The relative efficacy of McKenzie's exercises compared to traction in reducing mechanical low back pain - An experimental study

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Abstract

Mechanical low back pain is any type of back pain, which is caused by putting abnormal stress and strain on the muscles which support the vertebral column. This type of pain is as a result of bad habits which can be corrected; such as bad posture, poorly designed seating, wrong bending and lifting methods, obesity etc. The main goal of physical therapy for back pain is not to increase the strength, but to achieve adequate pain control. Physical Therapists commonly attempt to reduce and prevent low back pain by improving individuals' lumbar posture, and by treating it with passive therapy (modalities) and active therapy (exercises). This study is to determine the relative efficacy of McKenzie's exercises compared to Traction in reducing mechanical low back pain. Objectives: 1To study the effect of McKenzie's exercises in relieving the mechanical low back pain. ²To study the effect of traction in relieving the mechanical low back pain. To compare the effect of McKenzie's exercises versus traction in relieving the mechanical low back pain. ³Study method: This is a short term study, where 30 mechanical low back pain patients with predefined selection criteria were selected and assigned into two equal experimental groups as group A and group B. The pre and post test outcomes of pain intensity are marked on the Visual Analogue Scale. Then statistical comparison is drawn between the experimental groups mean values by using unpaired t test. Results: The study results shows that the pain intensity mean values have decreased to a significant extent after the treatment period. The mean Pre-test values of both McKnezie's exercise and Traction groups before the treatment are 8.4 and 8.6 respectively which have been decreased to 1.8 and 4.6 after the treatment. Conclusion: Both the treatment procedures have shown an effective outcome, but McKnezie's exercises have proven to be more effective than the traction statistically.

Key Word: McKenzie's exercises.

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INTRODUCTION

Human beings walk upright and as a result the lower back carries most of the body's weight. Because the stresses involved with twisting, lifting and bending are concentrated in the lower back, this is the part of the spine that is most likely to be injured and become a source of pain. Many people who suffer from back problems are experiencing mechanical pain, which means that a specific part of their spine, such as an intervertebral disc, a ligament, or a joint, is damaged and is not working correctly. There are many different disorders, that can produce mechanical back pain, such as degenerative disc diseases, herniated discs, strains, and sprains, facet arthropathy, stenosis, myelopathy, spondylolysis, spondylolisthesis, failed back syndrome.¹ The first recorded case of low back pain attributed to an occupation dated at about 2780 BC, when an Egyptian physician treating construction workers at the pyramids in Saggare described spinal strain.² Cherkin dc, Deyora, Voline,

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Loeserid follow the international classification of diseases to identify mechanical low back pain patients, and accordingly most used classification for pain in the lumbar spine by clinicians is specific and non-specific low back pain.³ Most people (60% - 80% of world population) will experience back pain at some point in their lifetime. 85%-90% of all episodes of back pain are non-specific or mechanical in nature.⁴ Mechanical low back pain remains the second most common symptom related reason which makes to visit a physician in the United States. Fortunately, the low back pain resolves for the vast majority within 2-4 weeks. For individuals younger than 45 years mechanical low back pain represents the most common cause of disability and is an associated work related injury. For individuals older than 45 years mechanical low back pain is the 3rd most common cause of disability. ⁵According to Carter, low back pain is a very common problem of working age. The physical demands of work can precipitate individuals attacks of low back pain and the risks are higher in jobs where there is heavy manual labour, manual material handling, awkward postures, and whole body vibration. The demands of work may also influence the ease of return after an episode of pain.⁶ Mechanical low back pain exists in every culture and country. Estimates by numerous investigators indicate that at some point in their lives, 80% of all human beings experience low back pain. Mechanical low back pain becomes more prevalent in countries with higher per capita income and where more liberal policies and adequate funds provide for compensation.7 Mechanical low back pain has been reported to arise from trauma either sudden or chronic such as a fall, a motor vehicle accident, prolonged poor posture, mental stress, fatigue, disc extrusion, sometimes painful disc degeneration (arthirtis), aging, congenital defects, poor flexibility etc.⁵ Mechanical low back pain is caused by wear and tear in the parts of lumbar spine. This type of pain is similar n nature to a machine that begins to wear out. Mechanical pan usually starts from degenerative changes in the disc. As the disc begins to collapse and the space between the vertebrae narrows, the facet joints may become inflamed. Mechanical pain typically gets worse after activity due to strain on the moving parts of the spine. Mechanical back pain is usually felt in the back, but it may spread into the buttocks, hips, and thighs.⁵ Mechanical low back pain due to acute or chronic musculotendinous or ligament injuries of the spine is the most frequent cause of lumbar spine in the athlete ⁸Micheli feels that some lumbar spine associated with soft tissue, in the adolescent athlete may represent a transient overgrowth syndrome.⁹ Few other activity related causes for mechanical low back pain are leg length differences, restricted hip motion, post operative scarring, misaligned pelvic obliquity, anteversion or retroversion.¹⁰ The onset of mechanical low

