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Efficacy of Pilates and MC Kenzie exercises on patients with chronic low back pain – A comparative study

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ABSTRACT

The major health issue of human being is lower back pain disease caused by various Lifestyle activities and occupational adaptation. People who continue to in same poster throughout the day like computer professionals and shops may be the major victims of this chronic disease process. Objectives : The study aims to produce the different kinds of Management techniques to deal with chronic low back pain and compared their effects on the pain relieving and core muscle strengthening. Methodology: The study focused on 40 subject into two groups such as group A and group B respectively treated with Pilates and Mc Kenzie exercise on management and and core strengthening. The effects of the both types of treatments more assessed by visual analogue scale, back performance scale score and Roland Morris disability questionnaire. Result and Conclusion: As per the various statistical analyses, it was found that both the methods are less effective for relieving pain and group A got effective improvement in core muscle strength. So as this study conclude that the alternative hypothesis has been accepted.

Keywords: *Chronic Low Back Pain, back performance scale score, Mc kenzie Exercises, Pilates, Roland Morris disability questionnaire , visual analogue scale*

1. INTRODUCTION

1.1 Introduction

Back pain is one of the most widely experienced health related problem. Epidemiological studies indicates that disorders of the lumbar spine affect up to 80% of persons living in industrialized countries at some point in time during their lives (Kelsey & White 1980). Moreover, low back pain (LBP) represents the most common cause of disability in persons less than 45 years of age (Bigose, et.al 1994). Spinal disorders represent at least 40% of the compensated disorders treated by physiotherapy clinicians, and 70% of these final disorders involve the lumbar spine (Spitzer,et.al 1987). Back pain is a huge public health issue affecting most of us some times in our lives and causing enormous suffering. Although most of this low back pain episode subsides in 2-3 months recurrence is common, shown to be as high as 85%.

Back is a mechanical structure that supports the individual throughout the life. Punjabi conceptualized the stabilizing system of the spine as consisting of 3 subsystems (1) Passive (2) Active & (3) Neural Control [28]. The functions of these 3 subsystems are interrelated and reduced function of one subsystem may place increased demands on the other systems to maintain stability [29 30]. The passive subsystem are consists primarily of the vertebral bodies, zygoapophyseal joints & joint capsules, spinal ligaments and passive tension from the musculotendinous units [28]. The active subsystem of the spinal stabilizing system consists of the spinal muscles and tendons. Multifidus muscle is better suited for the purpose of segmental control [27]. The neural Control subsystem is thought to receive input from structures in the passive and active subsystems in order to determine the specific requirements for maintaining spinal stability, then acting through the spinal musculature to stabilize the spine 31. The active and neural control subsystems are primarily responsible for spinal stability in the neutral Zone [28].

Lack of support by the trunk musculature can occur with the general weakness associated with a sedentary lifestyle. In addition to repetition of specific movement patterns can lead to patterns of over activity in some muscles and a related under activity in others. The proximal trunk muscles, especially the abdominals are those which most often tend to weaken. In a detailed EMG study. Soderberg and Barr (1983) established that muscular control in the lumbar region was significantly lower in patients with chronic low back pain when compared to normal. Exercise therapy designed to target key areas of back pain to increase individuals confidence in the use of their spine and to overcome the fear of physical activity has become an evidence based

treatment [32] additionally exercise therapy has been shown to be more effective than usual care by a general practitioner (which includes staying active and taking analgesics as required) & Just as effective as conventional physiotherapy[33]. Back pain has been associated with dysfunction and weakness of deeper abdominal muscles 31. These deeper abdominal muscles including the transverse abdominals (TA), Multifidus (MF), Pelvic floor muscles, are the core muscles.

Pilate's techniques aim to specifically train all the above mentioned "core muscles" sub maximally to increase the tone and strength of these muscles, to lengthen, and stretch the lumbar spine thus decreasing compression of the joints, and cause an alteration in the tilt of pelvis. Pilate's emphasis on proper breathing, and body awareness in addition to core strengthening. The McKenzie method is grounded in finding a cause-and-effect relationship between the positions the patient usually assumes while sitting, standing (or) moving and the generation of pain as a result of those positions (or) activities.

McKenzie defines postural syndrome as a mechanical deformation of postural origin causing pain of a strictly intermittent nature, which appears when the soft tissues surrounding the lumbar segments are placed under prolonged stress. There will be end range strain with different positions which load the soft tissues under prolonged stress. McKenzie explains three syndromes postural, dysfunction & derangement. The treatment for postural syndrome includes postural correction ad re education[3].

Low back pain is common affliction whose specific cause and precise treatment are still a baffling to the medical profession. In the present study the comparison between Pilates and McKenzie exercise is done to find out their effect on chronic low back pain.

1.2 Aim and objectives of the study

The aim of the study is to compare the effectiveness of Pilates & McKenzie exercises in the management of chronic low back pain.

- To determine whether there was improvement in visual analogue scale, Roland Morris disability questionnaire, back performance scale score, core muscle strength, following Pilates exercises in patients with chronic law back pain.
- To determine whether there was improvement in visual analogue scale, Roland Morris disability questionnaire, back performance scale score, core muscle strength following McKenzie approach in patients with chronic low back pain.

