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Effectiveness of mckenzie and yoga on chronic non specific low back pain and functional disability: A comparative study

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Abstract
Back pain is a common and costly condition. Low back pain is the most frequent reason for decreased activity of population under 45 years of the life, it affect 70% to 80% of the population. The prevalence of non specific chronic low back pain is high in middle aged and elderly people. McKenzie method is popular used management approach for spinal pain as extended spine provides significant pain relief in certain patients. Long term goal of it helps patient to manage their own pain for life using exercise and other strategies. The practice of Yogasanas goes beyond a mere mechanical performance of physical exercises; it involves the mind to liberate the body from aches and pains.
Method: A sample of 30 subjects were taken as per the inclusive criteria and where divided into two groups. Group A (n=15) received McKenzie technique were as Group B (n=15) received Yoga for 4 weeks. Pre and post intervention the subjects were asked to mark their pain on Visual Analogue Scale (VAS) and functional disability on Oswestry Disability Index (ODI).
Result: The findings of study revealed a significant improvement on chronic non specific low back pain in both the groups post-intervention. When the mean difference of both the groups were compared, group B showed more significant result than group A clinically but there was no significant difference statistically (ODI t value= -0.167 and p value 0.868 VAS t value= -0.030 and p value 0.976).
Conclusion: The study concluded that there no significant difference seen post intervention statistically.

Keywords: McKenzie technique, yoga exercise, visual analogue scale (VAS), oswestry disability index (ODI), chronic non specific low back pain (CNSLBP)

1. Introduction

Back pain is a common condition. Low back pain is the most frequent reason for decreased activity of population under 45 years of the life, it affect 70% to 80% of the population.
The anatomic location of LBP in the general population is as follows: cervical pain, 36%; thoracic pain 2%; lumbar pain 62%, with the L4-L5 and L5-S1 vertebral levels being the most frequently involved in the lumbar area.
Non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology (eg, infection, tumor, osteoporosis, lumbar spine fracture, structural deformity, inflammatory disorder, radicular syndrome, or cauda equine syndrome).
Non-specific low back pain is usually categorized in 3 subtypes: acute, sub-acute and chronic low back pain. This subdivision is based on the duration of the back pain.
Acute: ≤6 weeks
Sub-acute: between 6 and 12 weeks
Chronic: ≥12 weeks.
The McKenzie method is popular amongst physiotherapists as a management approach for spinal pain (Battie *et al* 1994, Foster *et al* 1999, Hurly *et al* 2000).
This technique was introduced by Robin McKenzie in 1960's a physical therapist from New Zealand. He noted that extended spine could provide significant pain relief to certain patients and allow them to get relief in their daily activities.
The long-term goal of the McKenzie is to teach patients suffering from neck pain and/or back pain to treat themselves and manage their own pain for life using exercise and other strategies.

Yoga is an ancient practice and meditation technique. The term Yoga is derived from the Sanskrit verb *yug*, which means to bind or join. This refers to the overarching goal of Yoga, which is to unite the mind and body in a way that promotes health.
There are key elements that include breathing exercises (*pranayama*), postures (*asanas*), and meditation (*dhyana*).
The practice of Yogasanas goes beyond a mere mechanical performance of physical exercises; it involves the mind to liberate the body from aches and pains [3].

2. Need of Study
Studies have reported the prevalence of non specific low back pain is high. (20-40 years aged individuals, rate is 30.8%) [15]. The studies of effectiveness of McKenzie on chronic non specific low back pain and the studies of Yoga on chronic non specific low back pain has been done. There are few studies done for Yoga and McKenzie on functional disability. But no comparative study of effectiveness of McKenzie and Yoga on chronic non specific low back pain and functional disability done yet.. Hence the present study is concluded.

3. Aim
To compare the effect of McKenzie and Yoga on chronic non specific low back pain and functional disability.

4. Objective
To study the effect of McKenzie on chronic non specific low back pain and functional disability at the end of 4 weeks
To study the effect of Yoga on chronic non specific low back pain and functional disability at the end of 4 weeks
To compare the effect of McKenzie and Yoga on chronic non specific low back pain and functional disability at the end of 4 weeks

5. Hypothesis
Null hypothesis (H0)
There will no difference in comparison of effect of McKenzie and Yoga on chronic non specific low back pain and functional disability at the end of 4 weeks

Alternative hypothesis
H1: McKenzie will be more effective than Yoga on chronic non specific low back pain and functional disability at the end of 4 weeks

H2: Yoga will be more effective than McKenzie on chronic non specific low back pain and functional disability at the end of 4 weeks.

