



THE EFFECTIVENESS OF MCKENZIE EXCERSISES ALONG WITH HOT PACK VERSUS SWISS BALL EXCERSISES IN PATIENTS LOW BACK PAIN

SHAIK AMINA AFREEN
STUDENT
SIMS COLLEGE OF PHYSIOTH

DR. BUDALA DIVYA
ASSISSTANT PROFESSOR
SIMS COLLEGE OF PHYSIOTHERAPY

DR CHRISTIE KIRAN GOTRU
PROFESSOR
SIMS COLLEGE OF PHYSIOTHERAPY

ABSTRACT

BACKGROUND AND PURPOSE: low back pain is ache or discomfort in the lower back , its characterized by a range of symptoms which includes pain, muscle tension or stiffness, Tingling or burning sensation ,Weakness in the legs or feet ,Stiffness in the morning ,Loss of balance, coordination ,Loss of bowel or bladder control ,Muscle weakness ,Numbness or tingling in the limbs. Each year 15-20%of the population will have back pain . the current relative values of incidence and prevalence of LBA are 0.6% and 7.8% of all cases respectively

AIM: To know the effectiveness of McKenzie exercises along with hot pack v/s Swiss an ball exercises along with hot pack in patients with low back pain

METHODOLOGY: 30 subjects were taken and were conveniently randomized into two groups, in such a way that 15 subjects are allocated into each group. The groups were named as group A and B . both the groups were treated with different techniques in order to clearly identify and analyze the difference and better result among the two techniques. [**Group A was treated with McKenzie exercises along with hot pack and Group B was treated with Swiss ball along with hot pack**], both male and females were considered equally. Treatment is given for 12 weeks 5 sessions per week for 30 mins. The outcome measures of pre-test and post-test were assessed by using Oswestry disability index {ODI}, numerical pain rating scale {NPRS}and manual muscle testing {MMT}

RESULTS: The results showed there is a significant effect of McKenzie Exercises along with hot pack when compared to swiss ball technique along with hot pack in the management of low back pain.

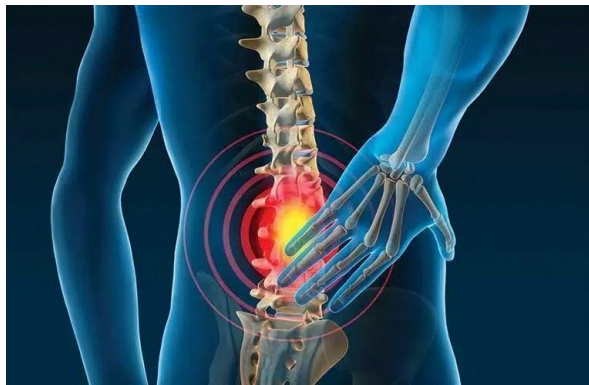
CONCLUSION: The present study concludes that use of McKenzie exercises along with hot pack more effective than using Swiss ball exercises along with hot pack in treating subjects with low back pain.

KEYWORDS:

Hot packs , McKenzie exercises, Numerical pain rating scale (NPRS), Oswestry disability index (ODI), Swiss ball , Manual muscle testing (MMT)

INTRODUCTION

The low back is remarkably a well-engineered structure of interconnecting bones, joints, nerves, ligaments and muscles, all working together to provide support, strength and flexibility. The lower back comprises the lumbar spine, sacrum and the coccyx, which is formed by vertebral bones, intervertebral discs, nerves, muscles, ligaments, and blood vessels. low back pain is an ache or discomfort in the lower back and spinal column, characterized by a range of symptoms which includes pain, muscle tension or stiffness. Low back pain is the commonest condition affecting the lumbar spine which causes significant discomfort, limitation in daily activities and impact on quality of life.



The worldwide prevalence of low back pain (LBP) ranges between 2–25%. Annual, and lifetime prevalence of LBP in India was 48%. prevalence increases with age up to 80 years,

The etiology of low back pain is complex and multifactorial, hence they are Degenerative disc diseases, Herniated disk, Sprain or strain, Spondylolisthesis Lumbar spinal stenosis, Scoliosis , Cauda equina syndrome ,Osteomyelitis and many morePain Ranges from mild and annoying to severe and debilitating pain. it may be confined across the low back or radiating down into the buttock and leg(sciatica). The low back pain may feel dull or achy or alternatively, feel stinging and burning. Many people with back pain find it hard to stand up straight. you may stand “crooked” or bent, with your torso off to the side rather than aligned with your spine. Your lower back may look flat instead of curved. Muscle spasms can cause extreme pain and make it difficult or impossible to stand, walk or move.

TREATMENT

The treatment can be divided into 3 types which there by it involves preventive method, conservative methods and physiotherapy management. The physiotherapy treatment in accordance to low back ache to the involves methods such as McKenzie exercises, Swiss ball exercises and hot pack therapy Preventing low back pain involves a combination of lifestyle modifications, exercises, and ergonomic adjustments such as Lifestyle Modifications by Maintain a healthy weight Regular exercise (aerobic, strengthening, flexibility) Balanced diet (rich in calcium, vitamin D, omega-3 fatty acids) Stress management, Ergonomic Adjustments,Propersitting posture Adjustable chair height and lumbar support Footrest or floor mat Monitor and keyboard alignment .

Conservative methods for managing low back pain focus on alleviating symptoms, improving function, and enhancing quality of life without surgery. Here are some effective conservative approaches. Pain Management Acetaminophen (Tylenol) or NSAIDs (ibuprofen, naproxen) Muscle relaxants (cyclobenzaprine)Topical creams (capsaicin, lidocaine) Oral steroids (short-term)

PHYSIOTHERAPY MANAGEMENT

Physical therapy helps restore the patient's ability to perform daily activities with little-to-no discomfort. Large-scale studies have shown that physical therapy can provide up to 60% improvement in lower back pain and other symptoms.The exercises are intended to provide flexibility and strength training to the entire kinetic chain—groups of body segments, joints, and muscles that work together to perform bodily movements.

Hot pack therapy

Heat therapy, also known as thermotherapy, works by applying heat to an affected area to treat damaged muscles, joints or tissues in the body. Its primary use is to help relieve persistent pains associated with muscle stiffness, sensitivity and cramping.

While the overall qualities of warmth and heat have long been associated with comfort and relaxation, heat therapy goes a step further and provides both pain relief and healing benefits for low back pain. Heat therapy promotes healing by increasing blood flow to the muscles in the lower back. Increased blood flow delivers more oxygen, white blood cells, platelets, and essential nutrients – all of which help repair damaged tissues heal.

McKenzie exercises therapy

The McKenzie back exercises belong to an exercise protocol pioneered by physiotherapist Robin Anthony McKenzie in the 1950s and popularized around 1985. The McKenzie method, also known as Mechanical Diagnosis and Therapy (MDT), is widely used as a classification system for the diagnosis and treatment of a variety of musculoskeletal conditions, including lower back, neck, and extremity pain.

