

ORIGINAL ARTICLE

Comparative Effects of McKenzie Technique versus Swiss Ball Exercises Along with Hot Pack in Patients with Low Back Pain

Komal Jamil, Syeda Rida Baqir*

ABSTRACT

Objective: To compare the effects of the McKenzie technique with Swiss ball exercises for low back pain management.

Study Design: Quasi-experimental study.

Place and Duration of Study: The study was conducted at the Department of Physical Therapy Patel, Hospital Karachi, Pakistan, from May 2018 to November 2018.

Materials and Methods: A total number of 50 patients with low back pain from the age of 18-40 years were included in the study. Research participants were divided into 2 groups. Group A comprised 25 participants who performed the McKenzie exercises and Group B comprised 25 participants who performed the Swiss ball exercises. In both groups, a heating pad was applied for 20 minutes before exercise interventions. Research participants were evaluated from a numeric rating scale and the Oswestry disability index questionnaire. Data were analyzed by SPSS version 21.

Result: The results showed there is a significant effect of McKenzie Exercises in the management of low back pain; the results were evaluated by the differences in the numeric rating scale ($P= 0.016$) and the Oswestry disability index ($P= 0.026$) between Pre and Post application of the intervention. The McKenzie numeric rating scale pretreatment mean is 4.48 with (S.D \pm 0.58), the numeric rating scale post-treatment mean is 2.84 with (S.D \pm 1.625), and the McKenzie pretreatment Oswestry disability index mean is 24.87 with (S.D \pm 24.87) and post-treatment Oswestry disability index mean is 16.96 with (S.D \pm 16.96).

Conclusion: McKenzie's technique showed a more beneficial effect than the Swiss ball exercises in patients with low back pain.

Keywords: Exercises, Gymnasium Ball, Hyperthermic Pad, Lumbago, Musculoskeletal Injury.

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Introduction

Back pain is a common problem worldwide and is rated as the second most common reason for taking consultations. It is positioned as the second highest cause of disability in the U.S.¹ Backache is a symptom of many different types of diseases but not a disease

¹Department of Physical Therapy

Bahria University, Karachi, Pakistan

Correspondence:

Dr. Syeda Rida Baqir

Assistant Professor, Physical Therapy

Bahria University, Karachi, Pakistan

E-mail: dr_rida91@yahoo.com

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itself; it can be along with radiating pain in the leg or gluteal region depending on the appropriate location of pain, it is also called lumbago. Low back pain is a common and expensive health concern within the United States, influencing 80-85% of individuals over their life. Low back pain sometimes involves spasms of the surrounding muscles on the spine. Also, pain, symptom, and tingling within the buttocks or lower extremities can be linked to the back.² It is described by the extent of pain like Acute back pain (pain lasting lesser than 6 weeks), Subacute back pain (6 to 12 weeks), and Chronic back (more than 12 weeks).³ Backache is classified into specific and non-specific types of pain. It is possible to identify a cause for

specific low back pain, but it is not easy to distinguish a particular reason for non-specific back pain in many conditions, for example, fracture of the lumbar vertebra, cancer, inflammation, deformity, infections, neurological disorders, and cauda equine, etc.⁴

The technique of McKenzie (also called MDT = Mechanical Diagnosis and Therapy) is a broad term of care that is used by physical therapists. In this technique, proper instruction by the therapist, along with the active involvement of the patient, is needed. McKenzie states "that self-treatment is the most ideal approach to deliver the goods a long-lasting improvement of back pain and neck pain".⁵ McKenzie's exercises concentrated on extension exercises like manipulation techniques, range of motion exercises, and counseling of patients. These exercises can be called self-manipulation exercises and they can be used in the correction of posture and pain management at any stage.⁶ If the patient complains of pain in the leg, then it is necessary to stop the treatment. Because the intensity of these exercises should be gently increased from small to large amounts throughout the treatment. It generally depends upon the ability of patients.⁷

The Swiss ball is used by physical therapists as recreational training for core stability exercises. It provides a great effect as compared to performing constant exercise on a fixed surface.⁸ These exercises are used for the strengthening of abdominal and back muscles and also used in the treatment of unstable balance and loosening of pelvic floor muscles; in addition, these exercises are useful for the treatment of muscle spasms and stress.⁹ In addition, swiss ball exercises are used as a warm-up practice and can help to increase the flexibility of muscles that can reduce the stress on the muscles of the back, it can also use in gym work out to increase the flexibility of our body as a whole. These exercises are helpful in people who follow yoga techniques which can improve the range of motion and the prevention of possible injury.¹⁰ In our study, we compare the effects of McKenzie exercises with Swiss ball exercises to enhance the role of physical therapy and help the practitioner in the advancement of knowledge, application, and treatment of low back pain.