1.3 Need and background of the study

Back pain is a huge public health issue affecting most of us at some times in our lives and causing enormous suffering. Although most of the low back pain episode subsides in 2-3 months recurrence is common, shown to be as high as 85%.

1.4 Hypothesis

Null Hypothesis (Ho): Null Hypothesis states there is no significant difference in reduction of pain, disability and improvement of physical activity and core muscle strength between Pilates & McKenzie exercises.

Alternate Hypothesis (H1): Alternate Hypothesis states there is significant difference in reduction of pain and disability between Pilates & McKenzie exercises.

Alternate Hypothesis (H2): Alternate Hypothesis states there is significant difference in improvement of physical activity and core muscle strength between the methods.

1.5. Operational Definitions

(a) Low back pain: Back pain located below the scapula and above the cleft of the buttocks.

(b) Chronic low back pain: Low back pain present more than two months.

(c) Pilates: It's an exercise program developed by Joseph Pilates that works on strengthening of core Muscles which affect posture and provide support and strength for the spine. It teaches body awareness, good posture & easy graceful movement. Pilates improves flexibility, agility & economy of motion[2].

(d) Mc Kenzie: Developed by Robin Mc Kenzie. McKenzie defines postural syndrome as a mechanical deformation of postural origin causing pain of strictly intermittent nature, which appears when the soft tissues surrounding the lumbar segments are placed under prolonged stress. This occurs when a person performs activities which keep the spine in a relatively static position (or) when they maintain end positions for any length of time (as in prolonged sitting & standing)

(e) Back Performance Scale Score: It is a condition specific performance measure of activity limitation for patients with back pain. It consists of the sock test; pick up test, roll up test, fingertip to floor test & lift test. All the tests are scored on 4 point ordinary scales according to observed physical performance. The BPS is the sum of scores from all five tests and ranges from 0 (No activity limitation) to 15 (major activity limitation)[7,8]

(f) RMDQ: (Roland Morris Disability Questionnaire): It's a self-administered questionnaire consisting of 24 items specific to low back pain. These 24 items have been selected from the sickness impact profile to measure disability secondary to low back pain. the total score is out of 24. Zero represents no disability, 24 represents severe disability.

(g) Sphygmomanometer: This was used to teach the correct activation of the transverse abdominal muscle from the baseline pressure of 40mm Hg (that is the pressure in the cell that fills the space behind the bag giving the patient awareness only if it's presence), the correct drawing in action causes a slight flattening of the lumbar spine, which registers as a pressure increase. this pressure sensor provides to measure strength of core muscle

(h) Visual Analogue Scale (VAS): A 10cm non-sequential scale with the range of scores from 0 (No pain) to 10 (Worst pain) used for subjective evaluation of pain.

2. REVIEW OF LITERATURE

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3. METHODOLOGY

3.1 Study Design: It is an experimental study intended to see the efficacy of Pilates and McKenzie exercises on chronic low back pain.

3.2 Study Setting: Clinical setting, the study was conducted at Physiotherapy department.

3.3. Study Population: Patients with chronic low back pain age group between 20-30 years both male and female are participated.

3.4 Sample Size: 40 subjects are participated in this study. They are divided into two groups, 20 subjects in each group.
Group –A: 20 subjects
Group – B: 20 subjects

3.5 Sampling Techniques: 40 Subjects were selected on the basis of assessment and who met the inclusion criteria. The subjects then divided into two group, group A (n=20) and group B (n=20). By using random sampling technique.

3.6 Study Duration: The study was conducted in one month protocol.

3.7 Inclusion Criteria:

- Low back pain chronic for more than 2 months.
- Without radiating pain & not attributable to any specific pathology.
- Back pain located below the scapula & above the cleft of the buttocks.
- No neurological system on physical examination and MRI reports.
- Patient is medically fit to perform exercises.
- Able to understand what study entails / what we prescribe exercises.

3.8 Exclusion Criteria:

- Back pain attributed to any specific pathology. e.g.
  1. Disc herniation
  2. Tumor
  3. Infection
  4. Fracture
  5. Osteoporosis
  6. Structural deformity
  7. Inflammatory disorder
  8. Radicular syndrome / cauda equina syndrome
  9. Soft tissue injuries.
- Severe back pain, not able to do any exercises.
- Recent back surgery
- Recent abdominal surgery
- Pregnancy
- Hamstring tightness
- Problems with communication
- Patients with obesity
- Except the points which are added in the inclusion criteria

3.9 Tool and Materials
Materials Used:

- Mat
- Plinth
- Sphygmomanometer
- Bench
- A piece of paper
- Inch tape
- 5 kg box

Tools:

- Pain
- Disability
- Physical activity
- Core muscle strength

3.10 Assessment Parameters:
3.10.1 For physical activity performance
Back performance scale score: It consist of 5 test they are sock test, pick up test, roll-up test, finger tip to floor test, lift test each was performed and later on the sum of scores was done & recorded. The highest score is 15-major activity limitation & 0-represents no activity limitation.

3.10.2 For disability

Roland Morris disability questionnaire: It's a self administered questionnaire consisting of 24 items specific to LBP. These 24 items have been selected to measure disability secondary to low back pain. Zero represents no disability, 24 represents severe disability.