The McKenzie method has wide acceptance as an effective program for back pain. It stresses self-treatment through posture correction and repeated exercise movements at end-range performed with high frequency. The McKenzie method emphasizes the centralization phenomenon in the assessment and treatment of spinal pain, in which pain originating from the spine refers distally, and through targeted repetitive movements the pain migrates back toward the spine

Swiss ball therapy

The physical object known as a Swiss ball was developed in 1963 by Aquilino Cosani, an Italian plastics manufacturer he developed a process for molding large puncture resistant plastics balls. The term "Swiss ball" was coined because one of the earliest noted uses of an exercise ball was in Switzerland in 1965, where a group of physical therapists used it in their work with children with cerebral palsy. The exercise ball may also be referred to as: gym ball.

The exercise ball is an exercise treatment option for back pain sufferers and is designed to help prevent or minimize further episodes of low back pain as part of a rehabilitation program. The exercise ball is effective in rehabilitation of the back because it strengthens and develops the core body muscles that help to stabilize the spine.

With the exercise ball, also called a Swiss ball or physio ball, an element of instability is introduced to the exercise that one would not normally get in a floor exercise. The body responds naturally and automatically to this instability to keep balanced on the exercise ball.

NEED OF THE STUDY

The need for research on low back pain is essential as it is one of the most common musculoskeletal disorders, affecting up to 80% of adults at some point in their life. There are various interventions such as electrotherapy, exercise therapy and manual therapy techniques. McKenzie technique, it is one of the exercise therapy techniques used in spine care programs in an effort to reduce pain and to improve range of motion and function. McKenzie exercises are known to reduce pain quickly and minimize the risk of recurrence of pain. The need for choice of McKenzie technique is that surgery can be avoided and it is cost effective and mostly stresses self-treatment. Though Swiss ball along with hot pack have proven to reduce low back pain it can also be used for other conditions but McKenzie more remarkable for this condition. McKenzie technique along with hot

pack can help develop personalised treatment plans tailored to individual needs. McKenzie technique prevents the low back pain, reducing its incidence and recurrence in people

AIMS AND OBJECTIVES

AIM

The aim of the study is to decrease pain intensity and reduce disability in subjects suffering with low back ache. Thereby leading to improvement in overall quality of life of a patient with low back ache

OBJECTIVES

1. To determine the effectiveness of McKenzie exercises along with hot pack on pain, disability in patients with low back ache
2. To determine the effectiveness of Swiss ball along with hot pack on pain, disability in patients with low back ache
3. To compare the effectiveness of McKenzie exercises along with hot pack versus swiss ball along with hot pack in patients with low back pain

REVIEW OF LITERATURE

1. **Aniqa Nasreen, Zarafshan Majeed , Malik Ali Hassan(2022)**- a randomized control trail was conducted in 36 subjects . By lottery method they were divided into 3 groups group a received conventional therapy , group b received back school exercises ,group c receives McKenzie exercises. The study duration was about 4 weeks. The 2 outcome measures taken are NPRS scale and RMDQ scale. This study concluded that McKenzie exercises are more effective than back school exercises for the management of low back pain
2. **Gaurav Bhatnagar, Shruti Tadmare, Shital Ghule(2024)**- a comparative study was conducted in 30 subjects , a randomised sampling technique is used and divided into 2 groups . Group a received mckenzie excersises and group b received neural mobilizations . The study duration was about 4 weeks . The 2 outcome measures taken are vas scale and mmst. In the current study the McKenzie Technique was found to be more effective than neural mobilization in decreasing pain, increasing spinal flexion-extension ROM
3. **Arzoo Nawaz, Sana Hafeez , Usama Ahmad(2024)**- conducted a comparative study on 36 participants , who were randomly allocated into group a and group b , group a received rhythmic stabilization exercises whereas group b received McKenzie exercises . The study duration was 8 weeks. the 2 outcome measures taken are nprs and modi score . It was concluded that McKenzie's technique was demonstrated to be more effective in alleviating pain and impairment, as well as improving mobility
4. **Czajka , Aleksandra Baszak , Malgorzata (2018)**- These 3 members gave a feedback through a literature review. Thereby the analysis included 50 articles from the last 20 years dealing with the issue of diagnosis and therapy of low back pain with the use of McKenzie Method. After the application of inclusion criteria, 22 publications were taken into account in the final analysis.

5. **Mauris Van and Luciana Machado(2019)**-conducted a randomised controlled trail study on the effectiveness of McKenzie method for low back ache. This study included total of 60 participants recruited from primary and tertiary care. Three trails were conducted in the USA, one in Australia and one in Scotland. There findings suggested that McKenzie exercises were effective in reduction of low back ache
6. **Smriti singh , Rakesh Ranjan , kumari sandhya (2023)**- conducted a randomized controlled trail on 30 subjects. To study the effects of mckenzie excersise and other treatment techniques in reducing pain and disability in low back pain. The study duration was about 12 weeks. The outcome measures taken was, nprs and mcgill questionarre for pain and rmdq, fsq, odi for functional disability. It was concluded that mckenzie excersises is equally effective to other manual therapy technique but slightly effective than passive treatment in decresasing pain and disability.
7. **Hesham, Naglaa zaky, maya galal(2022)**- conducted a comparative study on 34 participants , who were randomly divided into 2 groups names as group A and group B Group a received mckenzie extension excersises and group b received william flexion excersises. The study duration was about 4 weeks . The outcome measures taken are vas scale and vestibular balance score and balance board score . In the current study the both McKenzie Technique and William flexion excersises found to be effective comparably in decreasing pain, increasing spinal flexion-extension ROM .
8. **Jibi paul, v. indhumathi, Sathya p (2021)**- these 3 members performed a comparative study on 30 samples , who were randomly divided into 2 groups names as group A and group B. Group a trained with motor control exercises using swiss ball and group b trained with stretching exercises. The study duration was about 12 weeks . The outcome measures taken are vas scale , quebec disability scale . In the current study motor control traning using swiss ball is more effective than stretching to reduce pain , and disability in patients with low back pain.
9. **Sumit Raghav, Anushka singh (2017)**- conducted an experimental study on 30 subjects in which 13 were females and 17 were males . these study was conducted for 6 weeks . the outcome measures taken were odi, vas , and deet score. The conclusion derived from the experimental study done was swiss ball exercises were effective in reducing pain and disability in patients with low back pain.
10. **Anas alhakami, sally davis, mohammed qasheesh(2017)**- a systemic literature review of randomized control trail were performed using 6 databases on the effects of mckenzie and stabilization exercises in reducing pain intensity and fuctional disability in individuals with chronis low back pain . a total of 829 articles were found from the database of which 10 were selected to arrive at conclusion of mckenzie excersises were found to be effective for subjects with low back ache.
11. **Khadija Usman , Hassan nassir (2023)**- conducted a comparative study comparative study on 30 participants , who were randomly divided into 2 groups names as group A and group B. Group a was given mckenzie excersises and group b was given williams excersises The study duration was about 6 months . The outcome measures taken are vas scale and numerical pain rating scale . it was found that mckenzie excersises were deemed to be more effective than williams excersises motor control traning using swiss ball is more effective than stretching to reduce pain , and disability in patients with low back pain.