back pain is often sudden and associated with lifting or bending. Most people experience pain primarily in the lower back (lumbosacral) region. The pain may spread to buttocks or thighs, it is often asymmetrical in distribution.¹¹ Many people also experience spasms with mechanical low back pain. This is where spasm of the paraspinal muscles occurs with restriction of spinal movements. This however is not likely to affect function significantly. The symptoms of mechanical back pain are usually more noticeable on activity. E.g.: when bending or lifting heavy objects. Back pain is often described as worse, or more severe, than any other leg or thigh pain present.¹¹ Examination of mechanical low back pain cases should not reveal any significant spinal abnormality or deformity such as curvature of the spine. Similarly there should not be any significant muscle wasting or neurological signs, such as reduced reflexes, loss of muscle power or sensory disturbance (paraesthesia) in the lower limbs. ¹¹ There is likely to be restriction of spinal movements due to pain with flexion being the commonest restriction, although a reasonable range of back movements should normally be present. In specific back pain with nerve root compression movements are restricted and painful is some direction whilst in other direction they show very little restriction or pain.¹¹ Most patients need medications at some point of time in the treatment of low back pain. NSAIDS are the mainstay of treatment of acute low back pain and for flares of chronic low back pain. Muscle relaxants have a limited role or no role in the treatment of low back pain.¹² Opioid treatment is occasionally indicated for short periods. Adjunctive analgesics such as antidepressants, anti seizure drugs, membrane stabilizers, have roles in specialized situations.¹³Electrotherapeutic modalities and manual therapy techniques are used to modulate pain and stimulate mechano and nociceptive receptors. Mechanical therapy (traction) is used to provide pain relief by inter vertebral distraction, stretching muscle and other soft tissues provide relative rest. Corsets are used to control available range of motion, protection, decrease intra disc pressure, therapeutic exercises such as extension bias (used for discogenic pathology) and flexion bias (used for posterior element pain).¹³

METHODOLOGY

This is a experimental study design and the subjects have been selected from out-patient clinic in King George Hospital and out-patient clinic in VAPMS College of Physiotherapy, Visakhapatnam. The sampling technique is Simple random sampling technique – Lottery method which includes both male and female. Sample Size: Twenty mechanical low back pain patients were sequentially selected and were assigned into two equal groups. Experimental Group A-10 patients (McKenzie's Exercises) Experimental Group B- 10 patients (Traction) **Study Duration:** 1 Year

Criteria For Selection: Inclusion: Age between 20-45 years, Body weight between 60-80 kg, Height between 5-6 feet, Subjects with Mechanical low back pain.

Exclusion: Age less than 20 and above 45 years, Cardio and Respiratory problems, Claustrophobia Fractures, Gastro Intestinal problems, Infective conditions, Ligament Instability, Muscular weakness Neoplasm, Osteoporosis, Pregnancy, Rheumatic History, Spinal Deformities, Traumatic low back ache Tumour, Uncooperative, Vascular diseased, Vertigo/dizziness, Vertebrobasilar Insufficiency

Parameters: Visual Analogue Scale (VAS) is a straight line with the left end of the line representing no pain and the right end of the line representing the worst pain. Patients are asked to mark on this line, on the point where they think their pain is.

