

Comparison of Effect of McKenzie Exercises with or Without Theraband in Patient with Sub Acute Non-Specific Low Back Pain

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ABSTRACT

Non-specific back pain in general refers to any type of back pain that is caused by placing abnormal stress and strain on muscles of the vertebral column. The current study was based on the evaluation of the effect of McKenzie exercises with theraband for reducing pain, disability and improves the strength in patients with subacute non-specific low backpain. It also evaluated the effect of McKenzie exercises alone for reducing pain, disability and improves the strength in patients with subacute non-specific lowbackpain and compared the pain effectiveness of McKenzie exercises with theraband versus McKenzie exercises alone in reducing pain, disability and improves the strength in patients with subacute non-specific low backpain. he participants for the study were recruited from the population of Integral University at Physiotherapy OPD, Lucknow (UP). On the basis of dependent variables NPRS, ODI, MMT and all the measurements were checked on first day (pretreatment) and last day (post treatment) i.e., after 4 weeks. The subjects were selected according to the inclusion and exclusion criteria and were divided into 2 groups- Group A and Group B. tables showed average difference of ODI, NPRS, MMT showed at 1st to 28th respectively and showed that average difference in pre to post ODI, NPRS, MMT scores was significant in both groups but Group A showed statistically significant difference of pre to post ODI, NPRS, and MMT score in order to decrease pain, disability and in improving muscle strength. McKenzie exercises with theraband showed statistically more significant difference in ODI, NPRS and MMT score in order to decrease pain, disability and in improving muscle strength.

Keywords: McKenzie Exercise, Theraband, low back pain, ODI, MMT

INTRODUCTION

Non-specific back pain in general refers to any type of back pain that is caused by placing abnormal stress and strain on muscles of the vertebral column. It is called non-specific because it is usually not clear what is causing the pain. There is no specific problem or disease that can be identified as the cause of the pain [1] Non-specific low back pain is typically associated with pain, soreness and/or

stiffness in the lower back region, functional disability for which it is not possible to identify a specific cause of the pain [2]. The lifetime prevalence of low back pain is reported to be as high as 84% and the prevalence of low back pain is about 23%, with 11-12% of the population being disabled by low back pain [3].

It has a prevalence of 60-85% during an individual lifetime and it may vary according to age, gender, education and

occupation. Women's have higher rate of developing low back pain [4][5]. The lifetime prevalence of low back pain is reported to be as higher as 84% and best estimated suggest that the prevalence of chronic low back pain is about 23% with 11-12% of population disabled by it [6]. The incidence of back pain is high in workers doing heavy exertion, such as weight lifting, repetitive movement & frequent static postures [7][8].

The current study was based on the evaluation of the effect of McKenzie exercises with theraband for reducing pain, disability and improves the strength in patients with subacute non-specific low backpain. It also evaluated the effect of McKenzie exercises alone for reducing pain, disability and improves the strength in patients with subacute non-specific low backpain and compared the pain effectiveness of McKenzie exercises with theraband versus McKenzie exercises alone in reducing pain, disability and improves the strength in patients with subacute non-specific low backpain.

MATERIALS AND METHODOLOGY

Variables

Dependent variables were used as given below-

- *Pain*
- *Disability & Muscle strength*

Participants Recruitment

The participants for the study were recruited from the population of Integral University at Physiotherapy OPD, Lucknow (UP). On the basis of dependent variables NPRS, ODI, MMT and all the measurements were checked on first day (pretreatment) and last day (post treatment) i.e., after 4 weeks. The subjects were selected according to the inclusion and exclusion criteria and were divided into 2 groups- Group A and Group B. Both the groups are experimental and

have 16 subjects in each group on the basis of inclusion criteria.