6. Material
Pen
Paper
Consent form
Outcome measures – Oswestry Disability Index
Visual Analogue scale (VAS)
Yoga mats

7. Methodology
Study design: Comparative study
Sample size: 30
Sample technique: Convenient sampling
Study population: Age 20-40 years; both males and females
Study setting: Clinics in and around the city
Study duration: 6 months
Treatment duration: 4 weeks

8. Criteria
Inclusive: Both male and female Age group 20-40 years, Pre-diagnosed case with low back pain persistent > 3 months, Not undergoing any concurrent treatments like massage therapy or acupuncture or participation in any other Yoga program, BMI<37, Oswestry disability index score 10-60%, Visual analogue scale 3-8 cm

Exclusion: Abdominal or spine tumors, osteoporosis with vertebral fractures, ankylosing spondylitis, spondylolisthesis w/ radiculopathy, structural kyphosis or scoliosis, radicular pain with decreased or loss of reflexes, pregnancy, pre-surgical spine candidates, confirmed fibromyalgia, abdominal hernia, compromised cardiopulmonary system, widespread neurological disorder

9. Procedure
The study began with the presentation of synopsis to an ethical committee. Further proceedings were done after the approval from the ethical committee in Pes Modern College Of Physiotherapy, Shivajinagar PUNE -5.Study was conducted in and around Pune. Subjects were selected according to the inclusion and exclusion criteria based on and divided into two equal groups by odd even method. The subject were explained about the study in detail. Consent was taken from the patients who are eligible according to the inclusion criteria and wish to participate in the study .Subjects were assured that the collected data will not be misused in any form. Prior to the intervention, outcome measures for pain and functional disability was taken. At the end of 4th week of intervention outcome measures were taken again. Group A: received McKenzie for 4 weeks. Group B: received Yoga for 4 weeks.

Mckenzie Technique [11]
1. Lying prone: Lie prone arms down the side of body, face turns to either side. Take a few deep breathes and then mentally relax the muscular tension from the lumbar area completely for 2-3 min

2. Prone lying on elbows: Lie on stomach with weight on elbows and forearms, the hips should be touching the ground or mat. Maintain the position for 10 sec and than relax. Continue the exercise for 10 repetitions

3. Prone on hands: Put hands under shoulder and straighten the elbows, push the upper body up as much pain permits. Relax the pelvis, the hip and legs and let the back sag. If the patient feels pain den stop the exercise repetitions 10 times smoothly.

4. Standing extension: In standing place the hand behind the back and ask the patient to lean backward. The patient has to hold the position for 20 sec, 10 repetitions, 2 sets

5. Flexion in supine
A. **Single knee to chest:** Patient in supine lying. Ask the patient to raise one knee towards the chest and push the back on the floor. Ask the patient to hold at the knee or

grasping the thigh. The patient hold the position for 5 sec, repeat 10 times, 2 sets

B. **Double knee to chest:** Patient in supine lying. Ask the patient to grasp both the knee and pull toward the chest and push the back on floor. The patient holds the position for 5 sec, repeat for 10 times, 2 sets.

6. Flexion in sitting

Start after 1 week of completion of flexion in supine. Sit on a chair edge with knee and feet apart more than the width of shoulder and let the hands hang down to floor touching down between the legs. Bend the trunk to touch the floor. Repeat 10 times smoothly

7. Flexion in standing

Start after 2 weeks of completion of flexion in supine. Stand with feet shoulder width apart and bend forward with hands trying to touch the floor. Perform 10 reps smoothly

Yoga Protocol

A) Bhujangasana (Cobra pose)

Patient in prone lying. Hands at shoulder level Distance between the feet and heels pointing towards sky. Ask the patient to come up on hands with elbow bent. Lift the upper and middle back. Hold 5 sec/ 5 rep

B) Ardha Pawanmuktasana (one leg folded)

Lie down on back with the kegs bent. During exhale, keep the abdominal muscles engaged and raise one leg. Hold the leg with hand and press the thigh down towards the chest. The other thigh should not lift and should remain straight, pressed down. Tuck chin in to prevent over arching of the neck. Hold for a min and breathe continuously. Bring the folded leg down and repeat same with other leg. Hold for 5 sec/ 5 rep each side

C) Pawanmuktasana roll

Lie down. Take both legs in towards the chest. Hold the legs with one palm on each shin or thigh. Press thighs in towards the chest. Hold the pose as you breathe for 30 sec/ 5 rep.