Materials and Methods

A Quasi-experimental study was conducted at the Department of Physical Therapy, Patel Hospital Karachi, Pakistan, from May 2018 to November 2018 after approval of the ethical committee IERC/IIRS-IU-KC/18/014. The sample size was 50 patients calculated through Open Epi software. The inclusion criteria were both male and female gender, age group of 18 to 40 years, participants with minimal to moderate disability (up to 40%) on Oswestry disability index and numeric rating scale with a grade of 5 or below in patients diagnosed with subacute mechanical low back pain, only those participants included who gave consent. Exclusion criteria were age > 40 years, previous history of fracture or surgery (spine, rib), any other systemic illness, disc pathology, and being pregnant. The data collection tool was a numeric rating scale and an Oswestry disability index. The instrument included in this study was a dry heating pad (Besmed model no. BE-255), a yoga mat, and a Swiss ball (Slim line power). The data collection procedure was done by participants fulfilling the inclusion criteria will be randomly divided into two treatment groups:

Group A: McKenzie techniques, along with a hot pack

Group B: Swiss ball exercise along with a hot pack

Patients of both groups applied the heating pad for 20 minutes before the exercises. Pre- and post-intervention assessment was conducted and recorded for the outcome measures. In the McKenzie technique, the number of treatment sessions was planned in 3 sessions per week, and a total of 18 sessions were conducted.

McKenzie Exercises

Following McKenzie, exercises were performed on research participants to evaluate the effects of intervention:

Prone Press Ups

The aim of this exercise is to reduce lower back pain, which can be caused by vertebral disc issues. The therapist guides the patient to lie in a prone position on a couch with shoulders in a position at which palms bear weight.¹¹ Now advised the patient to make a relaxed position back and abdomen by pushing the shoulders in an upward direction and placing the hips on the couch. Hold the position for 5 seconds and repeat it 8-10 times.

Prone Lying on Elbows

Physical therapists teach the patient to lie in the prone position on the couch, place elbows with the bearing of weight on the couch, and allow the hips and back to stay in contact with the couch. Maintain the position for five seconds, used repeated up to 8-10 times. This exercise is used to alleviate the pain in the back and reduce nerve pressure.¹²

Standing Extension

The purpose of this exercise is to reduce back aches and improve the mobility of the lumbar region.¹³ The therapist teaches the patient to stand and place both his hand on the iliac crest and make a posterior tilt position with 5 seconds hold and repeat this exercise 10 times.

Swiss Ball Exercises

There were 18 sessions of exercises conducted with a rate of 3 sessions per week. Following are the exercises done on participants by the therapists with the use of a Swiss ball:

Curl-up on Swiss Ball

The physical therapist told the participant to lie in a supine position on a Swiss ball and place their hands behind the head. Now advised him to contract the abdominal muscles along with lifting the spine in an upward direction. Stabilize the ball by keeping the pelvis in a neutral position. Hold this position for 5 seconds and repeat it 8-10 times. This exercise is to be used to increase muscular strength and endurance.¹⁴ This exercise helps to increase the strengthening of the core muscles of the abdomen, which will reduce the backache.

Bridging on Swiss Ball

To increase the strength of the gluteal region, hamstrings, and inner thigh, bridging on a Swiss ball can be applied.¹⁵ For this exercise therapist advised the patient to lie in the supine position, place feet on the ball with pointed toes forward along with extended hands on the sides. now contract muscles

of the abdomen and gluteal region by lifting the trunk and hips in an upward direction. Maintain the position for five seconds and repeat this maneuver at least 10 times.

Front plank

In this exercise posture, core muscle strength, balance, coordination, and flexibility are targeted by the physical therapist who advised the subject to adopt a plank position on the ball instead of the floor and the position of the upper limbs should be perpendicular to the floor by the placement of elbows on the floor under the shoulders.¹⁶ Now, lifting of shoulder and pelvis to clear the ground, the stabilizing points during the exercise were both elbows and feet on the ground. Hold this position for 5 seconds and repeat it 8-10 times.

Data were analyzed by Statistical Package for Social Sciences version 21. Paired T-Test was used. The Confidentiality of the participants was maintained. Data were coded, and subjects were given the right to participate in the study willingly.

