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Trunk Balance Exercises and Strength Training Exercises in the Management of Pain and Disability Among the Chronic Low Back Pain Individuals

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Abstract

LBP has been described as twentieth century health care disaster. Eighty percent (80%) of all adults have significant low back pain in their life time. The incidence of low back disability appears to have dramatically increased in Western society since about 1970. This is not indicative of an increase in prevalence of LBP but rather of an increase in work loss, sick certification, compensation, and a long-term disability awards. Almost anyone born today in Europe and North America has a great chance of suffering disabling back injury regardless of occupation. In the United States, LBP is the most common reason for activity limitation under the age of 45, and approximately 2% of the work force receives compensation for LBP annually. An estimated 1.3 billion days a year are lost from work because of LBP.

Question and objective: To assess the role of exercises in chronic low back pain individuals.

The purpose of this study: The purpose of this study is to validate and compare the effects of trunk balance exercises along with flexibility exercises and Strength training exercises along with flexibility exercises on pain and disability among chronic low back pain (CLBP) subjects.

Design: Pre-test and post-test experimental study design.

Participants: Chronic low back pain patients in the age group between 30-40 years, both males and females were included in the study predominantly White collar occupation.

Intervention: Trunk balance exercises along with flexibility exercises for experimental group I and Strength training exercises along with flexibility exercises for experimental group II.

Outcome measures: Pain was measured using visual analogue scale and Disability using Roland Morris Low Back Pain and Disability Questionnaire (RMQ).

Results and Conclusion: Strength training exercises of the trunk and limbs along with flexibility exercises and Trunk balance exercises along with Flexibility exercises were effective in reducing pain and improving disability among CLBP subjects. When compared between groups between interventions there is no significant difference in reducing pain among chronic low back pain subjects (group A-trunk balance exercises along with flexibility exercises and group B-strengthening along with flexibility exercises) whereas there is significant difference between the groups in decreasing disability and so the trunk balance exercise with flexibility exercises is a superior choice in management of chronic low back pain.

Keywords: Chronic low back pain; Strength training exercises; Flexibility exercises; Disability in chronic low back pain

Introduction

Back pain is an extremely common human phenomenon, a price mankind should pay for their upright posture. Chronic low back pain syndrome lasts more than 6 months, worsens with time and associated with major co-morbidities, especially psychological [1].

LBP is the most frequent reason for referral to outpatient Physical Therapy, representing over 25% outpatient discharges from hospital-based and private physical therapy practices. In 90% of patients, LBP resolves within 6 weeks (self-limited). In another 5% of patients, the pain resolves by 12 weeks after initiation. Less than 1% of back pain is due to "serious" spinal disease (e.g., tumor, infection). Less than 1% of back pain stems from inflammatory disease (rheumatologic work-up and treatment required). Less than 5% of back pain is true nerve root pain. Most patients with LBP have one or more of four symptoms: Back pain, Leg pain, Neurologic symptoms, and Spinal deformity [2]. "Social class" is probably the strongest personal predictor of incurring back trouble. This is in part related to heavy manual labor and in part to "social disadvantage" e.g., poor medical care. Back pain is common in surgeons, dentists, miners; truck drivers. Lower back pain has a higher incidence in women [3]. LBP is also common during normal pregnancy, occurring in 48% to 90% of pregnancies, and is two to three times more common in pregnant women than the general population. Approximately 15% to 65% of women report substantial persistent back and pelvic pain postpartum, and if woman has back pain during pregnancy she is at an increased risk of pain postpartum. Many subjects with CLBP have been reported to have a psychological profile that predisposes them to develop chronic pain. Additionally, people aged between 50 and 60 years are more likely to become disabled due to LBP.

Low educational attainment and heavy physical occupation, slightly increase the risk of LBP and chronicity but markedly increase the difficulty of rehabilitation and job retraining [2].