Study Procedure: All 20 subjects are divided into two groups as group A and B with 10 subjects each for McKenzie's exercises and traction respectively. Both the groups are assessed for their pain intensity by using VAS scale, on the first treatment day before treatment commences and on the tenth day after treatment finishes.

Group A (McKenzie's Exercises): Robin McKenzie suggested to remove all tension from the low back muscles; without complete relaxation there is no chance of eliminating any distortion that may be present in the joint.¹⁴

Exercise 1: (prone) Lying face down, with the arms beside the body and the head turned to one side. Staying in this position, take a few deep breaths and then relax completely for 4 to 5 minutes. This exercise is used mainly in the treatment of acute back pain. It should be done once at the beginning of each exercise session, and the sessions are to be spread evenly 6 to 8 times throughout the day. This means that one should repeat the sessions about every day. **Exercise 2:** (prone) Lying face down in extension remains face down. Place the elbows under the shoulders so that one lean on forearms. During this exercise one should commence taking in a few deep breaths and allow the muscles in the lower back to relax completely. Again one should stay in this position for about 5 minutes. This exercise is used mainly in the treatment of severe low back pain. It should always follow exercise 1 and is to be performed once per session.

Exercise 3: (prone) Extension in lying, remain face down. Place the elbows under the shoulders in the press-up position. Now one is ready to start exercise 3. Straighten the elbows and push the top half of the body up as far as the pain permits. It is important that one completely relax the pelvis, hips, legs. Keeping one's pelvis, hips, legs in hanging limp and allow the back to sag. Once this position is achieved, maintain it for 1-2 seconds, and then lower to the starting position. Each time one repeat this movement cycle, one must try to raise one's upper body a little higher, so that in the end back is extended as much as possible with their arms as straight as possible. Once the arms are straight, remember to hold the sag for a 1 or 2 seconds as this is the most important part of exercise. The sag may be maintained for longer than one or two seconds if one feels pain reducing or centralizing. This is the most useful and effective first aid procedure in the treatment of acute low back pain, stiffness and recurrence. Whether used in the treatment of either pain or stiffness, the exercise should be performed 10 times per session (and the sessions are to be spread evenly 6 to 8 times throughout the day).

Exercise 4: (standing) Extension in standing, stand upright with one's feet slightly apart. Place one's hands in the small of one's back with their fingers pointing backwards and their thumbs pointing forwards. Now the position is ready for exercise 4. Bend the trunk backwards at the waist as far as one can, using the hands as a fulcrum. It is important that one keep the knees straight as they do this. Once maintained this position for a 1 or 2 seconds one should return to the starting position. Each time one repeat this movement cycle, one should try to bend backwards a little further so that in the end one should reach the maximum possible degree of extension. In acute pain, exercise 4 may replace 3. Once fully recovered and no longer have low back pain, this exercise is the main tool in the prevention of further back problems.

Exercise 5: (supine) Flexion in lying, lie on the back with knees bent and the feet flat on the floor/bed. Now the position is ready for exercise 5. Bring both the knees up towards the chest. Place both hands around the knees and gently but firmly pull the knees as close to the chest as the pain permits. Once maintained this position for 1 or 2 seconds one should lower the legs and return to the starting position. It is important that one do not raise the head when performing this exercise, or straighten the legs as they lower them. Each time one repeat the movement cycle, one should try to pull one's knees a little further so that in the end one can reach the maximum possible degree of flexion. At this stage, knees may touch the chest. This exercise is used in the treatment of stiffness in the low back which may be developed since the injury/pain began. While damaged tissues may have now healed. They may have also shortened and become less flexible; it is now necessary to restore their elasticity and full function by performing flexion exercises. These exercises should be commenced with caution. In the beginning one must only do 5 or 6 per session. (sessions are to be repeated 3 or 4 times per day) Flexion exercises must always be followed by a session of exercise 3 (extension in lying) to retain lordosis. One may stop performing exercise 4 when one can readily pull the knees to the chest without producing tightness or pain. Then can progress to exercise 6.

