



## EFFECT OF MOIST HEAT THERAPY VS MOIST HEAT THERAPY + Mc KENZIE EXERCISES ON MECHANICAL LOW BACK PAIN: A COMPARATIVE STUDY

### Physiotherapy

|                                |                                                                                                                                                     |
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### ABSTRACT

**Background:** low back pain is a common health condition that affects more individuals of any age group. While Mc Kenzie spinal extension exercises are commonly used for LBA but moist heat therapy is not so commonly used as evidence is less for its usage on LBA. This therapy along with exercises are very useful in treating nonspecific low back pain for pain, and improving functionality of life. **Objective:** this study aims to compare the effect of moist heat therapy along with Mc Kenzie ex's vs Moist heat therapy alone on pain, lumbar ROM and disability among patients with nonspecific low back pain using Visual analogue scale (VAS), Oswestry disability index (ODI), lumbar ROM using inch tape. **Methodology:** An experimental study was conducted on 30 subjects of age group between 20-70 years on both males and females with mechanical low back pain. they were randomly allocated into group A Moist heat therapy and group B Moist heat therapy + Mc Kenzie ex's. **Results:** The results showed significant differences in VAS, ODI, and lumbar ROM values between the two groups ( $p < 0.001$ ). Both treatments reduced pain and disability, but moist heat therapy along with exercises produced slightly greater improvement than Moist heat therapy alone.

### KEYWORDS

Mc Kenzie exercises – MKZ ex's, moist heat therapy – MHT, nonspecific low back pain.

### INTRODUCTION

**Low back pain (LBP)** will continue to be one of the most common health problems worldwide. It will remain a leading cause of activity limitation and the second most frequent reason for medical consultations. **Mechanical low back pain (MLBP)** will be described as any form of LBP that will originate from the spine, surrounding soft tissues, or intervertebral discs. It will occur as a result of excessive strain and pressure that will be placed on the muscles and supporting structures of the spinal column<sup>1</sup>. Nonspecific Low Back Pain also described as “simple backache”, the everyday bodily symptom that most adults get at some time in their life Low back pain (LBP) will be a very common health problem around the world<sup>2</sup>. It will be one of the main reasons people limit their activities and visit doctors. Mechanical low back pain (MLBP) will happen when too much strain is put on the spine, muscles, or soft tissues in the back. The most frequent type of low back pain is known as “**nonspecific low back pain**”, which is described as pain in the lower back that cannot be linked to any clearly identifiable or specific underlying condition.

In 2020, around **619 million people** worldwide had low back pain, with a global point prevalence of **7–8%** and **~245.9 million new cases** annually. In India, point, annual, and lifetime prevalence rates were **48%, 51%, and 66%**, respectively. One study estimated **~29.8 million new cases** of low back pain in India in a recent year<sup>3</sup>.

Moist heat therapy will be commonly prescribed in future medical practice for pain relief and healing. It will increase blood flow and deep tissue temperature, promoting recovery by flushing out waste and bringing fresh blood cells. When applied to the lower back at 40°C, it will raise muscle temperatures by 5°C, 3.5°C, and 2°C at depths of 19mm, 28mm, and 38mm, respectively. Moist heat is highly effective for relieving back pain from muscle spasms due to strain or tension, as well as easing discomfort from arthritic and musculoskeletal conditions. By boosting blood flow, it relaxes spasms and supports joint and muscle flexibility.

McKenzie extension exercises will be a preferred treatment for LBP, focusing on sustained posture or repeated movement to reduce pain. This study will evaluate and compare the effects of Moist heat therapy versus moist heat therapy with McKenzie exercises. These investigations will aim to identify the most effective approach for reducing mechanical LBP symptoms and improving quality of life.

### NEED OF THE STUDY

- The incidence of mechanical low back pain is gradually increasing day by day and various treatment methods are adopted and very few studies on comparison of Moist heat therapy and Mc Kenzie exercises.
- The study is to find the effect of Moist heat therapy and Mc Kenzie exercises on mechanical low back pain.

### OBJECTIVES OF THE STUDY

- To find comparative effects of Moist heat therapy and Mc Kenzie exercises on pain through VAS scale
- To find the effects of Moist heat therapy and Mc Kenzie exercises on disability using Oswestry disability index
- To find the effects of Moist heat therapy and Mc Kenzie exercises on lumbar ROM using inch tape

### MATERIALS AND METHODOLOGY

#### MATERIALS

- Measuring tape
- Pillow
- Mat
- High couch
- VAS scale (pain scale)
- Oswestry disability index questionnaire
- Hydro collator unit

### METHODOLOGY

- Source of sample: sri venkateswara institute of medical sciences (college of physiotherapy) tirupati
- STUDY DESIGN: experimental study
- STUDY SETTING: SVIMS college of physiotherapy
- Study duration: 4 weeks
- Sample size: 30
- Sampling technique: simple random sampling

### Study Procedure

- In this study simple random sampling technique was used and 30 patients were divided into two groups. 15 patients were selected randomly and was included in group A (Moist heat therapy) and 15 patients in group B (moist heat therapy + Mc Kenzie exercises).
- Visual analogue scale (VAS) was used to assess pain through a line of 10 cm divided from 0 to 10, where 0 refers to no pain and 10 refers to the worst pain.