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Diagnostic triage of back pain should be based primarily on an accurate, focused clinical assessment (history and physical examination) rather than growing trend of cursory examination and overreliance on imaging techniques [2]. Asymptomatic patients with no back pain have been found to have a high incidence of "positive" MRI or CT findings. Jensen and coworkers found that 64% asymptomatic individuals who underwent an MRI had "abnormal" appearing lumbar discs at some level. Abnormalities seen on MRI or CT scan (e.g., age related disc changes) are not the origin for patient's back pain (i.e., these tests are highly sensitive, but not specific). The crucial part of accurate diagnosis is the physician's clinical findings and their correlation with imaging findings [2]. X-ray examination is necessary for back pain lasting more than 3 weeks. C.T. scan and M.R.I. show most bony and soft tissue problems around the spine and spinal canal. Electromyography (EMG) may be appropriate if nerve root compression is a possibility. Blood investigation is carried out if one suspects malignancy, metabolic disorders, or chronic infection. Bone scan may be helpful if a benign or malignant bone tumor is suspected, but not seen on plain X-rays.

There is insufficient research evidence for any improvement in clinical outcomes in favour of conditioning exercises for the trunk muscles, aerobic conditioning, epidural steroid injections, workplace back schools, acupuncture, shoe lifts, corsets, and biofeedback, physical modalities which include ice, heat, and shortwave diathermy, massage ultra sound therapy**.**

Muscle strength is a broad term that refers to the ability of the contractile tissue to produce tension and resultant force based on the demands placed on the muscle. Strength training (strengthening exercise) is defined as a systematic procedure of a muscle or muscle group lifting, lowering, or controlling heavy loads (resistance) for a relatively low number of repetitions or over a short period of time. The focus of recent research has been on the role of the transversus abdominis (TrA) and multifidus muscles and their function as core stabilizers. These deep muscles have segmental attachments in the lumbar spine and are therefore able to provide segmental control and stiffness. Studies have shown that the deep fibers of the multifidi and TrA are the first muscles to become active when there is postural disturbance from rapid extremity movements [4]. The rectus abdominis (RA), external oblique (EO), and internal oblique (IO) muscles are large, multi-segmental global muscles and are important guy wires for stabilizing the spine against postural perturbations. The transversus abdominis (TrA) is the deepest of the abdominal muscles and responds uniquely to postural perturbations.It has been shown that activation and function in the TrA changes (delayed and more phasic) in patients with low back pain, possibly indicating less effective stabilizing action [4]. Studies have also documented that training this muscle for postural control and stability improves the long term outcome [5].

Balance exercises are the exercises designed to improve balance or postural stability. Balance is a dynamic process by which the body's position is maintained in equilibrium, static or dynamic. Balance is greatest when body's center of mass (COM) or center of gravity (COG) is maintained within the base of support (BOS). Balance is a complex motor control task involving the detection and integration of sensory information to assess the position and motion of the body in space and execution of appropriate musculoskeletal responses to control body position within the context of the environment and task. Most balance intervention programs require a multisystem approach [6]. The delayed activation has been described as an impairment of the ''neural control unit" of the spine stabilizing system [7]. The delayed response of trunk muscles could be related inaccurate information processing from higher centers of the central nervous system related to motor control. Some researchers emphasize a spinal reflex deficit and report that during a sudden load release protocol, individuals with low back pain have longer reflex latencies compared to healthy controls. These longer latencies would appear to be a pre-existing risk factor and not a result of low back pain.

The functional consequence of a delayed response of the trunk muscles to sudden external loads is a deficit in trunk balance as demonstrated with a sitting test**.** In addition, in the absence of visual feedback, poorer balance performance has been associated with longer onset time of the trunk muscles**.** Trunk balance deficits and muscle impairments could also originate from poor position sense, which has been reported to be present in individuals with CLBP. Clinicians understand patients with CLBP have difficulty maintaining balance, especially under challenging conditions (e.g., single limb support or closed eyes) and poor balance is also a frequent concern reported by patients with Chronic low back pain Balance deficits in individuals with CLBP have been demonstrated through increased displacement of the center of pressure (COP) while standing upright and greater medial-lateral postural sway.