D) Setu Bandhasana (bridge pose)

Lie down on the back. Keep the arms by the side of hips. Support the neck with a towel roll. Bend knees so that the feet flat on floor and knees parallel to each other pointing towards the ceiling. Lift the hips and hold the pose as you take three breaths. Relax and settle back to the starting position. Repeat for 5 times.

E) Supta Matsyendrasana (Supine spine twist):

Lying on back, bring arms out to the sides with the palms facing down in a T position. Bend the right knee and place the right foot on the left knee. Exhale drop the right knee over to the left side of body, twisting the spine and low back. Look at the right finger tips. Keep the shoulders flat to the floor, close the eyes, and relax into the posture. Breathe and hold for 6-10 breaths. To release: inhale and roll the hips back to the floor, and exhale and the leg back down to the floor. Repeat on other side.

F) Bilitasana Marjaryasana (Cat cow pose)

Keep hands and knees on the floor. Knees are under your hips, and your wrists are under shoulders (quadruped position). Begin in a neutral spine position, with back flat and abs engaged. Take a big deep inhale. On the exhale, round the spine up towards the ceiling, and imagine pulling belly button up towards spine, engaging abs. Tuck chin towards chest, and release neck. This is cat-like shape. On inhale, arch back, belly relax and go loose. Lift head and tailbone up towards the sky- without putting any unnecessary pressure on neck. This is the Cow portion of the pose. Continue flowing back and forth from Cat Pose to Cow Pose, and connect breath to each movement — inhale for Cow Pose and exhale on Cat Pose. Repeat for 5 times.

G) Anjaneyasana (low lunges pose)

Place right foot in front. Make sure right knee and ankle are in one line. Gently lower the left knee, placing it on the floor, right behind hips. Inhale, then, raise arms above head, such that biceps are next to ears, and palms are facing each other. Exhale. Let hips settle down and forward, such that a good stretch is felt in the frontal region of leg and the hip flexors. Pull tailbone towards the ground. Extend lower back as engaging the spine. Stretch arms further behind so that heart is pushed up. Look behind as to move into mild backbend. Hold the pose for a 10 seconds. To release the pose, take hands down on the mat,then take ur roght leg back to the starting position . Repeat the pose with your left leg forward.

H) Utthita Parsvakonasana (Kneeling lateral side bend)

Take distance between the legs, the front foot should straight facing in front, and the leg behind should be prependicular to the front leg. Bend the front hip knee at 90-90, if the right leg is in front then the left hand should be raise straight up as biceps touching the ears.The right hand should touch the ground from the medial side and the neck should be facing upwards. Hold for 5 sec/5 rep each side.

I) Shavasana (relaxation pose):

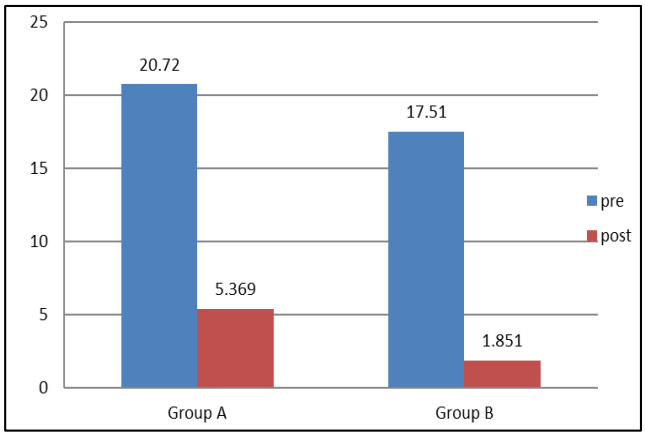
Lie on the back with the legs spread as wide as the Yoga mat and arms relaxed to the side. The eyes are closed and the breath is deep.The whole body is relaxed on the floor with an awareness of the chest and abdomen rising and falling with each breath. Performed for 5-10 mins at the end of all the asanas

10. Statistical Analysis

The data was entered in excel spreadsheet tabulated and subjected to statistical analysis. The data collected passed the normality test. Pre and Post values of both the groups were compared using paired t test.

Table 1: and graph 1 show the pre and post values Oswestry Disability Index of Group A and Group B.