- Oswestry Disability Index (ODI) is a valid and reliable tool for measuring the functional disability in patients with low back pain. It consists of 10 questions, each question includes 6 choices, and the patient selected the best 1 which described his disability. The maximum score is 50
- Range of motion of lumbar spine is measured using inch tape. The participants selected according to inclusion and exclusion criteria.
- 30 patients of age between 20 -70 yrs. with low back pain who was willing to take treatment for 4 weeks session after a written consent were taken according to inclusion and exclusion criteria. 15 patients were included in the group first and 15 in the second. The duration of the study was 4 weeks

#### Inclusion Criteria:

- Age: group of 20-70 years
- Gender: Both males and females,
- Patients with mechanical low back pain.

#### Exclusion Criteria:

- Neurological disorder
- Past History of Fracture
- Injury And Abdominal and Spinal Surgery
- Osteoarthritis
- Non-Cooperative
- Psychiatric Subject
- Pregnancy

#### OUTCOME MEASURES

- PAIN - VAS SCALE
- ROM - INCH TAPE
- DISABILITY - OSWESTRY DISABILITY SCALE

#### Study Procedure

The participants included in the study were allocated to group A are treated with moist heat therapy for a period of 3 consecutive days per week for 4 weeks for 15 minutes and group B receiving moist heat therapy along with Mc Kenzie exercises for 3 consecutive days per week up to 4 weeks of 15 min moist heat therapy and 10 min extension exercises.

#### Group 1 (Moist heat therapy)

Subjects who fill the inclusion & exclusion criteria will be randomly allotted using lottery method Assessment will be taken prior to the treatment & after the treatment, visual analogue score (VAS), ROM of lumbar spine, Oswestry disability index are outcome measure Group A and B has 15 subjects each

Heat treatment will involve placing a moist hot pack (160°F) covered with terry cloth on the lower back while the subject lies face down for 15 minutes. Hydro collator packs will be heated to 68°C for at least 20 minutes before use and adjusted to the subject's comfort level. Towelling will control heat output, and the pack will cover at least 7.5 cm on each side of the lower back. Subjects will be monitored frequently to maintain uniform heating throughout the treatment.

#### GROUP 2 (Moist heat therapy + Mc Kenzie spinal extension exercises)

Heat treatment will involve placing a moist hot pack (160°F) covered with terry cloth on the lower back while the subject lies face down for 15 minutes. Hydro collator packs will be heated to 68°C for at least 20 minutes before use and adjusted to the subject's comfort level. Towelling will control heat output, and the pack will cover at least 7.5 cm on each side of the lower back. Subjects will be monitored frequently to maintain uniform heating throughout the treatment.

Mc KENZIE SPINAL EXTENSION EXERCISES for about 10 minutes

The physiotherapist guided the subject to conduct four extension exercises. The extension exercise started with; first, lying face down for one until two minutes. Second, lying face down with extension, the subject was asked to start with lying face down position and followed with the extension exercises Third, extension on lying, subject instructed to start in lying face down position, and then followed with the extension of the trunk with elbow extension (push-up position) for ten seconds, then the subject asked to relaxation with back to first position. Fourth, extension on standing, subject instructed to standing and then asked to do the extension of the trunk and hold for five seconds with hands of the back and the fingers pointing backwards and

then followed with relaxation with back to standing position. All extension exercise repeated for ten repetitions for three sets.

#### Assessments

In the present study, data were collected using three outcome variables. The assessment was performed using rating scales such as visual analog scale (VAS) for the severity of pain, Oswestry disability index (ODI) for disability index, Lumbar range of motion (ROM) measured by inch tape.

#### Statistical Analysis

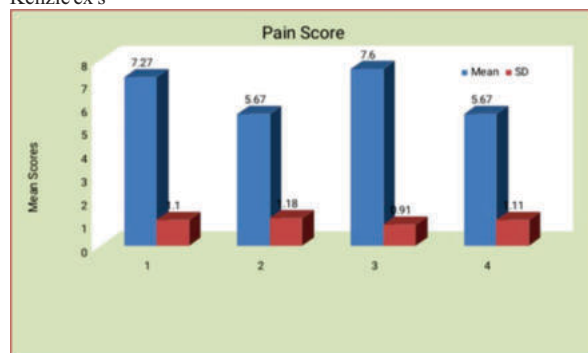
The collected data were systematized using Microsoft Excel Sheets (version 2010). The normality of the data was assessed with the Kolmogorov-Smirnov test and Shapiro-Wilk test. Within each group differences were assessed using Wilcoxon Signed Ranks test and Spearman's rho test. The overall comparison between the three groups was carried out using Kruskal-Wallis test and the Mann-Whitney test.