Selection criteria

Inclusion

- Age group between 20-40yr [9]
- Males and females with non- specific low backpain
- Pain duration (6-12weeks)
- NPRS (between 3-6)
- Patients willing to participate in the study

Exclusion

- History of trauma in the lumbar spine
- History of fracture in the lumbar spine
- History of recent spinal or abdominal surgery
- Any skin allergy
- Allergy to moist heat pack
- Any neurological symptoms involving prolapsed intervertebral disc, radiculopathy
- Any rheumatic disease like RA, Ankylosing spondylitis etc.
- Gynecological cause
- Congenital cause like scoliosis, spondylolisthesis

Place of study

This study was conducted at Integral University at Physiotherapy OPD (Out Patient Department), Integral Hospital, Lucknow.

Sample size

A total of 40 subjects were enrolled in this study. Both male and female were participated in this study having age between 20-40 years. On the basis of inclusion and exclusion criteria, 32 subjects (16 subjects in each group) were participated in this study. Ratio of male and female in my study was 15:17 respectively. The subjects were selected randomly on the basis of chit method. The subjects were equally allocated in each group.

Procedure

Group A

Moist heat pack (for 15 minutes) at lumbar region

+

Spinal extension exercise with theraband

+

Spinal flexion exercise with theraband

(2 set of 10 repetitions in first week after that added 3 repetitions in every set for next four weeks

Group B

Moist heat pack (for 15 minutes) at lumbar region

+

Spinal extension exercise without theraband

+

Spinal flexion exercise without theraband

(2 set of 10 repetitions in first week after that added 3 repetitions in every set for next four weeks

Tools Used in The Study

- Height adjustable plinth / couch
- Moist heat pack (for lumbar)
- Towel
- Back supported chair / comfortable stools
- Theraband
- Stationery (pen, copy, scale)
- Watch



Fig. 1. Materials Used

Outcome measures

Numeric Pain Rating Scale (NPRS)

The Numeric pain rating scale (NPRS) is a unidimensional measure of pain intensity in adults [10-12], including those with chronic pain. 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 [13]. The common format is a horizontal bar or line. Similar to

the VAS, the NPRS is anchored by terms describing pain severity extremes [14].

The 11- point numeric scale ranges from “0” representing one pain extreme (e.g., no pain) to “10” representing the other pain extreme (e.g., “pain as bad as you can imagine” or “worst pain imaginable”). The NPRS can be administered verbally or graphically [15]. Scoring ranges from “0-10” points, with higher scores indicating greater pain intensity.

Oswestry Disability Index (ODI)

Oswestry disability index is used to assess the patients subjective range of perceived disability related to his/her functional limitation, e.g., work status, difficulty in activity of daily living. The higher score shows more perceived disability. Using the test at the initial visit helps the examiner understand the patient perception of how his/her back pain is affected his or her life. The higher score is indicative of the need for the more intensive treatment such as spinal manipulative therapy and education to help the patient understand the lower likelihood of disability related to back pain. It can be calculated by dividing the total score (0 -5) by no. of section answered and multiplied by 100 [9].

Table 1. Score level with perceived disability

Score Level	Perceived disability
0-20%	Minimal disability
20-40%	Moderate disability
40-60%	Severe disability
60-80%	Crippled
80-100%	Bed ridden

MMT of Trunk Flexion

This checks the strength of the abdominals. If the abdominal muscles are weak, reverse action of the hip flexors may cause lumbar lordosis. When this occurs, the patient should be positioned with the hips flexed 45 degree and knee at 90 degrees with feet flat on the couch to disallow the hip flexors to contribute to the test motion.

(Normal) 5:- Supine with hands clasped behind head and check whether patient’s chest to be able to ascertain whether

scapulae off the couch during the test. If patient is unable to do it then move to grade 4 [16].

(Good) 4:- Supine with arms crossed over chest, patient completes range of motion and flexes trunk until scapulae are off the couch. Resistance of arms is reduced in the cross- chest position. If patient is unable to do it then move to grade 3.

