

EFFECT OF EIGHT WEEK CORE STABILIZATION EXERCISES PROGRAM FOR CHRONIC LOW BACK PAIN AMONG RESIDENCE OF ZIRO, ARUNACHAL PRADESH- PILOT STUDY

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Abstract

Low back pain is one of the major factor for reduction of work efficiency. Though there are several method to subside the problem, but of temporary benefit or need to compromise in other movement. Exercise has shown better benefit for subsiding the pain and disability but its unclear the specific exercise for solving mechanical low back pain. Keeping the aim and objective the researcher tried to find out the effect of core stabilization exercise for chronic low back pain patients. Pretest and post test data was taken among seventeen volunteers participated on specific parameters such as strength of gluteus maximus, gluteus medius and tensor facia lata, low back disability scale, pain intensity by visual analog scale and functional assessment by five times sit to stand test and active hip abduction test. the result shows improvement in both gender but major changes are not recorded as expected. The study concluded that number of participant should be increased and much more sophisticated instruments should be used for depth study.

Keywords: Chronic low back pain, Core stability exercise, Ziro

INTRODUCTION

In modern era human life style have been notes with drastic change. The consequence of unbalanced life style are due to over use or under use of physical movements. The result of over use of soft tissue leads to over stretch of soft tissue, recurrent and micro soft tissue injury, trauma of neuro-musculo-skeletal structure can leads to injuries to chronic soft tissue area. Whereas under usage of soft tissue leads to lack of fluid circulation, such as blood flow, lymphatic flow , shortening of soft tissue structure, imbalance of agonist and antagonist muscle strength, imbalance of strength between dominant and non-dominant side of skeletal muscle strength and so on. These are the few causes of chronic pain.

Chronic low back pain is one of the common complain among our clinical population. The cause and pathology of chronic low back pain may varies. There are several option to get rid off from such pain such as pain killer medication to surgical option, but mainly they have temporary effects. Now the morden world is looking for non-pharmacological approach as a treatment such as yoga, exercises, aerobic, physiotherapy, sports and recreation etc.

In general, public had an idea about exercise as a component for health and fitness. Several studies have been conducted and seen the positive outcome in physiological and psychological.



These days, exercises were consider as preventive measures for musculoskeletal problems, but had a less ideas about therapeutic measures. There are different therapeutic exercises protocol for different causes of low back pain. The torso of human body is a sole connection between upper and lower limb girdle. Thus movement of torso is important component for human movement in daily activity. Several study found that weakness of muscle can leads to chronic pain. Thus, researcher believes that weakness of torso muscle can leads to chronic low back pain. Our present study was at Ziro, of Arunachal Pradesh where farming is the major source of earning. During farming generally elderly population complain chronic low back pain and hampers there daily living activities. Based on facts our objective of the study is to evaluate selected muscle strength , quality of life, functional activity and disability index due to back pain. And we hypothesize that strengthening of core muscle can reduce pain, low back pain disability and improves the quality of life and functional activities.

METHODOLOGY

We have used randomized clinical trial design for study. The inclusion criteria were both gender above eighteen years of age, pain persist more that three months and should be mechanical or non-specific low back pain. ^{18,19}, may or may not radiating pain. On examination straight leg raising test should be negative and weakness of muscle strength should be less then 4/5 on Manual muscle testing scale. Tenderness may or may not be over lumbar paraspinal, gluteal muscle, greater trochanter of hip area only.

The exclusion criteria were any signs or symptoms of serious spinal pathology, including radiculopathy, cauda equine syndrome, inter-vertebral disc associated injury or pathology, cancer, or fracture. Any specifically identified pathology as a source of their back pain, A prior history of Thoracolumbar or pelvis fracture, Thoracic or lumbar spine surgery or abdominal surgery, Neurological injuries, Diseases affecting the lower extremities, Lower extremity musculoskeletal injuries or diseases, Any lower extremity orthopedic surgeries, super senior citizen, and participate who are not volunteer in our study. For ethical clearance the proposal was send to research board of our university and proper verbal consent was taken from all the participants. The participants were from Ziro and nearby villages and conducting their treatment at out-door clinical of physiotherapy department of Indira Gandhi technological and

medical sciences university. We had seventeen participants who matched our inclusive criteria and volunteer to participate.