Results

In this study, a total of 50 patients were included between the Ages of 18 to 40 years. The male gender percentage is 52.0%, and the female percentage is 48.0 %. In this study, the percentage of unmarried is 32.0%, and the married marital status percentage is 68.0%. Comparative results of McKenzie pre and post-treatment. The McKenzie NRS pretreatment mean is 4.48 with a standard deviation of +0.58 and the NRS post-treatment mean is 2.84 with a standard deviation is +1.625 and the McKenzie pretreatment ODI mean is 24.87 with a standard deviation is +24.87, and the post-treatment ODI mean is 16.96 with standard deviation is +16.96. The *p*-value of McKenzie pre and post-treatment NRS is shown in tabular form in Table no.1 and in the form of a bar chart in Figure no 1.

Comparative results of before and after application

Table 1: Comparison of McKenzie pre and post-treatment Mean

| Variable | Pre-test Mean (S.D) | Post-test Mean (S.D) | P value |
|----------|------------------------|-------------------------|---------|
| NRS | 4.48 (±0.586) | 1.84 (±1.625) | 0.016 |
| ODI | 24.87 (±4.653) | 16.96 (±8.048) | 0.026 |

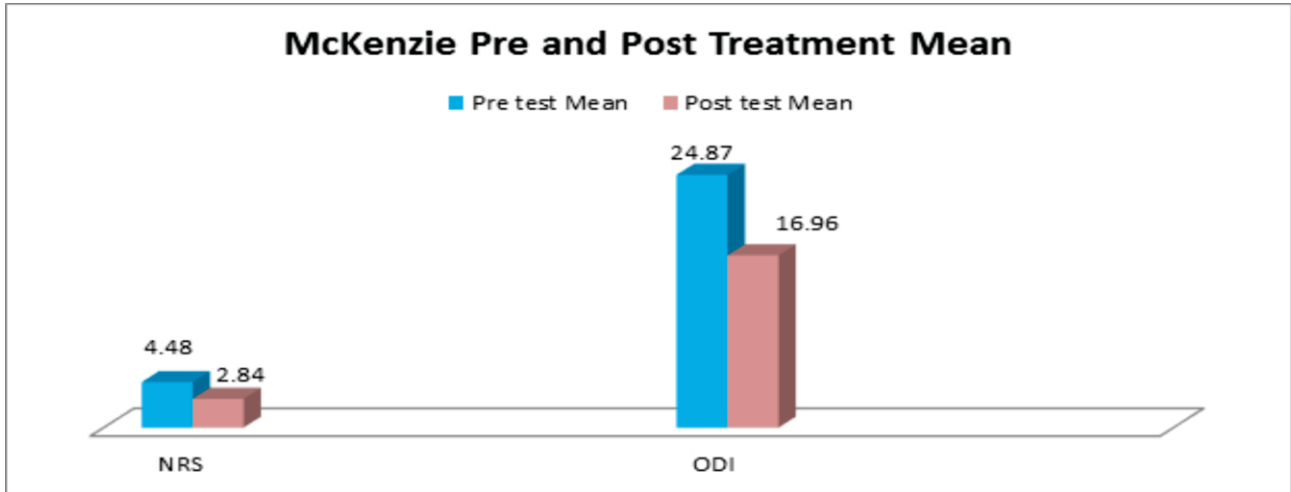


Fig 1: Comparison of McKenzie pre and post-treatment mean

of Swiss ball exercises. The second group of Swiss ball NRS pretreatment means is 4.28 with a standard deviation is +0.614. The post-treatment NRS of the Swiss ball mean is 3.44, with a standard deviation is about +2.123. The ODI in the pretreatment of the Swiss ball mean is 25.70 with a standard deviation is

+5.586 and the ODI of the Swiss ball group in post-treatment is about 22.02 with a standard deviation is +9.137. The *p*-value of the Swiss ball group in pre and post-treatment of NRS is shown in tabular form in Table no 2 and in the form of a bar chart in Figure no 2.

Table 2: Comparison of swiss ball ore and post-treatment mean

| Variable | Pre-test Mean (S.D) | Post-test Mean (S.D) | <i>P</i> value |
|----------|------------------------|-------------------------|----------------|
| NRS | 4.28 (+0.614) | 3.44 (+2.123) | 0.016 |
| ODI | 25.70 (+5.586) | 22.02 (+9.137) | 0.027 |