(Fair) 3:- Supine with arms outstretched in full extension above plane of body. Patient completes range of motion and flexes trunk, raises head and shoulders until inferior angle of scapulae are off the table.

(Poor) 2:- Supine with arms at the side of the trunk, ask patient to lift head from the couch. Patient raises head off the table only but unable to lift the scapulae.

(Trace) 1:- Supine with arms at the side of the trunk, unable to raise the head more than a palpable contraction of abdominal muscle.

MMT of Trunk Extension

This checks the strength of the spinal extension muscles.

(Normal) 5:- Prone with hands clasped behind head, patient extends the lumbar spine until the thorax is raised from the table (umbilicus). Patient raises head, shoulders and chest off the table.^[48]

(Good) 4:- Prone with hands on the back, patients extends the lumbar spine until the thorax is raised off the couch and in this back extensors can come to the end position but may waver or display some signs of effort.

(Fair) 3:- Prone with arms at sides, patient extends spine, raising body from the table so that the umbilicus clears the couch. Patient completes the range of motion.

(Poor) 2:- Patient completes partial range of motion

(Trace) 1:- Contractile activity is detectable but no movement.

Protocol

Moist Heat Pack

After assessing the patient, the subjects were first given hydrocollator pack on lumbar region for 15-20 minutes in both

groups to reduce muscles spasm and pain and to improve the extensibility of tissues. The temperature of hydrocollator pack was adequate for the targeted area. The hydrocollator pack was well covered with mackintosh sheet. During this phase therapist asked the patient about temperature of hydrocollator pack and his/her suitability towards the procedure [17].

Group A

1. Abdominal Crunches with Theraband

The arm straight crunch targets the upper rectus abdominal muscles, which is commonly known as the abdominals. It also targets the external oblique, the outermost muscles of the abdominals and the internal oblique which is the intermediate muscle of the abdomen.

Position of therapist: - Behind the patient.

Position of patient: - Lay on your back with hip at 45 degree and knee at 90 degrees flexed.

Instruction to patient:- The therapist is asked to lift your chest off the couch with bringing your shoulder up or curl your upper body forwardly with TheraBand and both ends of theraband were tied hand and a loop surrounds to a stable object and keep your arm straight throughout the exercise, hand of patient should be above plane of body and focus straight up the ceiling instead of looking down would cause unnecessary sprain in your neck and bring back your body to the starting position i.e., supine lying. Avoid holding your breath and focus on it. Repeat this exercise without taking rest in between.

Sets and repetitions: - 2 set of 10 repetitions in first week (after that added 3 repetitions in every set for the next four weeks).

Interval: - 3 second interval in every repetition and 2-minute interval after completion of 1set.



Fig. 2. showing abdominal crunches with theraband

2. Back Extension with theraband

The extension exercise may improve the strength of the extensor muscles of spine. In postural LBP, where extensors develop tightness due to prolonged flexion attitude of posture in sitting and standing. It improves the tone of the extensors muscle.

Position of therapist: - in front of the patient

Position of patient: - the patient lies in half sitting position with hips and knees flexed.

Instruction to the patient: - the loop of theraband tied around the fixed object and both ends of theraband held in the hand of patient.

Therapist commands to the patient to do extension of the lower spine with theraband and command to avoid holding of breathing

and repeat this exercise without taking rest or hold.

Sets and repetitions: 2 set of 10 repetitions in first week (after that added 3 repetitions in every set for the next four weeks).

Interval: 3 second interval in every repetition and 2-minute interval after completion of 1set.



Fig. 3. showing spinal extensions with theraband

Group B

1. Abdominal Crunches without theraband

These are accomplished on couch and targeting the upper rectus abdominis muscle. It is also targeting the external oblique the outermost muscle of the abdomen and the intermediate muscle of the abdomen. It also helps to reduce the risk of a back injury and helps in preventing many exercises related injuries. It also helps in improving the posture and balance of the body.

Position of therapist: - at the side of a couch.