Flexibility is the ability to move a single joint or a series of joints smoothly and easily through an unrestricted pain free range of motion. Flexibility is related to the extensibility of musculotendinous units that cross a joint, based on their ability to relax or deform and yield to a stretch force. Stretching and flexibility exercises as well as mobilization techniques to increase mobility of restricting tissues are used so the patient can assume effective alignment of the spine when exercising to improve muscle performance and functional outcomes. For patients who fit the manipulation may be indicated during the early intervention period and then followed with stretching exercises [6].

Aim and Need of the Study

Statement of the problem

To compare the effectiveness of trunk balance exercises and strength training exercises in the management of pain and disability among chronic low back pain subjects.

Need of the study

Chronic low back pain (CLBP) is a most common clinical condition and its complex etiology is not yet fully understood. There are systematic reviews reporting the effectiveness of motor control exercises for the treatment of CLBP. Comparison between motor control exercises and other rehabilitation techniques show that the former is useful in the treatment of CLBP, however there is no evidence of their superiority over other physiotherapy interventions. The question therefore remains open as to whether there is an optimum exercise program to address CLBP. More specifically the efficacy of trunk balance training alone in individuals with CLBP has never been studied. The aim of the study is to determine the efficacy of trunk balance exercise in subjects with CLBP.

Objectives of the study

1. To study the effects of trunk balance exercises combined with flexibility exercises on pain among chronic low back pain subjects.

2. To study the effects of trunk balance exercises combined with flexibility exercises on disability among chronic low back pain subjects.

3. To study the effects of strength training exercises combined with flexibility exercises on pain among chronic low back pain subjects.

4. To study the effects of strength training exercises combined with flexibility exercises on disability among chronic low back pain subjects.

5. To compare the effects of trunk balance exercises combined with flexibility exercises and strength training exercises combined with flexibility exercises on pain among chronic low back pain subjects.

6. To compare the effects of trunk balance exercises combined with flexibility exercises and strength training exercises combined with flexibility exercises on disability among chronic low back pain subjects.

Operational definitions

Pain: Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage [8].

Acute pain: Acute pain links an unpleasant sensory, perceptual, emotional, and mental experience provoked by acute disease or injury with autonomic, psychological, and behavioural responses [9].

Chronic pain: Chronic pain can be defined as persistent pain that lasts beyond the expected time frame for tissue healing. Chronic pain lends itself to behavioral and/or emotional interpretations and is a multifaceted problem [10].

Low back pain: Low back pain (LBP) is usually defined as pain extending from the twelfth rib inferiorly to the gluteal fold, whereas the neck pain is the pain between the occiput and the third thoracic vertebra.

Chronic low back pain syndrome: Chronic low back pain syndrome lasts more than 6 months; worsens with time; associated with major co-morbidities, especially psychological. Multi-disciplinary therapy is commonly required [1].

Mechanical low back pain: When low back pain varies with physical activity (e.g. prolonged sitting, bending forward) and with time it is called mechanical low back pain. The pain is in the lumbo-sacral region, buttocks, and thighs, with no radiation to foot or toes [2].

Flexibility: The ability to move freely, without restriction; used interchangeably with mobility [6].

Strength: Strength is the ability of a muscle or muscle group to generate a force or moment of force about a joint or body axis.

Balance: The ability to align body segments against gravity to maintain or move the body (center of mass) within the available base of support without falling; the ability to move the body in equilibrium with gravity via interaction of the sensory and motor systems [6].

Methodology

Study setting

The study was conducted in RVS Hospital, Sulur, Coimbatore, India.

Selection of subjects

Twenty (20) subjects with CLBP, fulfilling the inclusion criteria were selected for the study. The subjects were randomly assigned in to two groups (A and B) each group containing ten (10) subjects.