12. **ArbnoRE IBRAHIMAJ, SAMIRE DELIU, SYLEJMAN**- conducted a random controlled trail to study the effectiveness of McKenzie method in the treatment of low back pain sub acute and chronic stage on 100 patients who were randomly divided into 2 groups named group A and group B, age above 23 years both the sexes were included . it was conducted for 2 weeks. Thereby it was concluded that mckenzie exercises were found to be effective
13. **TARCISIO, CHRIS G MAHER, HELEN**- - conducted a random controlled trail to study the effectiveness of McKenzie method based self-management approach for the secondary prevention of low back pain on 50 patients of at least 18 years old in who were randomly divided into 2 groups named group A and group B . it was conducted for 12 weeks Thereby it was concluded that this approach was found to be effective in reducing recurring low back pain and its cost effective.

HYPOTHESIS

NULL HYPOTHESIS (H0) :

There may not be a significant difference of the effectiveness of McKenzie technique along with hot pack in patients with low back pain

ALTERNATE HYPOTHESIS (H1) :

There may be a significant difference in the effectiveness of McKenzie technique along with hot pack when compared to Swiss ball along with hot pack in patients with low back pain

MATERIALS AND METHODOLOGY

ETHICS:

- All the time during the period of study ethical issues will be followed with utmost care and due respect towards the patient's health. All the patients will be asked for their informed consent before entering the trial.
- Each patient shall be explained about both beneficial and potential harmful effects (if any) of the treatment which he/she was supposed to receive. The participants will be explained about the purpose of the trial. The request for the termination of the treatment by the patient at any time of the study shall never be denied.

MATERIALS USED ARE:

- ❖ mat
- ❖ Pillow
- ❖ Swiss ball
- ❖ Follow up record of the patient

- ❖ Pen, paper
- ❖ Hydrocollator packs
- ❖ Towels
- ❖ Consent form from the patient

STUDY DESIGN: Comparative study design

STUDY SETTING: Outpatient department of SIMS college of physiotherapy, Guntur, Andhra Pradesh

STUDY SIZE: 30 subjects are taken and divided into 2 groups, group A and group B (15 in each group)

SAMPLING METHOD: random sampling technique.

STUDY DURATION: 12 weeks is the total duration taken for the treatment of low back pain, 5 sessions per week for 30 mins

ELIGIBILITY CRITERIA:

INCLUSION CRITERIA

- ❖ Age group between 18-50 years
- ❖ Both male and female will be included
- ❖ Pain aggravates with daily activities in lower back region
- ❖ Patients who are willing to participate
- ❖ Oswestry disability scale in moderate level of disability
- ❖ Patients with moderate to severe pain in numerical pain rating scale

EXCLUSION CRITERIA

- ❖ Age group less than 18 years above 50 years
- ❖ Patients with low back ache along with radiating pain would be excluded
- ❖ Subjects who have undergone any surgeries over the lower back region before 6 months
- ❖ Subjects who have had any spinal fractures recently
- ❖ Subjects who have any kind of psychiatry disorders or mental retarded patients
- ❖ Subjects having other neurological disorders which causes severe motor weakness
- ❖ Subjects having osteoporosis, severe cardiovascular diseases

OUTCOME PARAMETERS

Outcome parameters, also known as outcome measures or endpoints, are variables measured in research studies to assess the effectiveness, safety, or efficacy of an intervention, treatment, or policy

- **OSWESTRY DISABILITY INDEX (ODI)**

The Oswestry Disability Index (ODI) a patient-completed questionnaire which gives a subjective percentage score of level of function (disability) in activities of daily living in those rehabilitating from low back pain. It was developed by Jeremy Fairbank and Graham Pynsent in Oswestry, England in 1980 and considered one of the best accepted tools for assessment of low back pain

Items:

Questionnaire examines the level of disability in 10 everyday activities of daily living.

- Pain intensity
- Personal care
- Lifting
- Walking
- Sitting
- Standing
- Sleeping
- Sex (if applicable)
- Social
- Travel

Materials needed:

- pen or pencil: for the patient to mark their answers on the questionnaire.
- Oswestry disability index questionnaire
- Scoring sheet: this is used to calculate the patients score based on their answers
- Calculator(optional); to help with scoring and calculator

Scoring:

Each item consists of 6 statements which are scored from 0 to 5. With 0 indicating the least disability and 5 the greatest then the total score is calculated as a percentage, with 0% indicating no disability and 100% indicating the highest level of disability.

Table 1: Assessment of Oswestry Disability Index (ODI) (Greenberg, 2010).

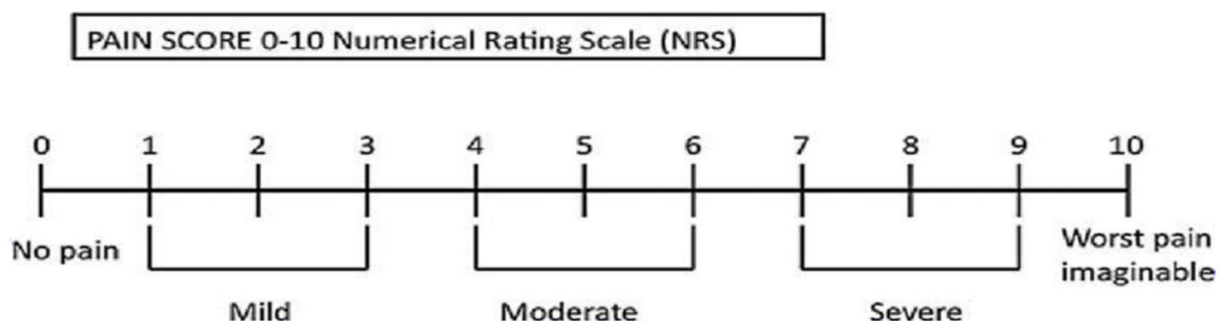
Score	Interpretation
0-2%	Minimal Disability: Can cope with most daily activities
21-40%	Moderate Disability: Pain and difficulty with sitting, lifting and standing. The patient may be disabled from work
41-60%	Severe Disability: Pain is the main problem, but other areas are affected
61-80%	Crippled: Back pain impinges on all aspects of the patient's life
81-100%	These patients are either bed-bound or else exaggerating their symptoms

- **NUMERICAL PAIN RATING SCALE(NPRS)**

The Numeric Pain Rating Scale (NPRS) (an outcome measure) that is a unidimensional measure of pain intensity in adults The common format is a horizontal bar or line. the NPRS is anchored by terms describing pain severity extremes.