3.10.3 For pain

Visual analogue scale: A 10cm long visual analogue scale with the range of scores from 0 no pain to 10 worst pain used for subjective evaluation of pain.

3.10.4 Core Muscle Strength

Core muscle strength was measured using sphygmomanometer. The subject were made to lie in crook lying on a firm surface and were taught the contraction of transverse abdominus by holding the breath during exhalation & moving the belly upwards & inwards for 10 seconds. The flicker was felt infero medial to ASIS. Once the subject mastered this procedure the sphygmomanometer cuff was placed beneath the back at the level of umbilicus. The cuff was inflated up to 40mm Hg. The subject then contracts the muscle by holding, the breath during exhalation, the deflection raises in sphygmomanometer was noted (fig.1)

3.11 Procedure

1. **Group A:** In this group (n-20) the subjects were given Pilates exercise for one month. The exercises were done 8 repetition / sitting/day. This includes:

1. Abdominal hallowing-in crook lying
2. Pelvic bridge
3. Chest lift
4. Swan prep
5. Abdominal hallowing in quadripod position
6. Kneeling arm & leg stretch.
7. Spine stretch

2. **Group B:** In this group (n-20) the subjects were taught McKenzie approach which includes postural correction & re education. This includes in following position.

1. Correction of sitting posture.
2. Correction of standing posture.
3. Lying prone
4. Progress to elbows
5. Full press up
6. Lying supine
7. Knees bend
8. Knees to chest

This procedure was done 2 sessions per day 10 times per session.

In both the group the pre test (0 days) value of visual analogue scale, back performance scale score, and Roland Morris disability questionnaire & core muscle strength was noted.

After the treatment intervention the post test values (30 days) of visual analogue scale, back performance scale score, and Roland Morris disability questionnaire & core muscle strength was noted.

Exercise procedure for Group –A (Pilates Exercises):-

The subjects are instructed while breath in move the belly upwards while breath out move the belly inwards.

4. STATISTICAL METHODOLOGY

4.1 Method of analysis

The following statistical tools were used to compare the efficacy of Pilates and McKenzie exercises in patients with chronic low back pain.

Paired "T" Test: Used for analyze within the group A and group B. Formula:

$$\sqrt{\frac{\Sigma d^2 - \frac{(\Sigma d)^2}{n}}{n-1}}$$

$$\frac{\bar{d}\ \sqrt{n}}{S}$$

d = Difference between the Pre Test Vs Post Test

$\bar{d}$ =Mean difference

n = Total number of subjects

S =Standard deviation

Unpaired "T" Test: Used for analyze between the group A and group B. Formula:

$$S = \sqrt{\frac{(n_1 - 1)\, s_1^2 + (n_2 - 1)\, s_2^2}{n_1 + n_2 - 2}}$$

$$t = \frac{|\overline{x_1} - \overline{x_2}|}{s\sqrt{1/n_1 + 1/n_2}}$$

n_1 = Total number of subjects in group A
n_2 = Total of subjects in group B
x_1 = Difference between pre test Vs post –test of group A
$\overline{x_1}$ = Mean difference between pre test Vs post test of Group A
x_2= Difference between pre-test Vs post test of Group B
$\overline{x_2}$= Mean difference between pre-test Vs post test of Group B

5. STATISTICAL ANALYSIS AND DATA INTERPRETATION

This section deals with data analysis and interpretation of data's from pre and post test of group A and group B.

Tabulation

Analysis between the group

Table 1 – pre and post testing for group A and B using visual analogue scale

S. No..	VAS	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	t-VALUE	p-VALUE
1	GROUP –A PRE TEST	20	4.35	0.70	1.226	1.769	0.085
2	GROUP –B PRE TEST	20	5.05		1.276		0.085
3	GROUP –A PRE TEST	20	1.70	0.50	.923	1.387	0.174
4	GROUP –B PRE TEST	20	2.20		1.322		0.175

Significant (P≤ 0.05)
Not significant (P≥ 0.05)
The analysis between group –A and group-B was done using unpaired t-test for o day and 30 days. The result shows that there is no significant difference between the groups (P≥ 0.05),

Table -2 pre and post testing for group A and B using Roland Morris disability questionnaire

S. No..	RMDQ	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	t-VALUE	p-VALUE
1	GROUP –A PRE TEST	20	9.60	-0.150	2.393	0.191	0.85
2	GROUP –B PRE TEST	20	9.75		2.573		0.85
3	GROUP –A PRE TEST	20	3.00	0.000	0.918	0.000	1.00
4	GROUP –B PRE TEST	20	3.00		0.918		1.00

Significant (P≤ 0.05)
Not significant (P≥ 0.05)
The analysis between group –A and group-B was done using unpaired t-test for o day and 30 days. The result shows that there is no significant difference between the groups (P≥ 0.05),

Table -3 pre and post testing for group A and B using Back performance scale score (BPSS)

S. No..	RMDQ	BPSS	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	t-VALUE	p-VALUE
1	GROUP –A PRE TEST	20	7.05	0.350	2.393	0.577	0.567
2	GROUP –B PRE TEST	20	7.40		1.789		0.567
3	GROUP –A PRE TEST	20	1.70	0.350	1.031	0.1.185	0.243
4	GROUP –B PRE TEST	20	2.05		0.826		0.244