#### Mean Values Of VAS Score In MHT And MHT + ex's

|            | Group               | N  | Pre-Test Score<br>Mean $\pm$ S.D | Post -Test Score<br>Mean $\pm$ S.D | Mean Difference | t-value<br>(p-value) |
|------------|---------------------|----|----------------------------------|------------------------------------|-----------------|----------------------|
| Pain Score | MHT                 | 15 | 7.27 $\pm$ 1.10                  | 5.67 $\pm$ 1.18                    | 1.600           | 3.841**<br>(0.000)   |
|            | MHT+ Mc Kenzie ex's | 15 | 7.60 $\pm$ 0.91                  | 5.67 $\pm$ 1.11                    | 1.930           | 5.208**<br>(0.000)   |

\*\*significant at 0.01 level; P < 0.01 (Highly Significant)

Graphical representation of VAS score of pain in MHT and MHT + Mc Kenzie ex's



Mean difference of ROM of lumbar spine in both MHT and MHT + Mc Kenzie ex's

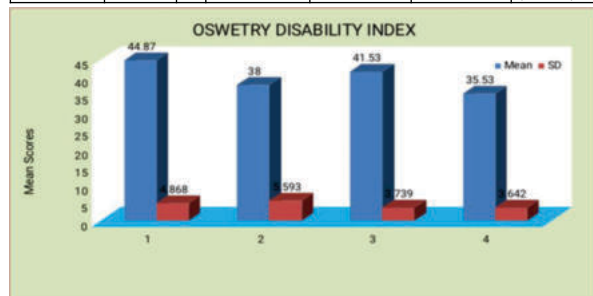
|                                | Group      | N  | Pre-Test Score<br>Mean $\pm$ S.D | Post -Test Score<br>Mean $\pm$ S.D | Mean Difference | t-value<br>(p-value) |
|--------------------------------|------------|----|----------------------------------|------------------------------------|-----------------|----------------------|
| Lumbar Flexion                 | MHT        | 15 | 4.80 $\pm$ 1.26                  | 6.60 $\pm$ 1.24                    | -1.800          | 3.944**<br>(0.000)   |
|                                | MHT + ex's | 15 | 6.47 $\pm$ 2.59                  | 11.20 $\pm$ 3.052                  | -4.733          | 9.611**<br>(0.000)   |
| lumbar extension               | MHT        | 15 | 2.47 $\pm$ 1.73                  | 5.20 $\pm$ 1.47                    | -2.730          | 4.657**<br>(0.000)   |
|                                | MHT + ex's | 15 | 3.27 $\pm$ 1.831                 | 7.27 $\pm$ 2.219                   | -4.000          | 15.492**<br>(0.000)  |
| lateral lumbar flexion (right) | MHT        | 15 | 9.07 $\pm$ 1.486                 | 14.13 $\pm$ 2.748                  | -5.067          | 10.311**<br>(0.000)  |
|                                | MHT + ex's | 15 | 11.40 $\pm$ 3.942                | 19.87 $\pm$ 4.274                  | -8.467          | 16.738**<br>(0.000)  |
| lateral lumbar flexion (left)  | MHT        | 15 | 12.60 $\pm$ 2.798                | 17.93 $\pm$ 3.327                  | -5.333          | 10.390**<br>(0.000)  |
|                                | MHT + ex's | 15 | 13.27 $\pm$ 4.06                 | 22.00 $\pm$ 4.000                  | -8.733          | 14.819**<br>(0.000)  |

@ -Not significant; \*significant at 0.05 level; \*\*significant at 0.01 level; Table No.

#### Mean difference of Oswestry disability index score in MHT and MHT + ex's

|                     | Group | N  | Pre-Test Score<br>Mean $\pm$ S.D | Post -Test Score<br>Mean $\pm$ S.D | Mean Difference | t-value<br>(p-value) |
|---------------------|-------|----|----------------------------------|------------------------------------|-----------------|----------------------|
| Oswestry Disability | MHT   | 15 | 44.87 $\pm$ 4.868                | 38.00 $\pm$ 5.593                  | 6.867           | 9.677**<br>(0.000)   |

|       |            |    |               |               |       |                  |
|-------|------------|----|---------------|---------------|-------|------------------|
| Index | MHT + ex's | 15 | 41.53 ± 3.739 | 35.53 ± 3.642 | 6.000 | 10.108** (0.000) |
|-------|------------|----|---------------|---------------|-------|------------------|