MATERIALS REQUIRED:

- NPRS form or paper with a numbered scale from 0 to 10
- Pen or pencil for patient to mark their pain level
- Chart or graph to track changes in pain levels



SCORING:

0 =indicates no pain

1–3=indicates mild pain

4–6=indicates moderate pain

7–9=indicates severe pain

10=indicates worst imaginable pain

- **MANUAL MUSCLE TESTING (MMT)**

Manual muscle testing (MMT) is a way to evaluate muscle strength and is often used as part of a neurological exam. MMT, which uses a grading scale of 0 to 5.MMT is often used to evaluate patients with suspected neurological diseases, such as stroke, brain injury, spinal cord injury, and low back ache. Muscle strength can decrease with age and can also be impaired by many medical conditions

Essential Equipment:

1. Muscle Testing Chart or Poster: Visual aid illustrating muscle groups and testing positions.
2. Measuring Tape or Ruler: Measures joint range of motion and limb length.
3. Goniometer: Measures joint angles.

Manual Muscle Testing Grades	
Grades	Description
0	No visible or palpable contraction.
1	Visible or palpable contraction without motion
2	Full range of motion, gravity eliminated
3	Full range of motion against gravity
4	Full range of motion against gravity, moderate resistance
5	Full range of motion against gravity, maximal resistance

PROCEDURE

30 subjects were conveniently randomized into two groups, each group consisting of 15 subjects [Group A- treated with McKenzie exercises along with hot pack and Group B- treated with Swiss ball along with hot pack], both male and females were considered equally. Baseline data were taken for all 30 subjects.

Group A- [MCKENZIE EXCERSISES ALONG WITH HOT PACK]

The method has a unique approach to assessment and provides individualized exercises-based treatment aimed to relieve both symptoms as well as cause of the pain.

Firstly, patients are made to apply hot packs (fig:1) for a duration of 20 mins prior to the treatment. Pre- and post-intervention assessment was conducted and recorded for the outcome measures. the McKenzie technique, was given for a period of 12 weeks. 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 11 palms bear weight. 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.(fig:2)

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.(fig;3)

Standing Extension:

The purpose of this exercise is to reduce back aches 13 and improve the mobility of the lumbar region. 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 for 10 times.(fig 4)

Fig;1**fig;2****Fig:3****fig:4**

Group B: [Swiss ball exercises along with hot pack]

Firstly, Patients are made to apply hot packs (fig:1)for a duration of 20 minutes prior to the treatment with Swiss ball. Pre- and post-intervention assessment was conducted and recorded for the outcome measures. Swiss ball exercises was given for a period of 12 weeks, 5 sessions per week, each session is of 60 mins. 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 14 endurances. This exercise helps to increase the strengthening of the core muscles of the abdomen, which will reduce the backache. (fig:2)

Bridging on Swiss Ball

To increase the strength of the gluteal region, hamstrings, and inner thigh, bridging on a Swiss ball 15 can be applied. 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(fig:3)

Spinal rotation

In this exercise posture, Rotating your spine from side-to-side works out not only the paraspinal muscles right next to your spine, but also other core muscle groups such as the lateral obliques, abdominals and muscles of the pelvis. While sitting upright on the exercise ball, you can place your hands on your hips), making sure that your feet are firmly on the floor. Then rotate as far as you can in one direction , holding for a few seconds at the end of the range. Contract the muscles in your core Then slowly rotate back to the neutral position for a second before rotating in the opposite direction. Aim for about 10 rotations in both directions (fig:4)

Fig:1



Fig:2



Fig:3

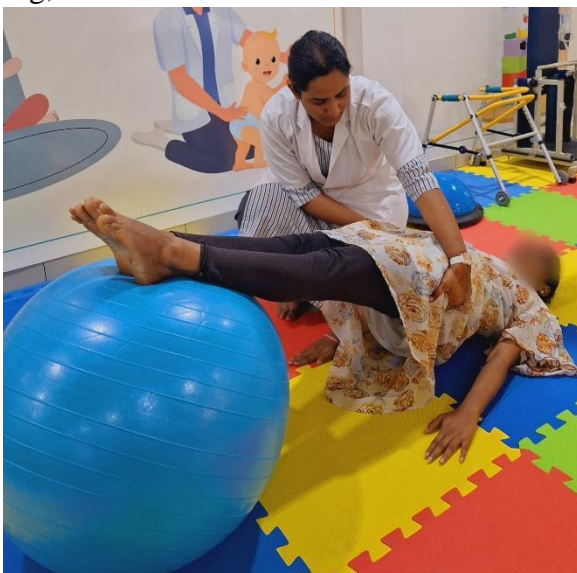


Fig:4



STATISTICAL ANALYSIS

Statistical analysis was performed using graph pad. The demographic data like standard deviation and main percentage were calculated and presented.

BETWEEN THE GROUPS: Unpaired t-test was performed which assess the statistical difference in mean values between the groups.

WITH IN THE GROUPS: Unpaired t-test was performed which assess the statistical difference within the groups.

To observe the impact of treatment before and after in the groups, the analysis was carried out using statistical tests, for the outcome measures Oswestry disability index (ODI) , numerical pain rating scale (NPRS) and manual muscle testing (MMT)The statistical significance was set at $p < 0.0001$. the statistical analysis was based on unpaired t test and descriptive statistical analysis . the bar graphical representation is also used as a parameter for statistical analysis.

Table 1: Analysis of mean scores of pre- and post- test values of Oswestry disability index (ODI) in group-A.

TEST	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
PRE-TEST	28.84	5.836	21.5	<0.0001
POST-TEST	2.840	1.491		

Graph 1: Comparison of mean scores of pre- and post-test values of OSWESTRY DISABILITY INDEX (ODI) in group-A

OSWESTRY DISABILITY INDEX

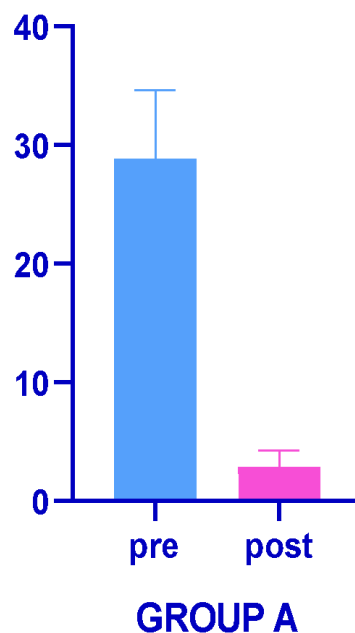
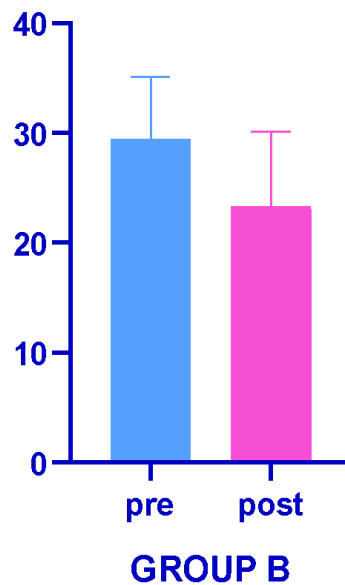


TABLE 2: Analysis of mean scores of pre- and post- test values of OSWESTRY DISABILITY INDEX (ODI) in group-B.