Position of a patient: - the patient is in crook lying or lying on his back with feet flat on the couch with hips and knees flexed.

Instruction to the patient: - therapist gives command to the patient to raise the chest or to curl up with arms straight out above the plane of body and then return slowly to the start position.

Sets and repetitions: - 2 set of 10 repetitions in first week (after that added 3 repetitions in every set for the next four weeks).

Interval: - 3 sec interval in every repetition and 2-minute interval after completion of 1 set.



Fig. 4. showing abdominal crunches without theraband

2. Back Extension without TheraBand

Strengthening of these muscles is very important because it helps to provide a great deal of stabilization to this part of the body. The back extension both trains the activation of the spinal extensors and strengthens their ability to extend the back. These muscles keep your back upright and protect your spine from injury.

Position of a therapist: - at the side of a couch

Position of a patient: - the patient lies in prone position with forearm and elbow supported on couch.

Instruction to patient: - ask the patient to slowly raise your trunk in extension in a

pain free range and your elbow joint and shoulder joint are lie in a same line by leaning on the forearm and curling of shoulders and upper back and then return to a start position.

Sets and repetitions: - 2 set of 10 repetitions in first week (after that added 3 repetitions in every set for the next four weeks).

Interval: - 3 sec interval in every repetition and 2-minute interval after completion of 1 set

Total time protocol- 28 days (5 days per week).

Duration of study- 4 months.



Fig. 5. showing spinal extension without theraband

Ergonomic Advises

Ergonomic care was advised in both the group A and group B.

Ergonomics is the study of the interaction between people and the objects they used and the environment they function in". Attention is necessary for body awareness, posture and ergonomic advises are necessary for the prevention of the lower back pain. The good posture is essential for preventing lumbar pain. Physiotherapist should teach what patient should do or should not do to avoid the recurrence of the back problem: -

Rest position

Chairs and bed should be of good support and comfortable for the spine. The best

position in resting is supine lying, with one pillow under the knees.

Sitting position

The ideal position of sitting at a desk is an adjustable chair with your knees below your pelvis and with good lumbar support. Avoid prolonged sitting and always take short break. When sitting on a chair foot should be on the floor and chair as close to the desk is possible. Your position should be within your arm's reach. In general, one should be able to sit in the chair with feet flat on the floor, knees and hips at about 90 degrees.

Back support

Lumbar should be supported by the back supportive chair. There should be a curve in the chair as in the back.

Arm support

Arm should rest comfortably at 90 degrees on armrest. Arm rest should be adjustable to prevent interference with the keyboard and to another task.

Sitting up

While getting up from lying position, turn to the side and bend knees forward over the edges of the bed. Gradually lift the trunk to sitting by taking support on both hands and simultaneously bringing the legs down keeping knees and feet together and forward bending of trunk is strictly avoided.

Forward bending

As far as forward bending should be avoided. When it is necessary, initiate bending at the hip and knee joints, keeping the back straight. First 60 degrees of forward bending puts maximum stress on

back. Therefore, start bending at hip and knee joint with palms rests on thighs.

Lifting

While heavy weight lifting always bend your knees and keep back straight. Balanced is the secret of carrying everything from the baby to the shopping. Hold baby in front of you and carry shopping material equally in both hands.

Learning to lift correctly

Lifting and bending techniques is a great way to look after your back, especially if you are in a job that involves a lot of heavy weight lifting. Always keep one foot flat and at the side of object to be lifted, never lift object with your body weight on the balls of your feet as it flexes the small of the back.



Fig. 6. Subject showing how to lift correctly [18]

Data analysis

All analysis was obtained using SPSS version 20.0. Demo graphic data of the patients- including age and gender were summarized. The dependent variables for the statistical analysis were NPRS, ODI and MMT. A base line data was taken at the beginning of the study (pre-test values) and after the completion of the treatment (post - test values) to analyse the difference between the two treatments Groups; independent t-test was used. A level of 5%

was used to determine the statistical significance.