The parameter were, Gluteus medius & maximus and Tensor Facia Lata musces strength were assessed by manual muscle tests (MMTs) and break tests as illustrate by Hislop & Montgomery. Trendelenburg Sign were assessed as per Hardcastle & Nade instruction. Functional strength assessment by - the Active Hip Abduction Test and Single Limb Squat Test. Pain intensity and severity was measured by Visual analog scale. and Low back pain-related disability was analysed by Oswestry disability index.

This exercise protocol was designed by Hicks and colleagues and Rabin and colleagues.²¹ they used abdomen drawing in maneuver (ADIM) to improve the stabilization of core muscles. The exercises have been begins from four different starting postion, viz- Quadruped Progression, Supine Progression, Sidelying Progression and Standing Progression. The details of the exercises protocol have been discussed in Table format(TableNo-1) The reason behind for selection this protocol as this have been widely used by physical therapist globally for caring



Exercise protocol for group-1 :	Stabilization Exercise Protocol		
Exercise	Progression Criterion		
Quadruped Progression			
ADIM in quadruped	30 reps with 8 sec hold		
ADIM in quadruped, UE lifts	30 reps with 8 sec hold, both sides		
ADIM in quadruped LE lifts	30 reps with 8 sec hold		
ADIM in quadruped UE & LE lifts	30 reps with 8 sec hold		
ADIM in quadruped, dynamic UE & LE lifts			
Supine Progression			
ADIM in supine	30 reps with 8 sec hold		
ADIM in supine heel slides	20 reps with 4 sec hold, both sides		
ADIM in supine LE lift	20 reps with 4 sec hold, both sides		
ADIM in supine bridge	30 reps with 8 sec hold		
ADIM in supine SLS bridge	30 reps with 8 sec hold, both sides		
ADIM in supine curl up, elbows at sides	30 reps with 8 sec hold		
ADIM in supine curl up, elbows elevated	30 reps with 8 sec hold		
ADIM in supine, curl up, hands at head			
Sidelying Progression			
ADIM in sidelying	30 reps with 8 sec hold		
ADIM in sidelying, side plank, knees bent	30 reps with 8 sec hold, both sides		
ADIM in sidelying , side plank, knee extended	30 reps with 8 sec hold, both sides		
ADIM in sidelying, side plank with tilt	30 reps with 4 tilts A/P, both sides		
ADIM in sidelying, side plank with roll			
Standing Progression			
ADIM in standing	30 reps with 8 sec hold		
ADIM in standing row	30 reps with 8 sec hold		
ADIM in standing, walking			

chronic non specific low back pain.²¹ The protocol was as follow.

The progression of exercises was purely based on clients confidence to progress. The exercises ware under supervision of on duty physical therapist, and were done 5 days a week for eight weeks. Each session was of 40 minutes. The exercises were conducted one to one ratio between therapist and clients. The above mention data were taken as pre test data and post test data.

RESULT

Seventeen participants with 10 male and 7 female were present. The demographic description is as follow.



Graph-1 represent the demographic data, it represents average age of male are 39.2 years and females are 32 years. On analyzing on body mass index it was just 24.56 kg/M² for males and 22.36 Kg/M² for females. The result suggest that the chronic low back pain can happen in middle age group, even in normal BMI. The result cant be generalized as the sample size is very small.



Based on the aim and objectives the following parameters were analyses .