TEST	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
PRE-TEST	1.126	5.628	3.456	0.0012
POST-TEST	1.367	6.837		

GRAPH 2: Comparison of mean scores of pre- and post-test values of OSWESTRY DISABILITY INDEX(ODI) in group-B.

OSWESTRY DISABILITY INDEX(ODI)

**TABLE 3: analysis of mean scores of pre- and post-test values of NUMERICAL PAIN RATING SCALE (NPRS) in group-A**

TEST	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
Pre test	7.800	0.8165	26.66	<0.0001
Post test	10320	0.9000		

GRAPH 3: Comparison of mean scores of pre- and post-test values of NUMERICAL PAIN RATING SCALE(NPRS) in group-A

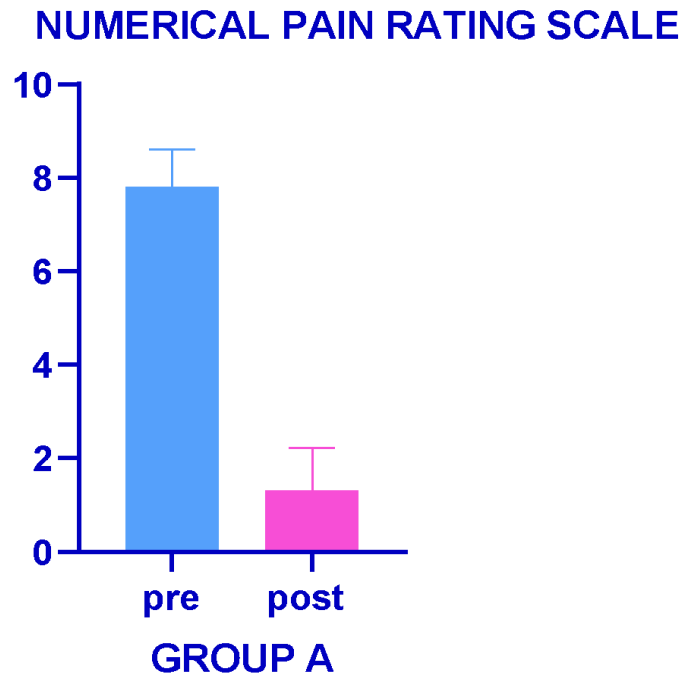


TABLE 4: Analysis of mean scores of pre- and post- test values of NUMERICAL PAIN RATING SCALE(NPRS) in group-B

TEST	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
PRE-TEST	0.1562	0.7810	3.893	0.0003
POST-TEST	0.1908	0.9539		

GRAPH 4: Comparison of mean scores of pre- and post-test values of in numerical pain rating scale (NPRS) group-B

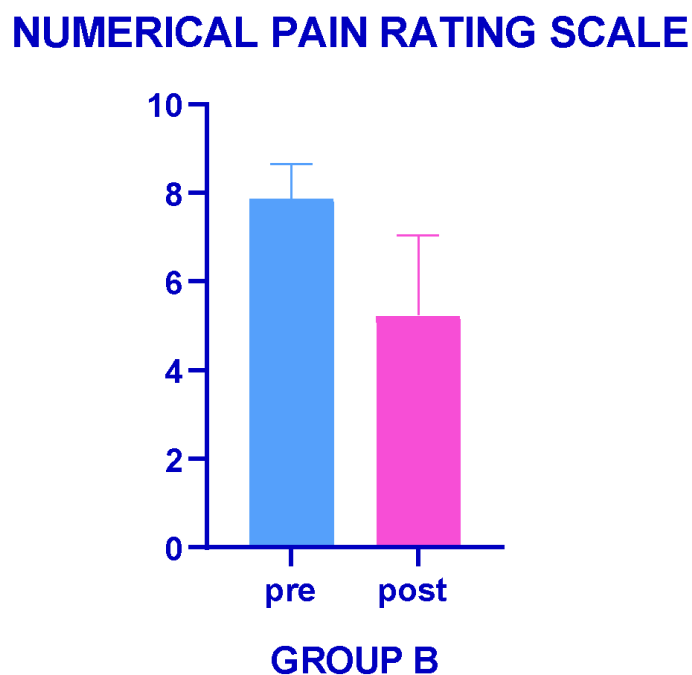
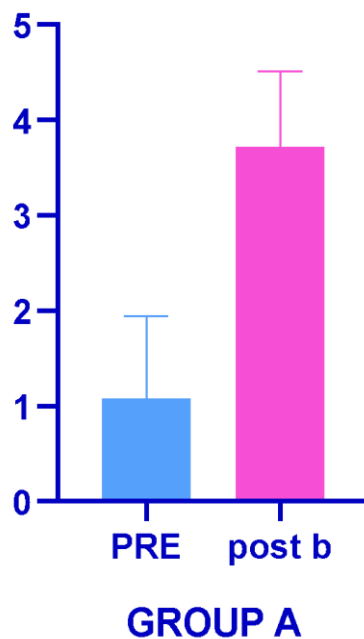


Table 5: Analysis of mean scores of pre- and post- test values of manual muscle testing (MMT) in group-A.

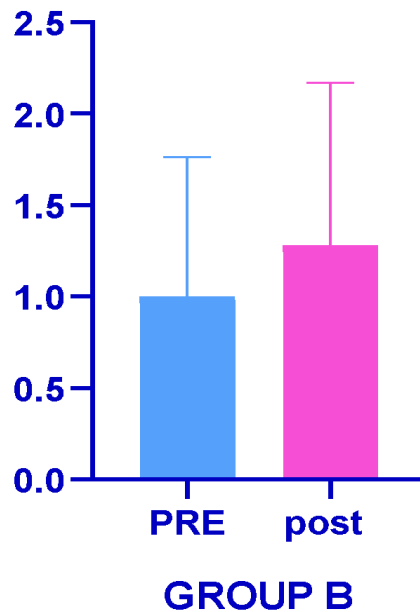
TEST	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
PRE-TEST	1.080	0.8622	11.28	<0.0001
POST-TEST	3.720	0.916		

GRAPH 5: Comparison of mean scores of pre- and post-test values of in manual muscle test (MMT) group-A

MANUAL MUSCLE TEST

**Table 6: Analysis of mean scores of pre- and post- test values of manual muscle testing (MMT) in group-B.**

TEST	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
PRE-TEST	1.000	0.7638	1.193	0.2387
POST-TEST	2.080	0.8907		

GRAPH 6: Comparison of mean scores of pre- and post-test values of in manual muscle test (MMT) group-B**MANUAL MUSCLE TEST****RESULTS**

The aim of the study is to know the effectiveness of McKenzie exercises along with hot pack in patients with low back pain, to eventually reduce disability and pain

A total of 30 subjects who met inclusion criteria have undergone baseline assessment and included subjects were randomized into two groups consisting of 15 in each group respectively. In this study 15 participants complete training in GROUP-A and 15 subjects completed training in GROUP-B without any dropouts in respective groups. The post-test mean value of The Oswestry disability index (ODI) for Group A was 2.840 and for Group B it was 1.367, The post-test mean value for numerical pain rating scale (NPRS) for Group A was 1.320 and Group B 0.1908, The post-test mean value for manual muscle testing (MMT) for group A was 3.720 and group B was 1.280. Based on the above data analysis it is evident that Group A showed significant improvement compared to Group B

The results in the study revealed that treating with Swiss ball exercises along with hot pack shown improvement in subjects with low back pain Whereas group A i.e., McKenzie exercises along with hot pack showed a significant difference with p value <0.0001 in Oswestry disability index (ODI) , numerical pain rating scale (NPRS) and manual muscle testing (MMT) which is considered as extremely significant.