Significant (P≤ 0.05)
Not significant (P≥ 0.05)
The analysis between group –A and group-B was done using unpaired t-test for o day and 30 days. The result shows that there is no significant difference between the groups (P≥ 0.05),

Table -4 pre and post testing for group A and B using core muscle strength (CMS)

S. No..	RMDQ	BPSS	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	t-VALUE	p-VALUE
1	GROUP –A PRE TEST	20	7.65	0.450	1.872	0.746	0.460
2	GROUP –B PRE TEST	20	8.10		1.944		0.460
3	GROUP –A PRE TEST	20	20.20	8.150	2.628	10.65	0.000
4	GROUP –B PRE TEST	20	12.05		2.188		0.000

Significant (P≤ 0.05)
Not significant (P≥ 0.05)
The analysis between group –A and group-B was done using unpaired t-test for o day and 30 days. The result shows that there are no significant differences in Pilate's groups as compared to McKenzie group (P≥ 0.05)

Analysis within the group: Paired t-test was used to analyze the dependent variable e.g., Visual analogue scale, Roland Morris questionnaire, back performance scale score, core muscle strength for within the group –A and group –B.

I) Visual Analogue Scale
Group A: Analysis within group-A

S. No..	VAS	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	GROUP –A PRE TEST	20	4.35	2.65	0.745	15.90	0.000
2	GROUP –B PRE TEST	20	1.70				

The analysis within group –A was done using unpaired t-test for o day and 30 days. The results revealed significant improvement within group-A. Therefore pain was reduced to the patients within group A p-value was found to be significant (P≥ 0.05).

Group B: Analysis within group – B

S. No..	VAS	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	PRE TEST	20	5.05	2.850	1.137	11.213	0.00
2	POST TEST	20	2.20				

The analysis within group –B was done using unpaired t-test for o day Vs and 30 days. The results revealed significant improvement within group-A. Therefore pain was reduced to the patients within group A p-value was found to be significant (P≥ 0.05).
Significant (P≤ 0.05)
Not significant (P≥ 0.05)

2) Roland Morris disability questionnaire (RMDQ)
Group A: Analysis within group –A

S. No..	RMDQ	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	PRE TEST	20	9.60	6.60	1.903	15.51	0.00
2	POST TEST	20	3.00				

The analysis within group-A was done using paired t-test for 0 day Vs 30 day. The results revealed significant improvement within group-A. Therefore Disability was reduced to the patients within group-A. p-value was found to be significant (p≤ 0.05)

Group B: Analysis within group-B

S. No..	RMDQ	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	PRE TEST	20	9.75	6.75	2.531	11.92	0.00
2	POST TEST	20	3.00				

The analysis within group-B was done using paired t-test for 0 day Vs 30 day. The results revealed significant improvement within group-B. Therefore, disability was reduced to the patients within group-B. p-value was found to be significant ($p \leq 0.05$) Significant ($P \leq 0.05$) and Not significant ($P \geq 0.05$)

3) Back performance scale score (BPSS)
Group A: Analysis within group-A

S. No..	VAS	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	PRE TEST	20	7.05	5.35	1.59	14.968	0.00
2	POST TEST	20	1.70				

The analysis within group –A was done using paired t-test for o day and 30 days. The results revealed significant improvement within group-A. Therefore physical activity was improved to the patients within group A. p-value was found to be significant ($P \geq 0.05$).

Group B: Analysis within group-B

S. No..	VAS	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	PRE TEST	20	7.40	5.35	1.565	12.28	0.00
2	POST TEST	20	2.05				

The analysis within group –B was done using paired t-test for 0 day and 30th days. The results revealed significant improvement within group-B. Therefore physical activity was improved to the patients within group B. p-value was found to be significant ($P \geq 0.05$).
Significant ($P \leq 0.05$) and
Not significant ($P \geq 0.05$)

4) Core Muscle Strength (CMS)
Group A: Analysis within group-A

S. No..	CMS	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	PRE TEST	20	7.65	12.55	2.60	21.54	0.00
2	POST TEST	20	2.20				

The analysis within group –A was done using paired t-test for o day and 30 days. The results revealed significant improvement within group-A. Therefore core muscle strength was improved to the patients within group A. p-value was found to be significant ($P \leq 0.05$).

Group B: Analysis within group-B

S. No..	CMS	N	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE	p-VALUE
1	PRE TEST	20	8.10	3.95	1.276	13.841	0.00
2	POST TEST	20	12.05				