Graphical representation of Oswestry disability index in MHT group and MHT + ex's group

## RESULTS

A total of 30 subjects were selected who met the inclusion criteria of the study. The means + standard deviations of age in groups A and B were  $50.93 \pm 10.33$ ,  $42.67 \pm 17.56$  and  $46.80 \pm 14.77$  respectively. This study aimed to assess the short-term impact of comparing MHT Vs MHT + exercises on pain severity, disability index and range of motion in patients with Mechanical low back pain. The results were evaluated by comparing data within each group and between two groups: group A (MHT), group B (MHT + Mc Kenzie ex's) with information collected at baseline at starting day of treatment i.e., on day 1 and after completion of treatment i.e., on 4<sup>th</sup> week

### GROUP A (MHT)

This group showed substantial reductions in VAS pre ( $7.27 \pm 1.10$ ) to post ( $5.67 \pm 1.18$ ) and ODI scores pre ( $44.87 \pm 4.868$ ) to post ( $38.00 \pm 5.593$ ). ROM also improved flexion pre ( $4.80 \pm 1.26$ ) to post ( $6.60 \pm 1.24$ ), extension pre ( $2.47 \pm 1.73$ ) to post ( $5.20 \pm 1.47$ ), lateral flexion right pre ( $9.07 \pm 1.486$ ) to post ( $14.13 \pm 2.748$ ) and lateral flexion left pre ( $12.60 \pm 2.798$ ) to post ( $17.93 \pm 3.327$ ). This values suggests that Moist heat therapy has greatly reduced pain, lumbar rom and disability index.

### GROUP B (MHT + Mc Kenzie ex's)

This group demonstrated significant decreases in VAS pre ( $7.60 \pm 0.91$ ) to post ( $5.67 \pm 1.11$ ) and ODI scores pre ( $41.53 \pm 3.739$ ) to post ( $35.53 \pm 3.642$ ). ROM also improved such as flexion pre ( $6.47 \pm 2.59$ ) to post ( $11.20 \pm 3.052$ ), extension pre ( $3.27 \pm 1.831$ ) to post ( $7.27 \pm 2.219$ ), lateral flexion right pre ( $11.40 \pm 3.942$ ) to post ( $19.87 \pm 4.274$ ) and lateral flexion left pre ( $13.27 \pm 4.06$ ) to post ( $22.00 \pm 4.000$ ). The p value 0.000 indicates that the differences in ODI, VAS and ROM in all directions (flexion, extension, lateral flexion right and left) across the three time points are statistically significant.

The comparison of Moist heat therapy and moist heat Therapy along with exercises has led to statistically significant improvements in both pain and disability among the participants. The decreasing mean ranks for VAS and ODI suggest that participants experienced reduced disability and pain over the course of the both therapies. It also showed statistical improvements in all aspects of range of motion (flexion, extension, right and left lateral flexion). The comparison of the effectiveness among the groups showed the highest mean ranks for VAS and ODI, with p-values indicating statistically significant differences in group B i.e., in MHT + Mc Kenzie ex's compared to Moist heat therapy alone.

## DISCUSSION

In a study to compare the effects generated by the application of three different pack on the flexibility of the lower backs of healthy students. A study comparing three types of heat packs on lower back flexibility found that moist heat, using water-based sources, provides deeper tissue penetration than dry heat. It is more effective in easing pain, improving circulation, and relieving chronic muscle stiffness. In an article it showed that moist heat therapy also led to an increase in redness (erythema) in the lower back. Each group showed a significant improvement in flexibility, the moist heat pack delivered greater heat to the lower back region and resulted in a more noticeable improvement in the flexibility of the lower back tissues.

An article on the development of a moist heat therapy device reported that it outperforms traditional hot water bottles by ensuring precise

temperature control, real-time tissue monitoring, and enhanced safety. The device is designed to deliver effective heat therapy for managing nonspecific low back pain. Another study found that combining McKenzie exercises with conventional physiotherapy is effective, and applying moist heat before exercise yields better results than using it afterward.

## Limitations

Small sample size, short duration of study, absence of a placebo group.

## CONCLUSION

In conclusion, this study highlights the promising potential of moist heat therapy along with mc Kenzie ex's for patients suffering from mechanical low back pain (LBP). Both groups demonstrated effectiveness in reducing pain and improving disability individually, but the significant results were observed with MHT, providing superior outcomes in terms of pain reduction, muscle relaxation, and mobility improvement. The results of this clinical trial showed statistically significant improvements across both the groups, with MHT along with Mc Kenzie exercises group showing the greatest enhancement in flexibility and functional abilities.

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