DISCUSSION

The purpose of this study is to find the effectiveness of McKenzie exercises along with hot pack versus Swiss ball along with hot pack in patients with low back ache

In this study 30 patients were taken. In group A (n=15), conventional therapies like are given to the patients. In group B (n=15), group A was treated with mckenzie exercises along with hot pack and group B was treated with swiss ball along with hot pack. Both the groups showed significant improvement in function which was assessed by Oswestry disability index (ODI) and numerical pain rating scale (NPRS) and manual muscle testing (MMT). Better improvement in functional recovery and reduction of pain was seen in group-A which received Mckenzie exercises along with hot pack.

McKenzie exercises can help with low back pain by improving spinal flexibility and reducing pain. McKenzie exercises can help reduce pain levels. Improved mobility: McKenzie exercises can help improve mobility in the lumbar spine. Reduced spinal disc herniation: McKenzie exercises can help reduce the size of spinal disc herniation. Applying hot pack to a backpain can cause a number of physiological changes, including: Increased blood flow: Heat therapy increases blood flow to the affected area, which can help with pain relief and healing. Increased blood flow delivers more oxygen, white blood cells, platelets, and nutrients to the muscle. Swiss ball exercises can help with low back pain by improving flexibility, balance, and strength, and by reducing stress on the lower back, Increased flexibility and range of motion: Swiss ball exercises can improve the flexibility and range of motion in your spine.

In Oswestry disability index for group A , the P value is <0.0001 whereas the T value is 21.5 thereby the mean values in context to pre and post is 28.84 and 2.840 respectively. Hence the standard deviation has pre value is 5.836 and post value is 1.491. In Oswestry disability index index for group B , the P value is 0.0012 whereas the T value is 19.61 thereby the mean values in context to pre and post is 29.48 and 6.920 respectively. Hence the standard deviation has pre value is 5.628 and post value is 1.187. By comparing the post values group A and group B their P value is <0.0001 , the T value is 10.70 , mean post A 2.840 and mean post B is 6.920 , thereby the standard deviation post A is 1.491, post B is 1.187, The above result values hereby we can arrive at a conclusion that group A shows prominent results than group B.

In numerical pain rating scale index for group A , the P value is <0.0001 whereas the T value is 26.66 thereby the mean values in context to pre and post is 7.800 and 1.320 respectively. Hence the standard deviation has pre value is 0.8165 and post value is 0.9000 In numerical pain rating scale for group B , the P value is <0.0001 whereas the T value is 12.49 thereby the mean values in context to pre and post is 7.880 and 5.120 respectively. Hence the standard deviation has pre value is 0.7810 and post value is 0.7810 By comparing the post values group A and group B their P value is <0.0001 , the T value is 15.94 , mean post A 1.320 and mean post B is 5.120, thereby the standard deviation post A is 0.9000, post B is 0.7810s, The above result values hereby we can arrive at a conclusion that group A shows prominent results than group B.

In manual muscle testing for group A, the P value is <0.0001 whereas T value is 11.28 thereby the mean values in context to pre and post is 1.080 and 3.720 respectively. hence the standard deviation has pre value is 0.8622 and post value is 0.7916. In numerical pain rating scale for group B , the P value is <0.0001 whereas the T value is 4.548 thereby the mean values in context to pre and post is 1.000 and 2.080 respectively. Hence the standard deviation has pre value is 0.7638 and post value is 0.9092 By comparing the post values group A and group B their P value is <0.0001 , the T value is 6.802 , mean post A 3.720 and mean post B is 2.080, thereby the standard deviation post A is 0.7916, post B is 0.9092, The above result values hereby we can arrive at a conclusion that group A shows prominent results than group B.

CONCLUSION

The present study concludes that 12 weeks of treatment, 5 sessions per week each session is of 30 mins with McKenzie exercises along with hot pack for group A and Swiss ball exercises along with hot pack for group B both showed significant effect in reducing pain and disability in subjects with low back ache

The results after 12 week treatment session suggest that the decrease in pain and improve in the overall reduction of disability in both the groups but howsoever the change and improvement is more significant in (Group A) Mckenzie exercises along with hot pack is more than (Group B) which are treated with Swiss ball along with hot pack in subjects with low back ache . in the intial 4 weeks changes were similar but from the 5th to 6th week as the patient gained strength in his lower back muscles the variation in results started to begin.

SUMMARY

The present study is carried out to determine the effectiveness of mckenzie exercises versus siwss ball along with hot pack in patients with low back pain. it is a comparative study done on 30 subjects and 15 in each group divided as group a and b . group a was treated with mckenzie exersises along with hot pack where as group b was treated with swiss ball excersises along with hot pack. Both the groups were assessed by numerical pain rating scale (NPRS), Oswestry disability index(ODI) and manual muscle testing (MMT.), which are measure before and after the treatment . This results revealed that there is a difference in both the groups but group A showed significant improvement in reducing pain and disability in patients with low back pain compared to group b

LIMITATIONS AND RECOMMENDATIONS

LIMITATIONS:

- The sample size is small.
- It was also run from a single center, using a single practitioner This makes generalization is difficult.
- Negligence of pain in initial stage
- Missing treatment sessions
- Home advices weren't executed properly
- Long term effect of the exercises protocol is not known.
- Study duration is short.

RECOMMENDATIONS:

- The result would be more efficient if low back pain was diagnosed at early stages
- Lack of awareness about low back pain and its consequences
- Long term outcome should be known by further studies.
- Study duration should be more.
- Sample size should be large.