1. Experimental group I received trunk balance exercises following flexibility exercises.

2. Experimental group II received strengthening exercises for the limbs and trunk following flexibility exercises.

Dependent variables

1. Pain.
2. Disability.

Variables	Tools
Pain	Visual Analogue scale (VAS)
Disability	Roland Morris Low Back Pain and Disability Questionnaire (RMQ)

Table 1: Measurement tools.

Independent variables

1. Trunk balance Exercises along with flexibility exercises.
2. Strength training exercises along with flexibility exercises.

Measurement tools

The Measurement tools are mentioned in Table 1.

Study design

Pre-test and post-test experimental study design.

Study duration

3 months.

Inclusion criteria

1. Clinically diagnosed chronic low back pain subjects.
2. Age group between 30-40 years.
3. Sex- both males and females were included in the study.

Exclusion criteria

1. Inflammatory arthritis.
2. Indication for surgical intervention.
3. Contra- indication to exercise.
4. Presence of neurological diseases.

Orientation to the subjects

Before collection of the data, subjects were explained about the purpose of the study. The investigator had given a detailed orientation to the various test procedures such as VAS and RMQ. The concern and full cooperation of each participant was sought after complete explanation of the condition and demonstration of the procedures involved in the study.

Materials used

1. Data collection sheet.
2. Client consent form.
3. Quadriceps Table with pulleys and weights.
4. Hamstring couch with pulleys and weights.
5. Treadmill.
6. Shoulder exerciser with pulleys and weights.
7. Weight bars.
8. Ball.
9. Pillows.

Test administration

Pain assessment by VAS: The Visual Analogue Scale is one of the most common and reliable pain intensity assessment tools. It is a self-reported measurement consisting of a horizontal line with extreme anchors of no pain to the worst pain. The horizontal line represents a continuum of pain intensity and is 10 cm long. The subjects were asked to mark on the line at a right angle at a point which represents his current level of pain. The distance in centimetres from the lower end of VAS to the subject's mark was used as a numerical index of the severity of pain.

No pain---Worst pain

Disability assessment by the Roland-Morris low back pain and disability questionnaires

Questionnaire (RMQ): Roland Morris low back pain disability questionnaires were given to the patients and clearly explained about the items in the questionnaires. The patients were asked to mark next to each appropriate statement and the scores were recorded.

Procedure

Trunk balance exercises

Trunk, head, and upper limbs rotation from kneeling

Position of the subject: The subject was positioned kneeling on a pillow with arms abducted to 90 degrees

Instruction to the subject: The subject was asked to rotate the trunk, head, and upper limbs to one direction.

Volume of the program: The position was maintained for 30 seconds in each direction, and repeated 2times per direction

Progression of the exercise: The exercise was more challenged by adding first eye closure and then head extension.

Upper limbs flexion and extension with simultaneous head movement from kneeling

Position of the subject: The subject was positioned kneeling on a pillow.

Instruction to the subject: The subject was instructed to look upward while moving his/ her arms above the shoulder.

Volume of the program: The position was maintained for 3 minutes, performing 6 repetitions of upper limbs movement.

Progression of the exercise: The exercise was made more challenging by adding eye closure.

Pelvic bridging followed by raising one lower limb and extending knee

Position of the subject: Supine with feet resting on the couch.

Instruction to the subject: The subject was instructed to lift his/her pelvis up, after reaching maximum hip extension he/ she were asked to raise one lower limb from the couch and extend the knee.

Volume of the program: The position was maintained for 30 seconds, and repeated twice for each lower extremity.

Progression of the exercise: The exercise was made more challenging by adding first eye closure and then a ball under the foot resting on the couch.

Lifting opposite upper and lower limbs from Quadruped position

Position of the subject: Quadruped position.

Instruction to the subject: The subject was instructed to lift his/her opposite lower limbs.

Volume of the program: The position was maintained for 1 minute for each combination of limbs.

Progression of the exercise: The exercise was made more challenging by adding first eye closure and then a pillow under the lower limb.

Sitting on the side of the couch with unilateral support

Position of the subject: Sitting on the side of the couch with unilateral support.