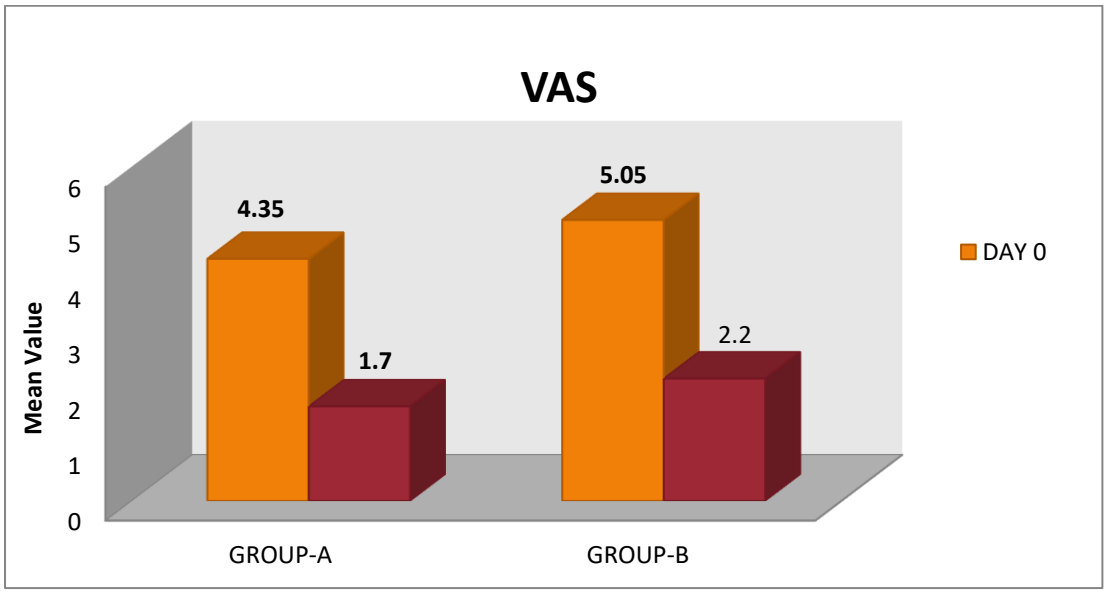
The analysis within group –B was done using paired t-test for o day and 30 days. The results revealed significant improvement within group-B. Therefore physical activity was improved to the patients within group B. p-value was found to be significant ($P \leq 0.05$).

Significant (P≤ 0.05)
Not significant (P≥ 0.05)

5.2 Graphical Representation:

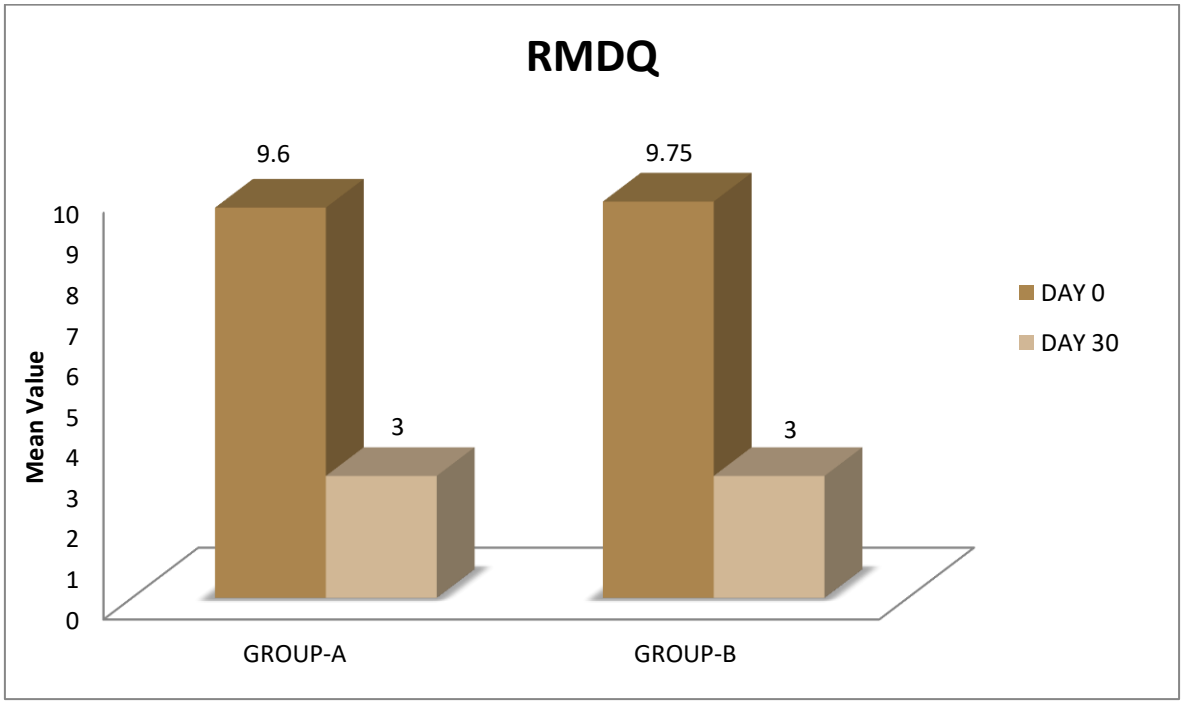
Below one is the Graphical representation of pre and post testing for group A and group B using visual analogue scale.

