tool to measure a patient’s functional disability due to low back pain and has been a worthwhile outcome measure. (Fairbank JC, Pynsent PB, 2003).

MATERIAL USED FOR THE STUDY

Manual Therapy table (LIC rehab.SESAM)
Reclining bed
Traction unit (Galtron Electromedical)
Hydro collar packs (Hitra Equipments)
Inclinometer (Jewell Instruments)
Weighing machine (Edryl)

DATA ANALYSIS:

First the mean & standard deviations of all tested variables (VAS, Lumbar ROM & ODI score) were calculated. Paired ‘t’ test was used to test the difference between pre & post measurement in VAS & lumbar ROM in same group. Analysis of variance (ANOVA) was used to test difference between the three groups. Further Scheffé test was used to conclude which group is better than the other two when the result from the ANOVA were significant.

RESULTS:

Table 1: Age wise distribution in each group

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group A (Mean ± S.D.)</th>
<th>Group B (Mean ± S.D.)</th>
<th>Group C (Mean ± S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>31.6 ± 7.5</td>
<td>31.9 ± 7.4</td>
<td>31.3 ± 6</td>
</tr>
</tbody>
</table>

Table 2: Gender wise distribution in each group

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>12</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Females</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 3- Comparison of VAS (cm) of 3 groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre treatment Mean ±SD</th>
<th>Post 1 week Mean ±SD</th>
<th>Post 3 week Mean ±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>7.4 ± 1</td>
<td>6.1 ± 2</td>
<td>4.4 ± 1.1</td>
</tr>
<tr>
<td>Group B</td>
<td>7.6 ± 1.1</td>
<td>5 ± 0.9</td>
<td>4 ± 0.6</td>
</tr>
<tr>
<td>Group C</td>
<td>7.5 ± 1.1</td>
<td>6.4 ± 1</td>
<td>5.4 ± 1</td>
</tr>
<tr>
<td>F value</td>
<td>0.09</td>
<td>9.9</td>
<td>15.5</td>
</tr>
<tr>
<td>’p’ value*</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>F1 value</td>
<td>-</td>
<td>6.46</td>
<td>6.46</td>
</tr>
<tr>
<td>-</td>
<td>F &gt; F1</td>
<td>F &gt; F1</td>
<td></td>
</tr>
<tr>
<td>Result</td>
<td>Not significant</td>
<td>Significant</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Table 4- Comparison of lumbar flexion ROM of 3 groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre treatment Mean ±SD</th>
<th>Post 1 week Mean ±SD</th>
<th>Post 3 week Mean ±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>34.7 ± 1.9</td>
<td>35 ± 1.8</td>
<td>35.2 ± 1.7</td>
</tr>
<tr>
<td>Group B</td>
<td>34.8 ± 2</td>
<td>36.6 ± 1.7</td>
<td>37 ± 1.6</td>
</tr>
<tr>
<td>Group C</td>
<td>33.9 ± 1.9</td>
<td>34.8 ± 1.8</td>
<td>35.05 ± 2</td>
</tr>
<tr>
<td>F value</td>
<td>0.11</td>
<td>6.81</td>
<td>7.02</td>
</tr>
<tr>
<td>’p’ value*</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>F1 value</td>
<td>-</td>
<td>F &gt; F1</td>
<td>F &gt; F1</td>
</tr>
<tr>
<td>Result</td>
<td>Not significant</td>
<td>Significant</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Graph1: Comparison of VAS (cm) of 3 groups
DISCUSSION

The mean age of all participants in all groups was similar. The number of visits was not significantly different across groups. The age group from 18-45 years was selected because for individuals younger than 45 years non-specific low back pain represents most common cause of disability & is generally associated with work related injury.

The significant decrease in pain in Maitland group (Group A) could be due to the stimulation of mechanoreceptors at the facet joint and within the joint capsules of the facet which inhibits the nociceptive fibres in the area, thereby disrupting the pain-spasm cycle. Therefore, manual therapy techniques may influence the joint receptors and disrupt or modulate the pain-spasm cycle.

Overall McKenzie group (Group B) had significant (p<0.05) alleviation in pain as compared to Maitland group (Group A) & Control group (Group C). This result was consistent with findings by Kay M.A.Helewa A (1994), Busanach B.M,Verscheure (2006) & H.A Clare, R. Adams (2003) who found out that McKenzie therapy was significantly more effective than other treatments in reducing pain at short term follow-up.