Exercise 6: (sitting) Flexion in sitting, sit on the edge of a steady chair with knees and feet well apart and let the hands rest between the legs. Now the position is ready for exercise 6. Bend the trunk forwards and touch the floor with the hands. Return immediately to the starting position. Each time repeat this movement cycle; one must bend down a little further so that at the end one can reach the maximum possible degree of flexion. At this reached maximum flexion position, make head as close to floor as possible. The exercise can be made more effective by holding on to the ankles with the hands and pulling the body down further. Exercise 6 should only be commenced after the completion of 1 week of exercise 5, whether exercise 5 has been successful or not in reducing the stiffness or pain, in the beginning one must only do 5 or 6 repetitions per session (and the sessions are to be repeated 3 or 4 times per day). Flexion exercises must always be followed by a session of exercise 3. No Response or Benefit:

After exercising without any relief or benefit for 3 or 4 days, one can conclude that the exercises performed as ineffectual. There are two main causes for lack of response/benefit from these exercises.

- 1. Pain is felt only to one side of the spine (correction: modify the position by shifting the painful side hips to 2 3 inches away from the centre and holding the hips in the off-centre position while doing the exercise, this centralizes the pain.)
- 2. Exercise 3 is performed without adequate fixation (correction: fixation can be provided by straps or therapist manually).¹⁴

Parameters:

Number of exercises: 6; Sessions: 2

Rest interval: 5 minute Treatment time: Min 10 to Max 20 minute Frequency of treatment: once in a day Total duration of the treatment: 10 days.

GROUP B (TRACTION - Mechanical)

Traction is a pull produced by an electrical motorized device. In the lumbar spine, an adequate pull with motorized device to achieve vertebral distraction usually can be obtained with the proper apparatus. Generally, a harness is attached around the pelvis (to deliver a caudal pull), and the upper body stabilized by a chest harness (for the cephalad pull). Motorized units have the advantage of allowing intermittent traction with less practitioner intervention. If the goal of traction force is to distract lumbar vertebrae, 70-150lb pull are usually needed. Friction between the treatment table and patient's body

usually requires traction force of 26% of the total body weight before effective traction to the lumbar traction to the lumbar spine is possible. Body weight should theoretically provide enough pull to distract lumbar vertebrae and eliminate mechanical devices.15 Supine position is chosen most commonly for lumbar traction since the sitting position may result in outcome limiting discomfort from the harness. Hip flexion of 15°-70°is routinely incorporated to cause relative lumbar spine flexion; this may facilitate optimal vertebral separation. In the lumbar spine, a pull, which equals approximately 50% of the weight of the body part, is needed to overcome friction.¹⁵ Generally, treatment in the lumbar spine is recommended in the 8-40 minute range per session.¹⁵Each patient is unique and what works well for one patient may not be appropriate for another. Therefore, each prospective patient is carefully evaluated prior to treatment. This assessment enables the therapist to make decisions about the type of traction to be utilized, the force/weight of distraction, and the duration of treatment.¹⁶

Position of the patient: Supine position.

Parameters: Hold time: 40 sec – 60 sec

Rest time: 20 sec – 40 sec

Treatment time: 20 min – 30 min `

Mode of traction: suggestive cycle (static/intermittent) Weight (tension): specific to body weight (1/3) Frequency of treatment: once in a day Total duration of the treatment: 10 days.