Instruction to the subject: The subject was instructed to maintain the position for 1 minute.

Volume of the program: The position was maintained for 1 minute each side

Progression of the exercise: The exercise was made more challenging by adding eye closure, crossing the upper arms across the chest and then putting a pillow under the lower limb.

Single limb kneeling on the edge of the couch

Position of the subject: Single limb kneeling on the edge of the couch with a pillow under the knee.

Instruction to the subject: The subject was instructed to maintain the position for 30 seconds. c) Volume of the program: the position was maintained for 30 seconds, two repetitions for each limb.

Progression of the exercise: The exercise was made more challenging by first adding eye closure, then head extension, and finally crossing the upper arms.

Strength training exercises

Abdominal curl ups

Position of the subject: Supine with feet resting on the couch.

Instruction to the subject: The subject was instructed to lift his / her head and shoulders off the couch contracting the abdominal muscles.

Volume of the program: The position was maintained for 3 seconds, 3 sets of 6 repetitions were performed

Latissimus dorsi: Shoulder extensions against resistance

Position of the subject: Standing with elbows extended.

Instruction to the subject: The subject was instructed to extend his/ her shoulders at 50% maximum voluntary contraction (MVC).

Volume of the program: 3 sets of 8 repetitions (50% MVC).

Hamstrings: Prone knee flexion against resistance

Position of the subject: Sitting on a hamstring table.

Instruction to the subject: The subject was instructed to bend both the knees against resistance at 50% MVC.

Volume of the program: 3 sets of 8 repetitions (50% MVC).

Quadriceps: seated knee extension

Position of the subject: Sitting on a quadriceps table.

Instruction to the subject: The subject was instructed to extend both the knees against resistance at 50% MVC.

Volume of the program: 3 sets of 8 repetitions (50% MVC).

Flexibility exercises

Walking on the treadmill

Position of the subject: Walk standing position.

Instruction to the subject: The subject was instructed to walk with a comfortable velocity.

Volume of the program: 15 minutes.

Anterior and posterior pelvic tilt

Position of the subject: Supine with feet resting on the couch.

Instruction to the subject: The subject was instructed to lift the pelvis upward and then to bring downward.

Volume of the program: 15 Repetitions.

Single knee to chest exercise

Position of the subject: Supine lying.

Instruction to the subject: The subject was instructed to bring a single knee towards the chest with the assistance of both hands.

Volume of the program: 10 repetitions.

Double knee to chest exercise

Position of the subject: Supine with feet resting on the couch.

Instruction to the subject: The subject was instructed to bring both knees towards the chest with the assistance of both hands.

Volume of the program: 10 Repetitions.

Lower limbs and trunk rotation

Position of the subject: Supine with feet resting on the couch.

Instruction to the subject: The subject was instructed to rotate the lower limbs and trunk to one direction and the head to other direction.

Volume of the program: 10 repetitions each direction.

Hip adductor stretches

Position of the subject: Supine with feet resting on the couch.

Instruction to the subject: The subject was instructed to bring each knee towards the same side of the couch by keeping the feet together while maintaining contact between the lumbar spine and the couch.

Volume of the program: 2 repetitions and 1 minute hold.

Hamstring stretches

Position of the subject: Supine with the hip and knee in 90°- 90° position of the lower extremity to be stretched.

Instruction to the subject: The subject was instructed to extend the knee from 90°- 90° position.

Volume of the program: 2 repetitions and 1 minute hold for each lower extremity.

Hip flexors and Quadriceps stretching

Position of the subject: Side lying with both hips and knees partially flexed.

Instruction to the subject: The subject was asked to move the limb to be stretched in a combination of hip extension and knee flexion while the opposite lower extremity is kept in flexion.

Volume of the program: 2 repetitions and 1 minute hold for each lower extremity.

Passive trunk extension

Position of the subject: Prone on elbows.

Instruction to the subject: The subject was asked to move the elbows into extension there by passive trunk extension occurred.