The significant pain relief in McKenzie group may be caused-1. Due to the rhythmical passive stretch created in the tightened soft tissue structures like fascia, ligaments & muscles which activates muscle spindles, cutaneous receptors thus stimulating the ‘reflex arc’ & thus reducing pain. 2. Due to the inhibition of nociceptive receptors present in subcutaneous tissues, fibrous capsule of facet joints, longitudinal ligaments which cause irritation of free nerve endings producing pain.

In the trial by Stanlovic and Johnell (1990) all patients in the McKenzie group received the same treatment: extension exercise for two weeks then commencement of flexion exercise. While extension is commonly the direction of movement that is prescribed, other patients are prescribed flexion (McKenzie and May2003, Donelson et al 1991). But as the analysis of ‘directional preference’ the key to the management (McKenzie and May 2003), so in this study an attempt was made to prescribe exercises in the individualised manner. The extension exercises have stretching effect on the anterior structures mainly anterior longitudinal ligament while flexion exercises stretch the interspinous, supraspinous ligament with some amount of rotation stretching the capsular ligaments.

There was highly significant (p<0.01) improvement in lumbar flexion & extension in pre & post treatment measurements in Group A & Group B. But Group B showed highly significant (p<0.01) improvement as compared to Group A & Group C. These findings correlate with studies done by B.Undermann, Mayer (2005), "Stiklic EM Suad T (2003)" which conclude that McKenzie therapy is a beneficial treatment for improving lumbar ROM.
The improvement in Group B may be attributed to the following mechanisms.

According to McKenzie, the range of movement can be increased by exercises when performed in a certain manner & frequency as they create the rhythmical passive stretch in surrounding soft tissues. Nelson et al stated that motion promotes healing in the musculoskeletal system. The healing benefits of motion for LBP may be accomplished by stretching shortened tissues such as fascia, ligaments & muscles, thus increasing blood flow to the lumbar extensors & improving range of motion. Because McKenzie therapy protocol strongly encourages patient self-management practices, all subjects were advised to perform their prescribed exercises at home and during work if possible.

The results showed that the Oswestry Disability Score is in favour of Group B. There is 10.3% reduction in ODI score when pre-treatment measurement is compared to post 1 week measurement, 11.6 % reduction in score is observed between pre-treatment & post 3 week measurement. While Group A & Group C showed very minimal reduction in score as compared to Group B. These results were in line with earlier findings by Brian M. Busanich; Susan D. Verscheure,(2006) Helen A. Clare, Roger Adams (2003) who stated that the McKenzie therapy result in decrease in short term (<3 months) pain and disability for low back pain patients compared with other standard treatments such as back massage, strength training and spinal mobilisation.

The rationale behind the reduction in disability in McKenzie Group may be because the patients were educated about the identification of predisposing & precipitating factors causing pain & disability. “There was significant reduction in pain & improvement in ROM of lumbar spine in 3 week duration. Patients received the exercises according to their ‘directional preference’. Because as stated by Long A, Donelson R, Fung T (2004) the group receiving the treatment as per directional preference improved in flexibility as well as in the functional disability.”

McKenzie’s Method of Mechanical Diagnosis and Therapy is an active patient treatment philosophy that emphasizes prevention and intervention, and encourages patients to be in control of their own treatment.

CONCLUSION

McKenzie therapy with an adjunct to conventional therapy resulted in greater alleviation of pain, improvement in lumbar ROM & also more reduction of disability as compared to Maitland’s mobilization & only conventional treatment in patients with non-specific low back pain. Therefore, McKenzie therapy encouraging patient’s self-management practices should be considered as one of the vital treatment protocol adjunct to the treatment regime for patients with non-specific low back pain.

Limitation of study

Foremost limitation of study was a relatively small number of subjects, and the duration of intervention was only 3 weeks.

Future research

Long term effects of Maitland’s mobilization & McKenzie therapy can be evaluated in patients with low back pain due to specific causes for low back pain.

Acknowledgement: We would like to express our gratitude to all the participants in the study to sincerely following the prescribed intervention.

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