RESULTS

Table	1: VAS for McK	Cenzie's	Exercises: Le	evel of s	ignificand	e 0.05
	Serial No	Age	Gender	Pre	Post	

Serial No.	Age	Gender	Pre	Post			
1	21	М	10	2			
2	22	Μ	8	0			
3	21	Μ	10	4			
4	23	Μ	9	1			
5	40	Μ	7	2			
6	35	Μ	10	0			
7	36	Μ	8	3			
8	22	М	7	2			
9	34	Μ	8	4			
10	40	Μ	7	0			
Table 2: VAS for Traction:							
			IUTI.				
Serial No.	Age	Gender	Pre	Post			
Serial No.	Age 23	Gender M	Pre 10	Post 5			
Serial No.	Age 23 24	Gender M M	Pre 10 7	Post 5 3			
Serial No. 1 2 3	Age 23 24 22	Gender M M M	Pre 10 7 8	Post 5 3 2			
Serial No. 1 2 3 4	Age 23 24 22 26	Gender M M M M M	Pre 10 7 8 8	Post 5 3 2 5			
Serial No. 1 2 3 4 5	Age 23 24 22 26 45	Gender M M M M M M	Pre 10 7 8 8 8	Post 5 3 2 5 4			
Serial No. 1 2 3 4 5 6	Age 23 24 22 26 45 27	Gender M M M M M M M M	Pre 10 7 8 8 8 8 9	Post 5 3 2 5 4 4 4			
Serial No. 1 2 3 4 5 6 7	Age 23 24 22 26 45 27 22	Gender M M M M M M M M M	Pre 10 7 8 8 8 9 10	Post 5 3 2 5 4 4 4 4 4			
Serial No. 1 2 3 4 5 6 7 8	Age 23 24 22 26 45 27 22 40	Gender M M M M M M M M M M M	Pre 10 7 8 8 8 8 9 10 10	Post 5 3 2 5 4 4 4 4 4 4			
Serial No. 1 2 3 4 5 6 7 8 9	Age 23 24 22 26 45 27 22 40 30	Gender M M M M M M M M M M M M	Pre 10 7 8 8 8 8 9 10 10 9	Post 5 3 2 5 4 4 4 4 4 4 6			

Results are showing the efficacy of McKenzie's exercises over the Traction in reducing the pain in mechanical low back pain patients.

DISCUSSION

This study was done to find out the effect of McKenzie's exercises and traction, and also to compare them in relieving the mechanical low back pain. Using predefined selection criteria, the results from the study reveal that McKenzie's exercises are statistically significant in reducing the mechanical low back pain than traction.

McKenzie's Exercises: McKenzie's exercises reduced pain from 8.4 to 1.8 on VAS pain intensity scale.

Physiology: Gently levering the vertebral bodies of the lower spine apart so that the jelly like disc nucleus of the disc away (removes disc bulging) from the nerves, thus reducing the pressure on the nerves that causes the pain associated with nerve compression.¹⁶ The McKenzie approach is completely based on the principle of centralization.¹⁷

Traction: Traction has reduced the pain from 8.6 to 4.6 on VAS pain intensity scale.

Physiology: The way traction reduces pain starts with minimizing the need for antigravity muscles to maintain erect posture.¹⁸ During spinal decompression therapy, a negative pressure is created within the disc. Because of that negative pressure, disc material that has protruded or herniated can be assisted back within the normal confines of the disc, and permit healing to occur. Pressure is released off of inflamed nerve roots allowing the inflammation to subside.¹⁹

It - a. Opens the intervertebral foraminae

- b. Separates the facets joint surfaces
 - c. Elongates the erector spinae muscles causing relaxation and release of protective spasm in the erector spinae.
 - d. Stiffens the annular fibers of the disc, this annular effect along with decreasing the intrinsic force within the nucleus, minimizes the annular "bulging".
 - e. Decreases the length of the nerve roots and thins dura and decreases their tension.

Though both the treatments are effective in reducing the mechanical low back pain, McKenzie's exercises takes a much better significant value when comparison is drawn with traction using unpaired t test. This result shows the efficacy of McKenzie's exercises over the traction.