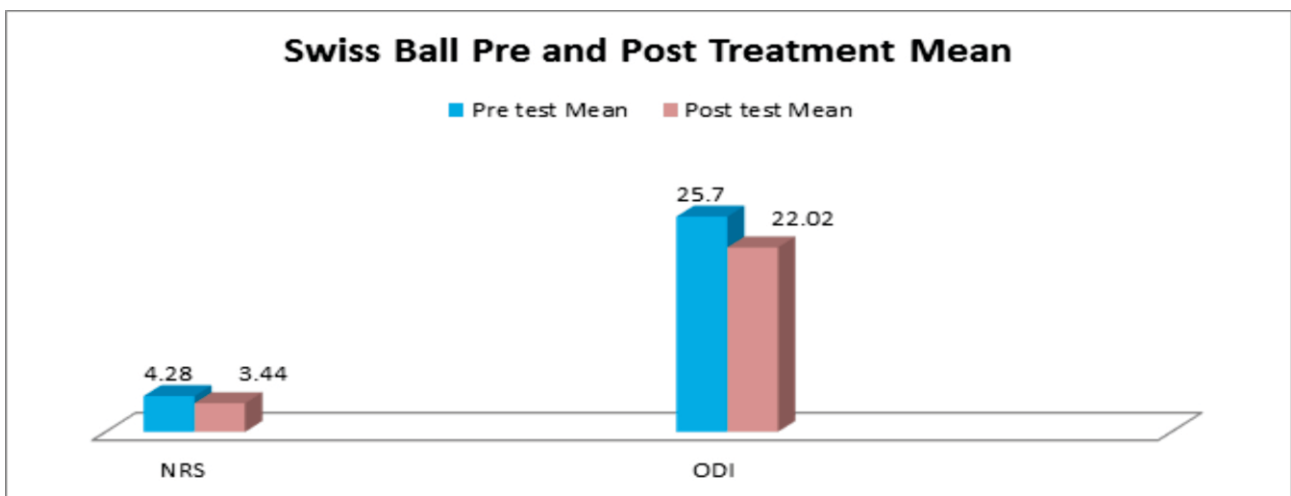


Fig 2: Comparison of Swiss Ball Pre and Post-Treatment Mean

Discussion

In this study, we compared the effects of McKenzie exercises versus Swiss ball exercises in low back pain management. Before performing the exercises, the

therapist applied the heating pad over the back region for about 20 minutes in both groups and then perform the exercises. The data showed a significant difference between before and after intervention

values of the Numeric rating scale and Oswestry disability index scores. In this study, 50 participants were categorized into 2 groups. Group A had 25 patients to perform McKenzie exercises, and the other group B had 25 patients to perform the Swiss ball exercises. A study reported that patients who were treated with the McKenzie technique did not show extra consequences for worldwide impact, disability, work, or on the danger of tenacious manifestations. These patients looked for fewer extra medicinal services than those getting just first-line care.¹⁷ In contrast with our study, results showed huge relief in low back pain from performing the McKenzie technique in the management of low back pain. In this study, the participants of the group A got better than the other group B. Group A participants improved their activities of daily living, social activities, and personal care activities more than the other group.

A study reported that those accepting the McKenzie convention enhanced to an essentially more prominent degree than did the subjects in the Williams group and that these progressions happened in an essentially shorter timeframe.¹⁸ Our study determined that the McKenzie technique works more effectively rather than Swiss ball exercises in decreasing pain intensity. A study that reported the outcomes uncovered that sustained natural apophyseal glide procedures on the lumbar spine may enhance flexion ranges superior to the posteroanterior preparation. So also, the gain altogether lumbar extension was huge in both the posteroanterior activation and the press-up.¹⁹ Furthermore, a study showed that there was a huge contrast seen on examination between the before and after insights of both the party, when a correlation was made between the after-effects of the two treatments, there was no critical contrast. Application of exercise applied on the mat and Swiss ball demonstrated huge variations in the quality of muscles however, when the impacts of the intercession on the mat and Swiss ball were thought about no critical changes were seen.²⁰

Rathore et al., found that stabilization practices utilizing a ball can enhance weight bearing help with discomfort and in the L4 and L5 portions for patients with low back pain. The stabilization practice utilizes

a ball for compulsory activity technique for patients with low back agony in a restoration program by expanding useful capacity and the trunk area of the multifidus.²¹ Another study by Petersen et al. showed that the McKenzie treatment was superior to others. The mean difference was 1.5, and the other group was 1.5, respectively.²² However, in our study, the result of the application of exercises on the Swiss ball was not significant as the pre-mean of McKenzie techniques is 24.8 and the post-mean is 16.9. There was also a significant improvement in the pain of participants in group A at the end of treatment with McKenzie exercises. There was a significant change in NRS and ODI scores in the McKenzie exercise versus the Swiss ball before and after the intervention. So, the McKenzie method was beneficial for patients with back pain and previous studies also demonstrated that this technique helps decrease the pain and improve their disabilities.

Conclusion

The data demonstrated that a treatment program based on the McKenzie technique creates appreciable relief in pain as compared to Swiss ball exercises. The limitations of the study are that the sample size is small, and we only choose those patients who understand the Urdu or English language. Due to the language barrier, you cannot explain the procedure to the patients easily.

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