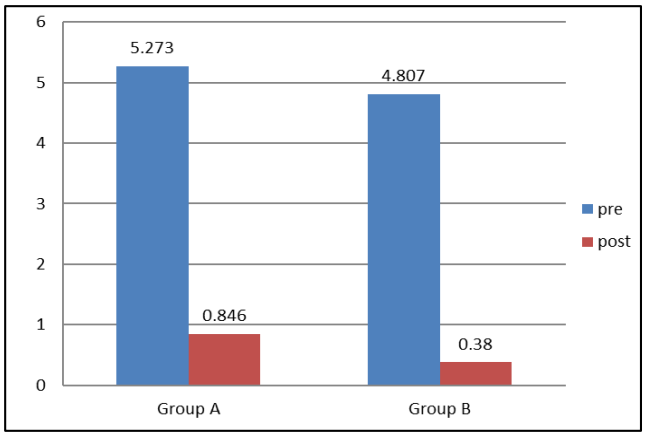
Outcome measure / Group	Pre treatment mean / sd	Post treatment mean / sd	T value	P value	result
ODI A	20.72±7.717	5.369±3.717	10.990	<0.001	significant
ODI B	17.51±4.596	1.851±1.888	12.683	<0.001	Significant



Graph 1: ODI

Table 2: and graph 2 show the pre and post value Visual Analogue Scale of Group A and Group B

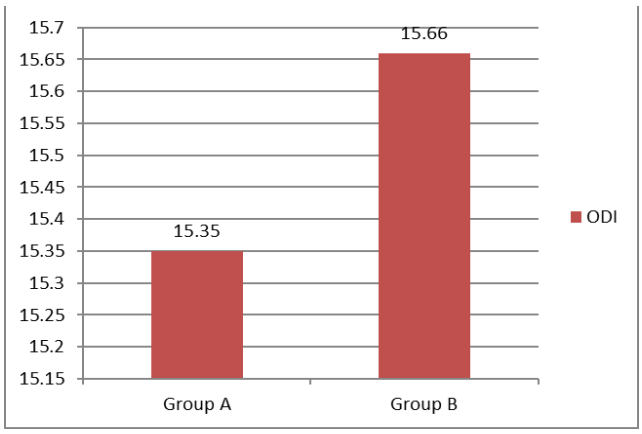
Outcome Measure/ Group	Pre treatment mean / sd	Post treatment mean/sd	T value	P value	result
VAS A	5.273±0.947	0.8467±0.5383	13.923	<0.001	significant
VAS B	4.807±1.094	0.84±0.3661	12.325	<0.001	Significant



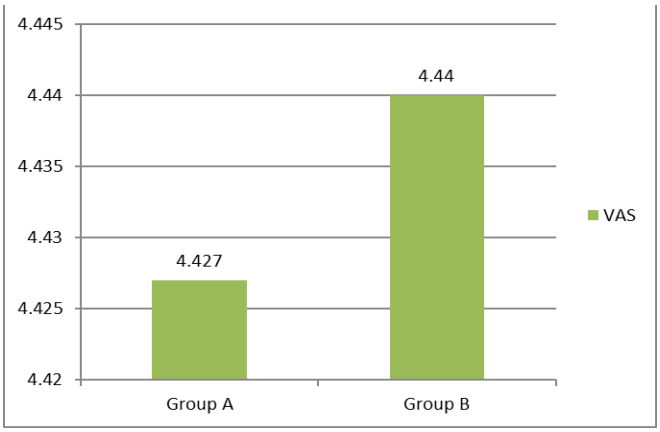
Graph 2: VAS

Table 3: Graph 3 and Graph 4 show the difference of Oswestry Disability Index and Visual Analogue Scale of Group A and Group B

Outcome Measure	Group A	Group B	T value	P value	Result
ODI	15.35±5.409	15.66±4.783	-0.167	0.868	Not Significant
VAS	4.427±1.231	4.44±1.174	-0.030	0.976	Not significant



Graph 3: ODI



Graph 4: VAS

11. Result

The mean values of ODI and VAS for Group A pre and post treatment showed significant difference when compared (ODI t value= 10.990 and p value <0.001 and VAS t value= 13.923 and p value <0.001)

Also, the mean values of ODI and VAS for group B pre and post treatment showed significant difference when compared(ODI t value= 12.683 and p value <0.001 and VAS t value= 12.325 and p value <0.001)

But when the mean difference of ODI and VAS of both the groups were compared, group B showed more significant result than group A clinically but statistically there was no significant difference post intervention (ODI t value= -0.167 and p value 0.868 and VAS t value= - 0.030 and p value 0.976)

12. Discussion

The aim of the study was to compare the effect of McKenzie and Yoga for the treatment of chronic non specific low back pain. The study included 30 individuals, Group A- McKenzie and Group B- Yoga (n=15 each group) pre assessment was taken. At 4 week follow up, observed a reduction on both pain intensity and functional disability