REFERENCES

1. Buchbinder R, van Tulder M, Öberg B, Costa LM, Woolf A, Schoene M, et al. Low back pain: a call for action. *The Lancet*. 2018; 391: 2384-8. doi: 10.1016/S0140- 6736(18)30488-4
2. Farzaneh JF, Akbari M, Takamjani EE, Mohsenifar H. Effect of McKenzie Techniques on Muscle Strengthening in Anterior Knee Pain. *Journal of Modern Rehabilitation*. 2018; 12: 31- 8. doi: 10.32598/jmr.12.1.31
3. Yoon JS, Lee JH, Kim JS. The effect of swiss ball stabilization exercise on pain and bone mineral density of patients with chronic low back pain. *Journal of physical therapy science*.
4. Chenot JF, Greitemann B, Kladny B, Petzke F, Pflingsten M, Schorr SG. Non-specific low back pain. *Deutsches Ärzteblatt International*. 2017; 114: 883-90. doi: 10.3238/ arztebl.2017.0883
5. Ko M, Song C. Comparison of the effects of different core exercise on muscle activity and thickness in healthy young adults. *Physical therapy rehabilitation science*. 2018; 7: 72- 7. doi: 10.14474/ptrs.2018.7.2.72

6. Lee JS, Kang SJ. The effects of strength exercise and walking on lumbar function, pain level, and body composition in chronic back pain patients. *Journal of exercise rehabilitation*. 2016; 12: 463-70. doi: 10.12965/jer.1632650.325
7. Permadi D, Indrajit RE, Santoso H, Dazki E. The Service Quality of Telemedicine in Indonesia During Covid-19: A Survey within Jakarta Area. *Jurnal Teknologi Komputer dan Sistem Informasi (JTKSI)*. 2017; 1: 3-6.
8. Ali MN, Sethi K, Noohu MM. Comparison of two mobilization techniques in management of chronic nonspecific low back pain. *Journal of bodywork and movement therapies*. 2019; 23: 918-23. doi: 10.1016/j.jbmt.2019.02.020
9. Kikuchi N, Nakazato K. Low-load bench press and push-up induce similar muscle hypertrophy and strength gain. *Journal of Exercise Science & Fitness*. 2017; 15: 37-42. doi: 10.1016/j.jesf.2017.06.003
10. Rajan Balakrishnan EY, Mahat MF. Effectiveness of the core stabilisation exercise on floor and Swiss ball on individual with non-Specific low back pain. *International Journal of Physical Education Sports and Health*. 2016; 3: 347-56.
11. Jeganathan A, Kanhere A, Monisha R. A comparative study to determine the effectiveness of the McKenzie exercise and williams exercise in mechanical low back pain. *Research Journal of Pharmacy and Technology*. 2018; 11: 2440-3. doi: 10.5958/0974-360X.2018.00450.X
12. Dzulkifli MA, Hamzaid NA, Davis GM, Hasnan N. Neural network-based muscle torque estimation using mechanomyography during electrically-evoked knee extension and standing in spinal cord injury. *Frontiers in neurorobotics*. 2018; 12: 50. doi: 10.3389/fnbot.2018.00050
13. Vlietstra L, Hendrickx W, Waters DL. Exercise interventions in healthy older adults with sarcopenia: a systematic review and meta-analysis. *Australasian journal on ageing*. 2018; 37: 169-83. doi: 10.1111/ajag.12521
14. Aksen-Cengizhan P, Onay D, Sever O, Doğan AA. A comparison between core exercises with Theraband and Swiss Ball in terms of core stabilization and balance performance. *Isokinetics and exercise science*. 2018; 26: 183-91. doi: 10.3233/IES-173212
15. Gupta G, Alok M. Effectiveness of plank exercise in low back pain. *International Journal of Science and Research*. 2018; 9. doi: 10.21275/SR201011145832
16. Cubala A, Hoffman J, Hagner W, Jurkiewicz T, Molski P, Ratuszek D, et al. Effect of McKenzie method on the severity and location of pain in patients with lumbo-sacral discopathy. *Medical and Biological Sciences*. 2012; 26: 65- 70.

ANNEXURE-1**● OSWESTRY DISABILITY INDEX (ODI)**

The Oswestry Disability Index (ODI) a patient-completed questionnaire which gives a subjective percentage score of level of function (disability) in activities of daily living in those rehabilitating from low back pain. It was developed by Jeremy Fairbank and Graham Pynsent in Oswestry, England in 1980 and considered one of the best accepted tools for assessment of low back pain

Items: Questionnaire examines the level of disability in 10 everyday activities of daily living.

- Pain intensity
- Personal care
- Lifting
- Walking
- Sitting
- Standing
- Sleeping
- Sex (if applicable)
- Social
- Travel

Equipment Required:

Conventionally ODI is applied as paper-based forms. By development of internet technologies, online calculator tools for ODI become popular. Electronic patient record (EPR) systems are specialized databases for management on patient's health records. By the integration of EPR and outcome measure databases distance patient assessment can be possible.

Materials needed:

- pen or pencil: for the patient to mark their answers on the questionnaire.
- Oswestry disability index questionnaire
- Scoring sheet: this is used to calculate the patients score based on their answers
- Calculator(optional); to help with scoring and calculator

Scoring:

Each item consists of 6 statements which are scored from 0 to 5. With 0 indicating the least disability and 5 the greatest then the total score is calculated as a percentage, with 0% indicating no disability and 100% indicating the highest level of disability.

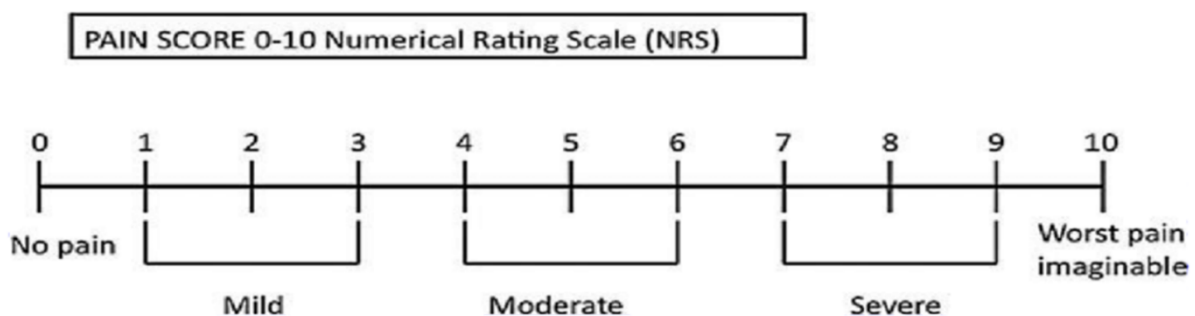
Disability (ODI scores)	f	% Of 105
0-20% (Minimal disability)	71	67.6
21-40% (Moderate disability)	33	31.4
41-60% (Severe disability)	1	1.0
61%-80% (Crippled)	0	0.0
81%-100% (Bed bound)	0	0.0
Total	105	

- **NUMERICAL PAIN RATING SCALE(NPRS)**

Feeding The Numeric Pain Rating Scale (NPRS) (an outcome measure) that is a unidimensional measure of pain intensity in adults, The NPRS is a segmented numeric version of the visual analog scale (VAS) in which a respondent selects a whole number (0–10 integers) that best reflects the intensity of his/her pain.