	GROUP-A	GROUP-B
DAY 0	4.35	5.05
DAY 30	1.7	2.2



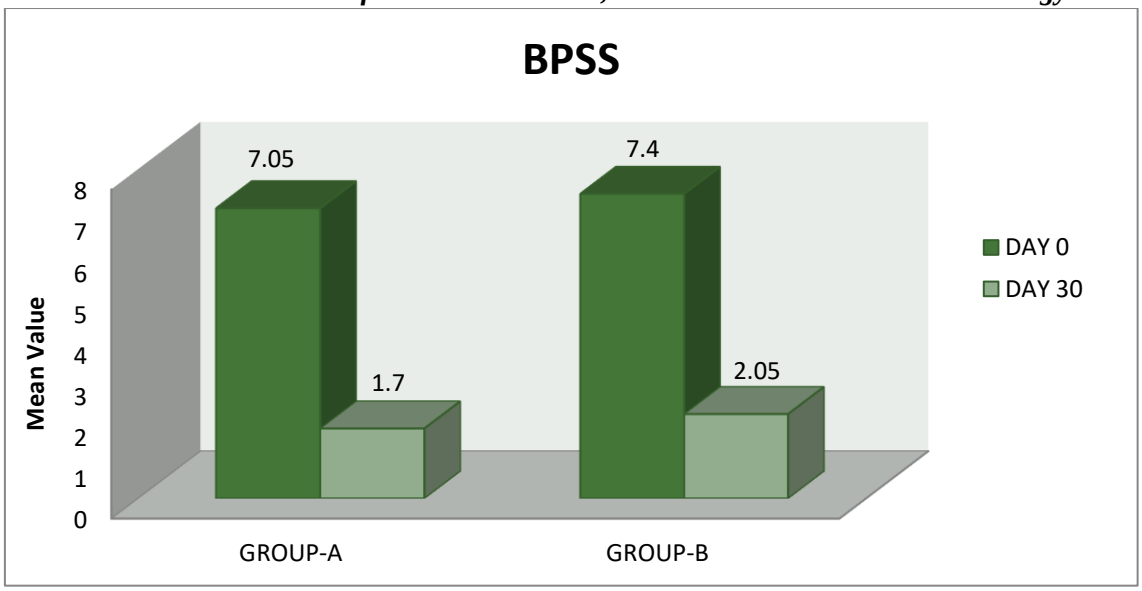
Below one is the Graphical representation of pre and post testing for group A and group B using Roland Morris disability questionnaire.

	GROUP-A	GROUP-B
DAY 0	9.6	9.75
DAY 30	3	3



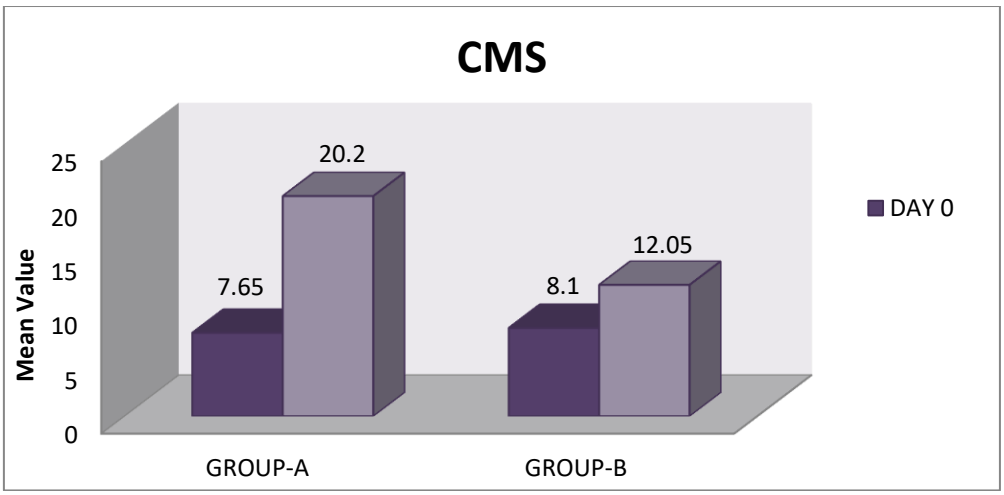
Below one is the Graphical representation of pre and post testing for group A and group B using back performance scale score.

	GROUP-A	GROUP-B
DAY 0	7.05	7.4
DAY 30	1.7	2.05



Graphical representation of pre and post testing for group A and group B using core muscle strength (CMS)

	GROUP-A	GROUP-B
DAY 0	7.65	8.1
DAY 30	20.2	12.05



6. DISCUSSION

This was an experimental study which compares the effect between Pilates and McKenzie exercises in rehabilitation of chronic low back pain.

O'sullivan et al (1997) investigated the effect of Pilates training program on pain, disability scores and spinal range of motion. 10 week program completed. The intervention group demonstrated a greater reduction in pain intensity, oswestry disability level and improved ROM.

In McKenzie the overload on the spinal stabilizing structure was reduced there by the pain was reduced.

Upon investigating the subjects with increased visual analogue scale, back performance scale score, Roland Morris disability questionnaire (RMDQ) and with reduced core muscle strength there is no effective significant improvement to visual analogue scale, back performance scale score, Roland Morris disability questionnaire (RMDQ) between the groups A & B. But there is significant improvement in core muscle strength between group A & B.

7. CONCLUSION

- Among forty (40) subjects with increased visual analogue scale, back performance scale score, Roland Morris Disability Questionnaire, reduced score muscle strength investigated to compare the effects of Pilates and McKenzie exercises in rehabilitation of chronic low back pain, over a period of 30 days.
- The result showed significant improvement within the group A with context to visual analogue scale, back performance scale score, Roland Morris Disability Questionnaire, and core muscle strength.
- The result showed significant improvement within the group B with context to visual analogue scale, back performance scale score, Roland Morris Disability Questionnaire, and core muscle strength.