Volume of the program: 10 repetitions.

Seated trunk flexion

Position of the subject: Sitting with hands clasped behind the occiput.

Instruction to the subject: The subject was asked to move the head towards the knees without providing over pressure with hands.

Volume of the program: 10 repetitions.

Trunk rotation

Position of the subject: Sitting with hands on opposite shoulders.

Instruction to the subject: The subject was asked to rotate the trunk one direction and then to other direction.

Volume of the program: 10 repetitions each direction.

The treatment intervention for both the experimental groups consisted of 5 sessions per week, each lasting 60 minutes for a total of 10 treatment sessions over 2 consecutive weeks.

Experimental Group I - Received trunk balance exercises following flexibility exercises.

Experimental Group II - Received strengthening exercises for the limbs and trunk following flexibility exercises.

Before and after completion of 2 weeks treatment intervention, pain and disability were evaluated by VAS (Visual Analogue Scale) and RMQ (Roland Morris Low Back Pain Disability Questionnaires) respectively and recorded.

Statistical analysis

The collected data were analysed by paired 't' test to find out significant difference between pre and post-test values of experimental groups I and II and further unpaired 't' test was applied to find out the differences between groups.

Results

Analysis of dependent variable low back pain in experimental group I

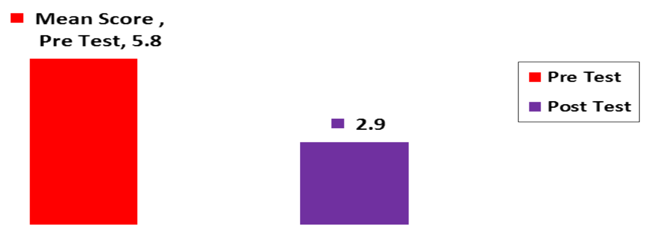
The calculated paired 't' test value for pain is 13.55 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value, there is significant difference in Pain following trunk balance exercises along with flexibility exercises among CLBP subjects (Table 2 and Graph 1).

Analysis of dependent variable low back pain in experimental group II

The calculated paired 't' test value for pain is 15.33 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value, there is significant difference in Pain following strength training exercises for the limbs and trunk along with flexibility exercises among CLBP subjects (Table 3 and Graph 2).

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	5.9	2.9	5.07	16.11
Post-test	2.9			

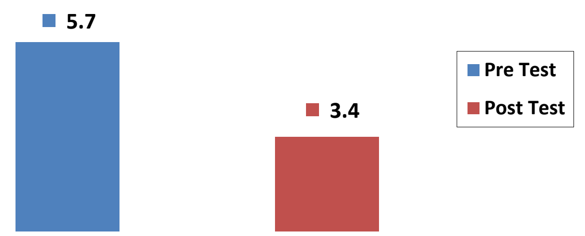
Table 2: The table shows mean value, mean difference, standard deviation and paired 't' value between pre-and post-test scores of pain (VAS) in experimental group I.



Graph 1: Graphical representation of the pre-and post-test mean values of pain among experimental group I.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	5.7	2.3	0.48	15.33
Post-test	3.4			

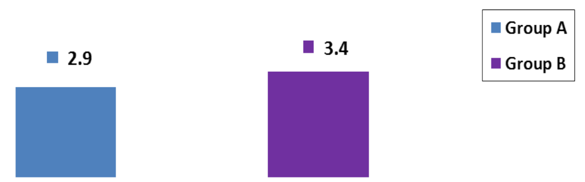
Table 3: The table shows mean value, mean difference, standard deviation and paired 't' value between pre-and post-test scores of pain among experimental group II.



Graph 2: Graphical representation of the pre-and post-test mean values of pain among experimental group II.