RESULTS AND DISCUSSION

Table 2. Mean, Standard Deviation & S.E.M. of ODI score between 1st to 28th day

Groups	Time period	Mean (%)	S.D.	SEM
Group A	1 st day	34	0.08	0.02
	28 th day	7	0.05	0.01
Group B	1 st day	37	0.05	0.01
	28 th day	18	0.04	0.01

There is reduction in ODI mean score of group A and group B but it is evident that reduction in ODI means score of group A is more than group B.

Table 3. Mean, Standard Deviation & S.E.M. of NPRS score between 1st to 28th day

Groups	Time period	Mean (%)	S.D.	SEM
Group A	1 st day	4.06	0.68	0.17
	28 th day	0.44	0.51	0.13
Group B	1 st day	4.68	0.87	0.22
	28 th day	1.75	0.86	0.21

There is reduction in NPRS mean score of group A and group B but it is evident that reduction in NPRS means score of group A is more than group B.

Table 4. Mean, Standard Deviation & S.E.M. of MMT score of abdominal muscles between 1st to 28th day

Groups	Time period	Mean (%)	S.D.	SEM
Group A	1 st day	2.43	0.63	0.16
	28 th day	3.87	0.62	0.15
Group B	1 st day	2.56	0.81	0.20
	28 th day	3.75	0.77	0.19

There is an improvement in MMT (Abdominal muscles) mean score of group A and group B but it is evident that reduction in MMT means score of group A is more than group B.

Table 5. Mean, Standard Deviation & S.E.M. of MMT score of back extensor muscles between 1st to 28th day

Groups	Time period	Mean	S.D.	SEM
Group A	1 st day	2.25	0.58	0.14
	28 th day	3.18	0.40	0.10
Group B	1 st day	2.18	0.40	0.10
	28 th day	3.12	0.34	0.09

There is an improvement in MMT (back extensor muscles) mean score of group A and group B but it is evident that reduction in MMT means score of group A is more than group B.

Table 6. Paired t- test of pre and post ODI score between 1st to 28th day

Group	Time Period	t-value	p-value
Group-A	1 st -28 th Day	18.78	0.000
Group-B	1 st -28 th Day	22.12	0.000

The above table represents the t-test value and p-value of ODI of group A and group B, by independent t-test for all patients of group A and group B 1st to 28th day scores. It is observed that there is a significant difference present in both groups but group

A is statistically more significant than group B for average 1st to 28th ODI score at 5% level of significance.

Table 7. Paired t- test of pre and post NPRS score between 1st to 28th day

Groups	Time Period	t-value	p-value
Group-A	1 st -28 th Day	29	0.000
Group-B	1 st -28 th Day	11.77	0.000

The above table represents the t-test value and p-value of NPRS of group A and group B, by independent t-test for all patients of group A and group B 1st to 28th day scores. It is observed that there is a significant difference present in both groups but group A is statistically more significant than group B for average 1st to 28th NPRS score at 5% level of significance.

Table 8. Paired t – test of pre and post MMT score of abdominal muscles between 1st to 28th day

Groups	Time Period	t-value	p-value
Group-A	1 st -28 th Day	9.13	0.000
Group-B	1 st -28 th Day	11.78	0.000

The above table represents the t-test value and p-value of MMT (abdominal muscles) of group A and group B, by independent t-test for all patients of group A and group B 1st to 28th day scores. It is observed that there is a significant difference present in both groups but group A is statistically more significant than group B for average 1st to 28th MMT (abdominal muscles) score at 5% level of significance.