SUMMARY AND CONCLUSION

This study was conducted to reduced the pain in mechanical low back pain patients. Pain intensity was measured using VAS scale in 20 mechanical low back pain patients. The values were recorded before the treatment on

day 1 and after the treatment on day 10. There is a significant improvement in the pain levels of both the groups. This study concludes that for mechanical low back pain patients, McKenzie's exercises does result in a greater decrease in pain in the short term than do the traction. Making a firm conclusion on treatment effectiveness is difficult because of insufficient data, less number of subjects, selection criteria and treatment bias. Effect of McKenzie's exercises is greater than the effect of Traction in reducing the mechanical low back pain.

LIMITATIONS and SUGGESTIONS

This study was a short term study, it is therefore necessary to do a long term study to make the result more valid. The pain intensities recorded were subjective evaluation by the patients and so can be doubted for their reliability. For further studies on low back pain more condition specific scales like Oswestry back pain disability scale and Manniche's low back pain rating scale can be used. Sample studied was small and the study reduces the generalizability, therefore study with a larger population is recommended. Study aimed to compare the effect of McKenzie's exercises with traction, other modalities like tens, ultrasound, IFT, etc... can also be conducted for further studies.

REFERENCES

- 1. Salinas valley memorial healthcare system, www.SVMH.com/spine/causes-mechanical.asp
- 2. Low back pain/journal of American pharmaceutical Association
- http://www.medscsape.com/viewarticle/457101_3
- 3. Cherkin, Deyo, Volinn, Loeser/spine 1992; 17:817-825
- 4. www.emaxhealth.com/45/3785.html (centre for the advancement of health) www.c fah.org/hbns/getdocuments.cfm?documentID=1169
- 5. Everett C Hills MS.,MD'; June 28, 2006/www.emedicine.com/pmr/topic73.html.
- Carter JT. Birell LN. Occupational Health guidelines for the management of mechanical low back pain at work; recommendations, faculty of Occupational medicine, London 2000, ISBN 1860161316 (www.facoccmed.ac.uk)
- Debra Perina MD, Edward Bossman, Fransico, Eric, John, Rick/Back pain, Mechanical/article Dec 6, 2007 www.emedicine.com/emerg/topic 50.htm.8
- Norman Scott, BontonNisonson, James A Nicholes/principles of sports medicine
- W.Jackson Douglas, A Frank Manarino/Lumbar spine injuries in athletes (Norman Scott, BontonNisonson, James A. Nicholes/principles of Sportsmedicine.)
- Deshpande, A .Fuslan; Mailes, Gagnon A , Atlas, S. Tusk(2007)/my.clevel and clinic.org/disorders/back_pain/hic low_backpain_aspx
- www.dwp.gov.uk/medical/med_conditions/major/back_p ain/mech_back_pain.asp. (Department of work and pensions, U.K.)
- 12. Back Care/Jean Oliver edition 1994

- 13. Andrew J Cole, Stanley A. Herring/ The Low Back Pain Handbook
- 14. www.communigate.co.uk/ne/eppsg/page8.phtmlhttp://ww w.easyvigour.net.nz/fitness/h_McKenzieExt.html
- 15. Clarke JA, vanTudler MW, Blomberg SEI, deVetHCW, vanderaHeijden, Brofort G, Bouter LM Traction for low back pain with or without sciatica, jan 25.2007/http://www.ncbi.nlm.nih.gov/pubmed/16235311 http://mrw.interscience.wiley.com/cochrane/clsysrev/artic les/CD003010/frame.html
- 16. Susan Spinsanta; www.SpineUniverse.com/display article/php/article 1481.html/article1478 (Vincent Traynelis, MD) and article 2026.html.
- W. Donelson, R.; Silva, G.; Murphy, K.: The centralization phenomenon: its usefulness in evaluating and treating referred pain. Spine, 1990; 15:211-5/McKenzie therapy for Mechanical Low back pain.
- RennieCalliet MD/low back pain syndrome/ 4th edition/pp 130-135
- 19. www.greatlakes_physiotherapy.com/physiotherapy.com/ physiotherapy-traction- decompression.html (traction)

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