S. No	Groups	Improvement		Standard Deviation	Unpaired 'T' test
		Mean	Mean Difference		
1	Group-I	2.9	0.5	1.17	0.12
2	Group-II	3.4			

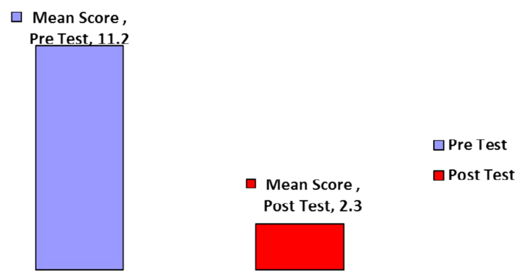
Table 4: The table shows mean value, mean difference, standard deviation, and unpaired 't' value of pain between experimental group I and experimental group II.



Graph 3: Graphical representation of the mean values of pain on visual analog scale in experimental group I and experimental group II.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	11.2	8.9	0.74	38
Post-test	2.3			

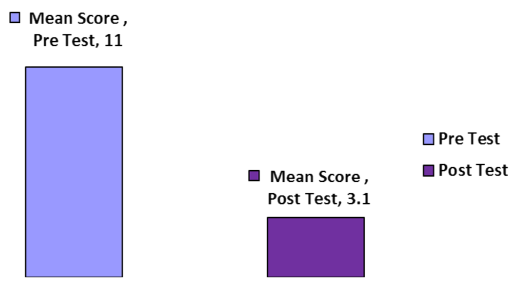
Table 5: The table shows mean value, mean difference, standard deviation and Paired 't' value between pre and post test scores of Disability (RMQ) among experimental group I.



Graph 4: Graphical representation of the pre and post-test mean values of disability (RMQ) among experimental group I.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	11	7.9	0.875	28.5
Post-test	3.1			

Table 6: The table shows mean value, mean difference, standard deviation and paired 't' value between pre-and post-test scores of disability among experimental group II.



Graph 5: Graphical representation of the pre and post-test mean values of disability (RMQ) among experimental group II.

Analysis of dependent variable pain between experimental groups

The calculated unpaired 't' value for pain is 0.12 and the table 't' value is 2.878 at 0.005 level of significance. Hence, the calculated 't' value is lesser than table 't' value, it is concluded that there is no significant difference between experimental groups (Trunk Balance Exercise and Strength training exercises) in decreasing pain among CLBP subjects (Table 4 and Graph 3).

Analysis of dependent variable disability in experimental group I

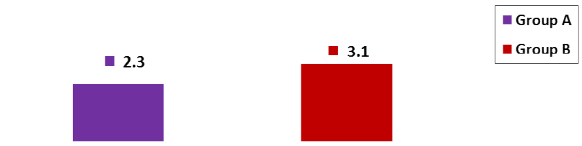
The calculated paired 't' value for disability is 38 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value, there is significant difference in disability following trunk balance exercises along with flexibility exercises among CLBP subjects (Table 5 and Graph 4).

Analysis of dependent variable disability in experimental group II

The Calculated Paired 't' value for disability is 28.5 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value, there is significant difference in Disability following strength training exercises for the limbs and trunk along with flexibility exercises among CLBP subjects (Table 6 and Graph 5).

Groups	Improvement		Standard Deviation	Unpaired 'T' test
	Mean	Mean Difference	1.17	3.24
Group-A	2.3	0.8		
Group-B	3.1			

Table 7: The table shows mean value, mean difference, standard deviation, and unpaired 't' value of Disability (RMQ) between experimental group I and experimental group II.



Graph 6: Graphical representation of the mean values of disability (RMQ) on visual analog scale in experimental group I and experimental group II.

Analysis of dependent variable disability between experimental groups

The calculated unpaired 't' value for disability is 3.24 and the table 't' value is 2.878 at 0.005 level of significance. Hence, the calculated 't' value is greater than table 't' value, there is significant difference between Trunk Balance Exercises and Strength Training Exercises in improving disability among CLBP subjects.

When comparing the mean values of experimental group I and II, experimental group I shows more difference than experimental group II. Hence, it is concluded that Trunk balance exercises along with Flexibility exercises are more effective than Strength Training exercises along with Flexibility exercises in improving disability among CLBP subjects (Table 7 and Graph 6).