1. Manual Muscle Testing.



Table-1	MANUAL MSUCLE TESTING								
	GLUTEUS MEDIUS		TENSOR FACIA LATA			GLUTEUS MAXIMUS			
	Pre Test	Post Test	Difference	Pre Test	Post Test	Difference	Pre Test	Post Test	Difference
Men	3.27±0.48	3.86±0.56	0.6±0.51	4.47±0.52	4.88±0.31	0.4±0.51	3.72±0.79	4.18±0.42	0.4±0.51
Women	3.57±0.79	4.42±0.53	0.86±0.38	4.57±0.53	4.43±0.53	0.14±0.38	3.89±1	4.42±0.53	0.43±0.53

Representing Graph-2, and table-1, We have analyzed few selected muscles, which are being noticed being affected by chronic low back pain i.e. gluteus medius, gluteus maximus and tensor facia lata. It has been found after analyzing the muscle strength the muscle strength that women were improved better then men. In men the strength gain of Gluteus medius, tensor facia lata and gluteus maximus was 0.6 ± 0.51 , 0.4 ± 0.51 and 0.4 ± 0.51 respectively where as women gain their strength by 0.86 ± 0.38 , 0.14 ± 0.38 and 0.43 ± 0.53 respectively.



Table-2	Oswestry Low Back Disability(ODI)			
	Pre Test	Post Test	Difference	
MEN	28.17±2.9	26.93±3.07	1.2±1.5	
WOMEN	29.42±4.58	29.42±2.5	2.28±3.03	



Based on Graph-3 and Table-2, analyzing the functional disability level of back pain we found the men disability level was 28.17 ± 2.9 which was subsided to 26.93 ± 3.07 were after eight weeks of exercises the mean value for pain was for 26.93 ± 3.07 for men and 29.42 ± 2.5 for women. There was marginal marginal improvement of back pain disability of 1.2 ± 1.5 men and 2.28 ± 3.03 for women.



Table-3	Pain scale (VAS)			
	Pre Test	Difference		
Male	4.76±0.63	4.58±0.51	0.4±0.51	
Female	5.28±0.95	4.71±0.49	0.86±0.69	

Pain was analyzed by subjective scale known as Visual analog scale, as a pre test the mean value of pain for male was 4.76 ± 0.63 which was reduces to 4.58 ± 0.51 after exercise and there was mild reduction of 0.4 ± 0.51 , where as in female it was recorded as 5.28 ± 0.95 and after exercises it was recorded as 4.71 ± 0.49 and had a mild improvement of 0.86 ± 0.69 The detais was analysed on Table-3 and Graph-4







Active hip abduction test is the functional test where Grade-0 was consider as normal and Grade-3 was consider as maximum affected. In men we found that 20% of male and 14% of female were in Grade-3. Among men group 30% and female almost 57% where in Grade-1 whereas in post test number of members in Grade-3 has been reduced and maximum where in Grade-1 and Grade-0. The details was represented in Graph-5.



Table-4	Five times sit to stand (5TSTS)			
	Pre Test	Post Test	Difference	
male	12.86±2	11.59±1.77	1.7±2.23	
female	10.14±3.76	9.86±0.9	1.71±1.25	

Its interesting to note that females pre test data was 10.14 ± 3.76 sec. better than boys 12.86 ± 2 sec. in five times sit to stand test. even after exercises the females took 9.86 ± 0.9 sec were better than men who need 11.59 ± 1.77 sec. to complete same task. The effect and improvement were almost similar for male and female. The further details given in Graph-6 and Table no.-4



DISCUSSION

Low back pain is one of the common problem in human population without respecting the boundaries of age, gender, life style, social and other factors. The consequence of such problems are they are chronic in nature and hampers the daily-living and work efficiency of an individual.¹ To solve this issue there are several pharmacological and other therapeutic methods but, mainly solves only symptomatic and that to for short term. Physiotherapy has shown promising outcome for solving chronic mechanical low back pain ³with help of exercises therapy² and electrotherapy modalities⁴. After analyzing several studies, found that weakness of toros muscles had an impact on chronic low back pain. ^{5,6,7}Based on studies we tried to find out the effect of chronic low back on strength of hip abductors⁸, disability and life style⁹. The study was done in Ziro, Arunachal Pradesh, India at Clinical unit of physiotherapy department of IGTAMSU. After following set inclusion and exclusion criteria and ethical clearance from research board of university we had only seventeen volunteers to participants included ten male and seven female. Though average age of females are quite younger age then male group. The out of several core strengthen exercises protocol we choose abdomen drawing in maneuver (ADIM) for our test.¹⁰ The test was done for eight weeks, 40 to 45 minutes session for once in a day, with five days a week and progression was depend on participants agility and ability. The parameters to analyzed were strength of gluteus medius, gluteus maximus and tensor facia lata., Pain intensity, low back disability index and functional test such as active hip abduction test and five times sit to stand test.