- There is a no significant improvement in visual analogue scale, back performance scale score, Roland Morris Disability Questionnaire, between the group A and group B.
- And there is significant improvement in core muscle strength between group A and group B.
- From this study we conclude that the core muscle strength is better and have significant improvement in group A (Pilates exercises), When compared to group B (McKenzie approach).

7.6 limitations of the study

- Patients with low back pain only
- Age group between 20-30 years.
- Patients without neurological symptoms.
- Patients without deformity and independent ambulation
- Patients who can able to perform the exercises.

8. RECOMMENDATIONS

- This study has been performed for limited subjects only instead we can perform it for a large group of subjects also.
- Instead of conducting the treatment for 30 days the duration of treatment can be performed as long term process.
- Subject's improvements can also be compared between the Genders.
- The Electromyography (EMG) of muscle can be measured after the Pilates and McKenzie exercise.

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Appendix

10. Appendix - i

10.1 Informed Consent Form

Name :

Age :

Gender :

Occupation :

Address for communication :

Deceleration :

I have fully understood the nature and purpose of the study. I accept to be a subject in this study . I declare that the above information is true to my knowledge.

Date :

Place : Signature of the subject

Appendix - ii

10.2 Assessment Chart

NAME :

AGE :

GENDER : Male/Female

OCCUPATION :

CHIEF COMPLAINTS :

Past History

MI	TIA/STROKE	CARDIAC SURGERY	OTHERS

CONG ANOMALIES	FRACTURES	CONTRACTURES/ DEFORMITIES	ARTHRITIS/ SPONDLYLOSIS

Cardiac Symptoms if any

ANGINA	DOE	PND	ORTHOPNEA	PALITATION	SYNCOPE

Activity Level

Sedentary ❑

Mod Active ❑

Very active ❑

On Palpation

- Tenderness
- Skin temperature
- Consistency of subcutaneous tissues
- Hypersensitivity
- Muscle spasm

Pain History

Symptoms now .....

Present for.....

At onset

Improving ❑ unchanging ❑ worsening after 24 hours ❑

Commenced as a result of ❑

Commenced for no apparent reason ❑

Symptoms

Constant ❑

Intermittent ❑

Aggravating Factors

Bending ❑ Sitting/rising ❑ Prolonged standing ❑

Walking Standing / on the move ❑ Lying ❑

AM As day progresses PM

Relieving factors

Bending❑ Sitting/rising Standing ❑

Walking❑ Stationary/on the move Lying❑

AM ❑ As day progresses❑ PM❑

Other .....

Disturbed sleep

Sleeping postures.....

Surface.....

Cough sneeze strain

On Observation

Posture

Sitting .....

Standing.....

Lordosis reduced attenuated normal

Lateral shift reduced attenuated normal

Structural scoliosis.....

Leg length.....

On Examination

Parameter	Before treatment	After Treatment
Visual analogue scale for pain response(cm)		
Roland Morris Disability questionnaire		
Back Performance Scale Score		
Core Muscle Strength in mm Hg		

Date

Time

Physical Therapist

Appendix - iii

10.3 Visual Analogue Scale:

- It is a 10 cm horizontal line with two ends labeled no pain (0) at one end to most severe pain imaginable (10) at another end.
- The patient marks on the line which corresponds to the intensity of pain that the patient experiences.

0 10

No Pain Severe Pain

Appendix - iv

10.4 Roland Morris Disability Questionnaires

It is a Low Back Pain (LBP) specific disability measure.

Description:

The RMQ is a self administered questionnaire consisting of 24 items specific to LBP .these 24 items have been selected from the sickness impact profile to measure disability secondary to Low Back Pain.

Scoring:

If the item is circled as applicable it is scored as 1

If the item is not circled, it is scored as 0

The total score is out of 24. Zero represents no disability 24 represents severe disability.

Test Scoring:

Add up all the circled numbers and assign a score out of 24.

Instruction:

When your back hurts you may find it difficult to do some of the things you normally do. The list contains some sentences that people used to describe themselves when they have back pain. When you read a sentence that describes you today put a circle around its number.

I. I stay at home most of the time because of my back pain.

2. I change position frequently to try to get my back comfortable.

3. I walk more slowly than usual because of my back.

4. I am not doing any of the jobs that I usually do around the house.

5. I use a hand rail to get upstairs.

6. I lie down to rest more often.

7. I have to hold on to something to get out of an easy chair.

8. I try to get other people to do things for me.

9. I get dressed more slowly than usual.

10. I only stand for a short period of time.

11. I try not to bend or kneel down.

12. I find it difficult to get out of a chair.

13. My back is painful almost all of the time.

14. I find it difficult to turn over in bed.
15. My appetite is not very good.
16. I have trouble putting on my socks.
17. I only walk short distances.
18. I sleep less well.
19. I get dressed with help from someone else.
20. I sit down for most of the day.
21. I avoid jobs around the house.
22. I am more irritable and bad tempered with people than usual.
23. I go up and down stairs more slowly than usual.
24. I stay in bed most of the time.