Discussion

Discussions on findings

Individuals with acute and chronic low back pain (CLBP) show changes in trunk muscle activity, particularly in the transverse abdominis and multifidi, which during functional activities ensures the mobility and stability of the lumbo-pelvic region [11].

Clinicians understand patients with CLBP have difficulty maintaining balance, especially under challenging conditions (e.g., single limb support or closed eyes) and poor balance is also a frequent concern reported by patients with Chronic low back pain [7].

To validate and compare the effects of Trunk balance exercises along with Flexibility exercises and Strength training exercises along with Flexibility exercises among chronic low back pain (CLBP) subjects. Hodges et al. found that activation and function in the Transversus abdominis (TrA) changes (delayed and more phasic) in patients with LBP, possibly indicating less effective stabilizing action [4]. Hides et al. also documented that training these muscles for postural control and stability improved the long-term outcome [5]. Danneels et al. had supported the idea that training with specific exercises increased the function of the multifidi as well as the erector spine in general [12].

Trunk balance exercises along with flexibility exercises role in reducing pain and decreasing disability among CLBP subjects. Hides et al. found quick atrophy of the fibers of the multifidi at the spinal segment in patients with low back impairment [5]. Lee et al. found an increased incidence of LBP in those who had lower extensor than flexor strength after following 67 asymptomatic individuals for 5 years [13]. Nourbakhsh and Arab found poor muscular endurance in the back extensors muscles had the greatest association with LBP [14]. Anderson et al. conducted an EMG study to find out abdominal and hip flexor muscle activation during various training exercises [15]. They found that curl up recruited primarily the rectus abdominis, with low activity in the obliques, transversus abdominis, and psoas major muscles. Takemasa et al. conducted a study on trunk muscle strength in and effect of trunk muscle exercises for patients with chronic low back pain [16]. They concluded that strengthening the extensor muscles and an improved extensor/ flexor ratio had been found to be important in decreasing symptoms in patients with CLBP. Hodges et al. explained the mechanism of deep muscles (TrA and MF) as core stabilizers [5]. These deep muscles have segmental attachments in the lumbar spine and are therefore able to provide segmental control and stiffness. The deep fibres of the multifidi and the TrA are the first muscles to become active when there is postural disturbance from rapid extremity movements.

This study shows there is significant difference in pain and disability following strengthening and flexibility exercises among chronic low back pain subjects.

This study shows there is significant difference in pain and disability following trunk balance and flexibility exercises among chronic low back pain subjects.

This study shows there is no significant difference between strengthening along with flexibility exercises and trunk balance exercises along with flexibility exercises in reducing pain among chronic low back pain subjects. But this study shows significant difference between strengthening along with flexibility exercises and trunk balance exercises along with flexibility exercises in disability score among chronic low back pain subjects.

Conclusion

Twenty subjects with CLBP were included in this study and randomly assigned in to two groups A and B with each group consisting of 10 subjects.

Experimental group I was treated with trunk balance and flexibility exercises and experimental group II was treated with strengthening and flexibility exercises. Low back pain and disability were assessed before and after the intervention by Visual Analogue Scale (VAS) and Roland Morris Low Back Pain and Disability Questionnaires (RMQ) respectively.

The result showed that trunk balance and flexibility exercises were effective in decreasing low back pain and disability. Also, strengthening and flexibility exercises were effective in decreasing low back pain and disability.

When comparing trunk balance and strengthening exercises on low back pain the statistical result showed that there was no significant difference between both the groups, but when analysing mean difference of both groups, experimental group I received trunk balance exercises showed more difference than experimental group II which received strengthening exercise.

But when comparing trunk balance and strengthening exercises on low back disability the statistical result showed that there was significant difference between both the groups.

Hence, we conclude that Trunk balance exercises combined with flexibility exercises were found to be more effective than a combination of Strength and flexibility exercises in reducing disability among chronic low back pain subjects.

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