On analyzing the manual muscle testing we found that gluteus medius are much weaker compared to others. In both male and female group, where as improvement was similar in all muscle group. comparing the gender based improvement in gluteus medius was better in females and improvement in tensor facia lata males showns much better, where as similar improvement was noted among female and male groups. Camila Santana de Sousa et al (2019) concluded in review article the similar outcome as we found in our study. ¹³ We have used the manual muscle testing which was the limitation of our study, otherwise dynamometer was superior option which tells about the several other factors. Even surface electrode electromyography can elaborate better description about muscle activity.¹¹ On analyzing the low back disability we found that disability index among female was much higher (29.42±4.58) as compare to male. We assume that our female participants were younger and thus they have to look after house hold chaos and as well outer activities such as farming as compare to male. Even after exercises protocol we didn't found much improvement in female as compare to male, we assume that female are more active then male thus exercise doesn't effect such improvement in low back pain disability improvement. A similar study was done by Sang wk Lee (2014) and reported that pre test disability data was 23.8±10.5 in lumbar stability group and 25.9±15.8 for lumbar insatiability group. After hip abductor exercises training for 3 weeks he recorded that the disability score was reduced to 20.2±9.1 and 22.7±13.1 respectively in lumbar stability and lumabar instability group. on reassessment of after six week he found that the disability score was further reduced to 17.5±8.1 and 19.8±12.1 respectively. ¹² Its well documented that pain perception was higher in female as compare to male thus we found that pain intensity among female was 5.28 ± 0.95 as compare to male 4.76 ± 0.63 . After exercise the intensity of pain was much reduced in female upto 0.86 ± 0.69 as compare to male which was 0.4 ± 0.51 only. We assume that exercise induced neuro-chemicals had a great role to reduce the pain perception. It has been well-documented that exercise can induce or increase happy hormones such as



enkaphaline and endorphin which reduces pain perceptions.¹⁴⁻¹⁵ Comparing to our outcome a similar result was published by Sang wk Lee (2014) measured pain intensity by Visual analog scale with 100 point scale. As a pre test of lumbar stability group and instability group he recorded as 55.7 ± 8.9 and 58.9 ± 8.6 . After exercises for three week he noted the pain was subsided to 46.1 ± 6.9 and 53.89 ± 9.6 respectively and further after six week of exercise the pain was subside to 39.6 ± 7.5 and 43.3 ± 12.0 .¹²

Five times sit to stand test was noted as valid test to measure dynamic balance and functional mobility. ¹⁶ more over such test were used for degenerative pathology for lumbar spine. ¹⁷Out of all the parameters the most interesting factor was five minute sit to stand test. we found that females had higher pain perception, higher low back disability scale but functional activity such as five times sit to stand they need less time then male, as pre test the female took only 10.14±3.76 sec. as compared to male, which as 12.86±2 seconds. Though the rate of improvement was same in both the genders. The study was done in very small population and thus failed to achive any significant result. Thus we recommend the similar test can be done as retest on larger clinical population with much sophisticated equipment with different time interval and other even other parameters and different exercise protocol can be compared and correlated.

CONCLUSION

The study concludes that low back pain has an impact on hip abductor muscle weakness and found that eight week core exercise training program definitely had an effect on chronic mechanical low back pain. But we didn't found the significant change in muscle strength , disability index and functional improvement. The study was done in very small clinical sample and thus failed to receive significant result.

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