MATERIALS REQUIRED:

- NPRS form or paper with a numbered scale from 0 to 10
- Pen or pencil for patient to mark their pain level
- Chart or graph to track changes in pain levels



SCORING:

The Numeric Rating Scale (NRS) is an 10-point scale that measures the intensity of pain, with 0 indicating no pain and 10 indicating the worst pain imaginable, wherein

0 =indicates no pain

1–3=indicates mild pain

4–6=indicates moderate pain

7–9=indicates severe pain

10=indicates worst imaginable pain

- **MANUAL MUSCLE TESTING (MMT)**

Manual muscle testing (MMT) is a way to evaluate muscle strength and is often used as part of a neurological exam. The Medical Research Council (MRC) scale is the most common method for MMT, which uses a grading scale of 0 to 5. The grades are based on how much resistance a patient can tolerate while moving through a range of motion

MMT is often used to evaluate patients with suspected neurological diseases, such as stroke, brain injury, spinal cord injury, and low back ache. Muscle strength can decrease with age and can also be impaired by many medical conditions

Essential Equipment:

1. Muscle Testing Chart or Poster: Visual aid illustrating muscle groups and testing positions.
2. Measuring Tape or Ruler: Measures joint range of motion and limb length.
3. Goniometer: Measures joint angles.
4. Sturdy Table or Examination Bed: Supports patient during testing.
5. Comfortable Cushions or Pillows: Supports patient positioning.

ANNEXURE – 2

INFORMED CONSENT

TITLE: A COMPARATIVE STUDY FOR THE EFFECTIVENESS OF MCKENZIE EXCERSISES ALONG WITH HOT PACK VERSUS SWISS BALL ALONG WITH HOT PACK IN PATIENTS WITH LOW BACK PAIN

I (the undersigned) _____ consent to participate in this study. I was explained and made understood about the consequences and risks associated with the participation in the study. The principal investigator has answered my questions regarding all the aspects of the study. I give my permission for any results from the study to be used in any resort or research paper, on understanding that anonymity will be preserved. I understand that I may withdraw from studying at any time and without any prejudice.

ADDRESS:

SIGNATURE:

DATE:

I have explained the nature of the procedures involved in the study to which the subject has given consent to participate and answer all the questions,

INVESTIGATOR: **SHAIK AMINA AFREEN**

DATE:

Manual Muscle Testing Grades	
Grades	Description
0	No visible or palpable contraction.
1	Visible or palpable contraction without motion
2	Full range of motion, gravity eliminated
3	Full range of motion against gravity
4	Full range of motion against gravity, moderate resistance
5	Full range of motion against gravity, maximal resistance

అంగీకార పత్రము

----- అను నేను ఈ పరిశోధనలో పాల్గొనుటకు పూర్తి అంగీకారమును తెలుపుచున్నాను. ఈ పరిశోధనలో పాల్గొనుచుండగా వచ్చు పరిణామములన్నీ నాకు వివరముగా పరిశోధనావిద్యార్థి/విద్యార్థిని వివరించారు. నేను ఈ పరిశోధన గురించి అర్థము చేసుకున్నాను. మరియు పరిశోధనకు సంబంధించిన నా సందేహాలకు పరిశోధనవిద్యార్థి /విద్యార్థిని జవాబులిచ్చారు. ఈ పరిశోధన నుండి వచ్చు ఫలితాలను ప్రచురించుటకు నేను అంగీకరించుచున్నాను. ఏ కారణము వలనైనా నా ఇష్టానుసారము ఈ పరిశోధన నుంచి నేను వైదొలగవచ్చుని తెలియపరుస్తున్నాను.

చిరునామా:

నంతకము:

తేదీ:

నేను ఈ పరిశోధన వలన వచ్చు పరిణామములను వీరికి పూర్తిగా వివరించి, ఈ పరిశోధనలో పాల్గొనుటకు వీరి అనుమతి పొందితిని.

నంతకము:

తేదీ:

ANNEXURE 3

PATIENT ASSESSMENT

SUBJECTIVE

NAME:

AGE:

GENDER:

OCCUPATION:

DOMINENCE OF HAND:

ADDRESS:

DATE OF ASSESSMENT:

HISTORY:

Present history

Past History

Medical history

Family history

Socioeconomic status

VITAL SIGNS:

Objective

ON OBSERVATION

General condition

Built of the patient

Posture attitude of the limbs

Deformity

External appliances

Obvious muscle wasting

Scar

Ambulation

ON INSPECTION

Skin:

Color

Texture

Swelling

Edema

Deformity

posture

ON PALPATION

Tenderness

Warmth

Spasm

Scar

ON EXAMINATION

Higher mental functions:

Level of consciousness

Orientation to time, place, and person

Memory-recent, short term, and long term

Speech

Comprehension

COGNITIVE EXAMINATION

Body scheme/body image disorders

Unilateral neglect

Right left discrimination

Finger agnosia

Asomatognosia

Anosognosia

Spatial relation disorders:

Finger ground discrimination

Form discrimination

Spatial relations

Position in space

Topographical disorientation

Depth and distance perception

Agnosia

Visual object agnosia

Auditory agnosia

SENSORY EXAMINATION

Superficial sensations

Pain

Fine touch

Temperature

Deep sensations:

Joint position sense

Vibration

Cortical sensations:

Graphesthesia

Stereognosis

Barognosis

Tactile localization

Two-point discrimination

MOTOR EXAMINATION

Muscle tone (Modified Ashworth scale)

Range of motion:

Active

Passive

Deep tendon jerk:

Biceps jerk

Triceps jerk

Supinator jerk

Ankle jerk

Voluntary control grading:

Tightness contracture/deformity:

Bladder and bowel function:

Balance testing

Gait assessment:

ADLS:

Investigations:

Diagnosis :

X ray

CT

MRI

Treatment:

Conservative

Surgical

Physiotherapy

Short term goals

Long term goals

MASTER CHART

S.no	GROUP A						S.no	GROUP B					
	OSWERTSTY DISABILITY INDEX (ODI)		NUMERIC AL PAIN RATING SCALE (NPRS)		MANUAL MUSCLE TESTING (MMT)			OSWESTR Y DISABILITY INDEX (ODI)		NUMERIC AL PAIN RATING SCALE (NPRS)		MANUAL MUSCLE TESTING (MMT)	
	PRE	POST	PRE	POST	PRE	POST		PRE	POST	PRE	POST	PRE	POST
1	24	4	7	0	0	3	16	27	13	9	8	1	1
2	32	5	9	3	1	4	17	24	22	8	7	0	0
3	28	1	8	2	0	3	18	38	33	7	6	1	2
4	22	2	8	2	2	3	19	26	19	7	5	1	1
5	36	1	7	1	1	4	20	35	27	8	6	0	1
6	29	2	9	2	1	3	21	37	30	9	8	2	2
7	31	3	7	0	0	4	22	27	13	8	7	2	3
8	23	3	8	1	0	3	23	23	17	8	6	1	2
9	33	2	9	2	3	5	24	32	12	7	6	2	1
10	25	4	9	3	1	4	25	22	17	9	8	0	1
11	30	5	7	0	1	5	26	39	35	8	7	1	1
12	34	3	8	1	2	4	27	40	37	7	7	2	2
13	37	2	8	2	0	3	28	21	19	8	8	2	3
14	26	1	7	1	2	5	29	27	25	9	8	1	1
15	32	5	7	1	2	3	30	26	23	9	7	1	1