McKenzie exercise are beneficial for patients and showed significant reduction in pain and functional disability. It emphasises the maintenance of the lumbar lordosis and a full range of lumbar spine extension to keep nucleus pulposus anteriorly [11]. Static or repeated flexion will result in gradual movement of the nucleus pulposus in a posterior direction, resulting in tension forces posteriorly (at the least protected and weakest aspect of the Intervertebral Disc (IVD)) and compressive forces anteriorly on the IVD. Greater stresses are placed on the IVD posteriorly, resulting in microtrauma to the annular fibres, where eventual fibre tearing and disc bulging or herniation which can impinge on nerve roots or other innervated structures, causing pain. The opposite as been showen to be true with static or repeated extension: there is gradual movement of the nucleus pulposus anteriorly, where the IVD is stronger, causing anterior tension forces and posterior compressive forces on the IVD. It is the concept of nucleus pulposus movement during flexion and extension that is the basis for extension exercises [12]. McKenzie recognized the importance of lumbar flexion as it helps to improve the flexibility of the spine and so selective lumbar flexion exercises were determined not increase the subject's symptoms and were part of treatment and home programs to gain full, painless

range of lumbar spine flexion and return to normal function [11].

Yoga exercise are beneficial for patients and showed significant reduction in pain and functional disability. The practice of Yoga places as much emphasize on mental focus as on physical movement and consider the breath which links the mind and body[7]. Yoga increases flexibility and strength, tone and releases muscle tension in patients with low back pain it was found that Yoga increases hip flexion and spinal and hamstring flexibility [7]. Yoga also works on breathing principles [3].

When the study was compared it showed that Yoga was more beneficial in reducing pain and functional disability with patients having chronic non specific low back pain.

Yoga helps to improve the muscle control which causes the back muscles to improve the strength and hence reducing the imbalance in muscles causing reduction in pain. Yoga also emphasis on mental focus as on physical movement. Hence mental focus also helps people to increase their awareness of how to position their body for relaxing the tense muscles [3]. Considering all the posture performed by the patients have effect on rectus abdominus, transverse abdominus, erector spinae, internal and external oblique, quadrates lumborum, which carry out spine flexion and extension. Tonic muscles tend to shorten in response to over-use, under-use or trauma, whereas phasic muscles tens to lengthen and weaken in response to these types of stimuli. These effects can lead to musculoskeletal imbalance and joint instability. Rectus abdominus muscle is prone to weakness whereas erector spinae, quadrates lumborum are prone to tightness. During the exercise, the muscles exert pressure on the vertebrae to the lower part of the spinal column and provokes proper blood supply and helps to tone the muscles[3]. It helps in aligning the disc, helps in soothing the low back pain, renders the spinal column more flexible and keeps it in good health[3]. The exercise also help in strengthening the upper limb muscles as well as lower limb muscles.

McKenzie showed effect in fewer treatment sessions where as Yoga exercise showed slow effect on pain. The patient receiving Yoga protocol will spend longer time perhaps the patient receiving McKenzie protocol will spend less time in the physical therapy clinic will return to normal function earlier and as a result will have decrease health care cost as compared to Yoga group, McKenzie exercise are proved to be effective only on pain by reducing it or centralising it. These exercises work on specific part of the body As compared with Yoga it can be given as strengthening exercise for back. As Yoga works on over all body that is focusing on mental health, physical movements and also breaths which link the body and mind. Yoga considers of diaphragmatic breathing and deep relaxation [3].

While performing Yoga therapist also instruct about breathing hence patient pays attention on breathing in which leads to diaphragm to move freely and gives most effective ways to align the spine. It organizes the bones and tones the muscles thus stabilizing the spine from the inside out[3].

Yoga protocol

Asana	Week 1	Week 2	Week 3	Week4
Bhujangasana	Yes	Yes	Yes	Yes
Ardha Pawanmuktasana	Yes	Yes	Yes	Yes
Pawanmuktasana	Yes	Yes	Yes	Yes
Setu Bandhasana	Yes	Yes	Yes	Yes
Supta Matsyendrasana	-	-	Yes	Yes
Bilitasana Marjaryasana	Yes	Yes	Yes	Yes
Anjaneyasana	-	-	yes	Yes
Utthita Parsvakonasana	-	-	Yes	Yes
Shavasana	Yes	Yes	Yes	Yes

13. Conclusion

The study concluded that both intervention showed significant effect on improvement of pain and functional disability with patients having non specific chronic low back pain.

But when compared with each other no significant difference was seen post intervention statistically.

14. Limitations

1. The study was performed with participants having variable age.
2. The sample size was less
3. Any difference in gender was not consider.
4. No any specific population was considered

15. Future Scope

1. A larger sample size can be used for the study
2. The study can include specific age group.
3. The study can be performed in specific population.

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