Appendix - v

10.5 Back Performance Scale Score

The patient is to wear loose clothing and no shoes. The activities are explained and demonstrated to the patient. BPS scale: 0-15			
Test	**Performance**	**Scoring categories (therapist circle scores)**	**Scores**
Sock test	The patient is sitting on a high, firm bench, the feet not reaching the floor. One leg is tested at the time – the least reach scored. Instruction: Can you grab your toes with fingertips of both hands when the leg is flexed in the sagittal plane?	Can easily grab the toes with fingertips of both hands Can hardly grab the toes with fingertips Can reach beyond the malleoli, but not reach the toes Can hardly, if at all, reach as far as to the malleoli.	0 1 2 3
Pick-up test	The patient is standing on the floor. A curled piece of paper is dropped on the floor. Instruction: Can you pick up the paper? Can you do it in different ways showing flexibility of the trunk?	Can do the task with ease in varied ways. Can do the task with minor effort or some decreased variability. Can do the task with marked effort or lack of flexibility, may need support of hand on thigh Cannot perform the task at all, or need external support.	0 1 2 3
Roll-up test	The patient is lying supine on a firm mattress Instruction: Can you roll up slowly into a long-sitting position, with arms relaxed?	Can roll up with ease, to a long-sitting position. Can roll up with marked effort or partially to long-sitting position. Can roll up in supine between the 8th and 12th thoracic vertebra. A roll-up above the 8th thoracic vertebra, supine	0 1 2 3
Fingertip-to-floor test	The patient is standing on the floor, feet 10cm apart and knees straight.	Can reach to the floor, distance = 0 cm Can reach to a distance>0cm, ≤20cm	0

	Instruction: Can you reach as far as possible to the floor?	Can reach to a distance >20cm, ≤40cm Can reach to a distance >40cm	1 2 3
Lift test	The patient is standing on the floor in front of a table. Instruction: Can you repeat lifting this box, containing a sandbag of 5 kg for 1 minute from the floor to the table (height 76cm) and back to the floor using an optional technique	Can do the lifting task > 15 times Can do the lifting task >10, ≤ 15 times Can do the lifting task >0, ≤ 10 times Cannot do the lifting task =0	0 1 2 3
BPS sum score:			

Back Exercises

1. Abdominal Hallowing In Crook Lying:

Starting position: Crook lying, the subjects were asked to breath in deeply & relax all the stomach muscles.

Abdominal hallowing: While breath out the subject draws the lower abdomen in wards (The umbilicus goes backward) & hold for 8 seconds. Then breath in while inhale the lower abdomen is in upwards (move the belly upwards)

2. Pelvic bridge.

Starting position: Crook lying

In hale: Move the belly upwards

Pelvic bridge: While doing pelvic bridge & exhale move the belly inwards

Inhale: In pelvic bridge position

Exhale: While exhale move the belly inwards & return to starting position

(crook lying)

3. Chest lift:

Starting position: Supine lying

In hale: move the belly upwards

Exhale: While exhale draws the belly inwards simultaneously lift the head up then pause then inhale.

While coming down exhale & draws the abdomen inwards.

4. Swan Prep:

Starting position: Prone lying, keep your arms close to your body & bend the elbows to bring your hands under your shoulders, legs are usually together.

Inhale: draws the belly upwards in starting position.

Exhale: While exhaling (draws the belly inwards) simultaneously lift your head & Chest slightly, then pause.

In hale:

Exhale: While exhale coming down to starting position.

5. Abdominal hallowing in quadripod position:

Starting position: Four point kneeling.

Inhale: Draws the belly outwards

Exhale: Draws the belly inwards**.**

6. Kneeling arm & leg stretch:

Starting position: four point keeling

Inhale: In starting position

Exhale: While exhale extend right arm & left leg straight.

Then pause, Inhale,

Exhale: Coming to starting position

Then Alternate Arm & leg are extended.

7. Pilates spine stretch:

Starting position: Sitting in tall, legs are straight.

In hale: in starting position & extend the Arm

Exhale: While exhales try to touch the toes by finger.

Then pause, inhale.

While exhale coming to starting position.

Exercise procedure for group – B (McKenzie Approach):

Mainly focuses on positioning, postural correction & re education.

1. Correction of sitting posture :

The subject were made to sit slouched on a backless chair (or) stool, allowing the lumbar spine to rest on the ligaments in the fully flexed position & permit head & chin to protrude. Then slowly move into the erect sitting posture with the lordosis as its maximum & the head directly over the spine with the chin pulled up.

2. Correction of standing posture:

The subjects were make to stand and moving the lower part of the spine backwards by tightening the abdominal muscles and tilting the pelvis posterior then moving the spine forwards and raising the chest.

3. Lying prone:

With Arms are kept inside & relaxed, maintain for 5 minutes.

4. Progress to elbow:

Chest & head slightly upwards & the forearm rest on the floor. Maintain for 5 minutes.

5. Full press up: The hand only rest on the floor – 5 repetitions.

6.Lying supine: Arms are kept in side & relaxed maintain for 5 minutes.

7. Knees bent: Crook lying maintain for 5 minutes.

8. Knees to chest: Repetition for 5 times.

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BIOGRAPHY

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