Table 9. Paired t – test of pre and post MMT score of back extensor muscle between 1st to 28th day

Groups	Time Period	t-value	p-value
Group-A	1 st -28 th Day	15	0.000
Group-B	1 st -28 th Day	15	0.000

The above table represents the t-test value and p-value of MMT (back extensor muscles) of group A and group B, by independent t-test for all patients of group A and group B 1st to 28th day scores. It is observed that there is a significant difference present in both groups but group A is statistically more significant than group B for average 1st to 28th MMT (back extensor muscles) score at 5% level of significance.

The purpose of this study to find out the comparison between the McKenzie exercises with theraband and without theraband in subjects with sub-acute non-specific Low Back Pain. 40 subjects were enrolled but only 32 participated in this study. In this study the subjects were allocated in two groups such as group A and B. In both groups i.e., group A and B, the subjects were first given hydrocollator pack followed by McKenzie exercise with theraband and McKenzie exercise alone respectively. Before starting the exercises protocol the NPRS, ODI and MMT was measured, similarly then readings also noted down after 4 weeks.

The result of this study revealed that McKenzie exercises protocol with theraband and without theraband is statistically significant and effective in improving the strength of muscles and decreasing the pain and disability.

Data of ODI, NPRS and MMT of both Groups i.e., McKenzie exercises protocol with theraband and without theraband for pre and post interventional study are expressed in terms of mean, S.D and S.E.M is shown in table-1, 2,3 and 4 respectively. Further application of paired t-test to find the significant difference between pre and post intervention study in McKenzie exercises protocol with theraband and without theraband, which revealed significance difference for the 16 patients each group individual at 5% level of significance. Within the group pre and post values were assessed by paired t-test in both the groups which has mentioned in table 5, 6, 7 and 8 respectively. The 4 weeks protocol with and without theraband showed significance in both groups individually in improving muscle strength of extensor and flexor of lower trunk and decreasing the pain and disability but group A, McKenzie exercises with theraband showed statistically more significant difference in decreasing pain, disability and improving muscle strength.

The result accord with those of Jorgensen K et al., They found in their study that trunk

endurance training has been recommended as means of increase fatigue threshold and improving performance and reducing disability.

There is less empirical data available related to this study which shows a significant effect of theraband in reducing pain, disability, and muscular strength in patients with low back pain. But in this study the significant difference showed in pre to post ODI, NPRS and MMT score in both groups. Finally, Group A received McKenzie exercises with theraband showed statistically significant difference in order to decrease pain, disability and in improving strength of muscle.

Limitations of study

The limitations of the study are as follows-

- Small sample size
- Short duration
- No control groups
- Only pain and disability were taken

Recommendations

1. The strengthening of lateral flexors, rotators and lower rectus abdominal muscles with theraband can be taken for further study.
2. Roland Morris Disability Questionnaire may be used as primary outcome measure in place of Oswestry Disability Scale to check disability.
3. Progressive exercises programme on the basis of MMT grades as outcome measure for muscle strength can be added.
4. Exercises with theraband in chronic low back pain can be taken for further study.
5. Comparison between the effects of theraband versus Swiss ball exercise in non-specific low back pain can be done in future.

CONCLUSION

Study concludes that the difference from 1st to 28th day in ODI, NPRS and MMT score in both groups/therapies which shows that both groups A and B i.e., McKenzie exercises with theraband and without theraband

reduced pain, disability and improved the muscle strength. Further application, tables showed average difference of ODI, NPRS, MMT showed at 1st to 28th respectively and showed that average difference in pre to post ODI, NPRS, MMT scores was significant in both groups but Group A showed statistically significant difference of pre to post ODI, NPRS, and MMT score in order to decrease pain, disability and in improving muscle strength.

The 4 weeks McKenzie exercises with and without theraband resulted in significant effect in both groups individually in improving muscle strength of extensor and flexor of lower trunk and in decreasing the pain and disability but group A, McKenzie exercises with theraband showed statistically more significant difference in ODI, NPRS and MMT score in order to decrease pain, disability and in improving muscle strength. On the basis of statistical analysis, this study supports experimental hypothesis.

Declaration by Authors

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