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Research Article

COMPARISON OF THREE DIFFERENT TREATMENT METHODS ON PAIN AND DISABILITY OF PEOPLE WITH NON-SPECIFIC CHRONIC LOW BACK PAIN

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ABSTRACT
Numerous recovery strategies have been used in an attempt to minimize the symptoms of low back pain (LBP). However, scientific evidence to support the effects of a Combination Treatment on low back pain is lacking. The purpose of the present study was to compare the effectiveness of a combined - physical exercise program versus routine exercise and posture education on pain and disability of people with non-specific chronic low back pain. The study was designed as a clinical and pseudo-experimental trial set at University laboratory. The participant s included a population of 33 men gaining from 18 to 45 years old with chronic low back pain. The interventions in this study were Routine therapeutic protocol, a combined - therapeutic protocol (Therapeutic Aquatic Exercise and foam roller and Swiss-ball exercises plus massage), posture education (back school), all delivered by experienced Physical therapists, thrice a week for 6 weeks. Measurements: Sorensen Test, Trunk flexors endurance test, Side bridge endurance test, Modified schober test, McGill Pain Questionnaire (MPQ), Roland-Morris Disability Questionnaire (RMDQ). There were differences between the groups at 6 weeks for pain measurements (MPQ), disability scores (RMDQ). A combined - physical exercise program is more effective than general exercise for decreasing pain and disability, eventually, improving quality of life and function in a population suffering from chronic low back pain.

Keywords: *Chronic Low Back Pain, Exercise Therapy*

INTRODUCTION

Low back pain (LBP) is one of the most common conditions affecting all population, worldwide (Jin *et al.*, 2004; Mohseni - Bandpei *et al.*, 2006, 2007). It is ranked first as a cause of disability and inability to work and approximately one quarter of adults in the United Sates (US) reported having LBP lasting at least one day in the past 3 months (Lou *et al.*, 2004; Deco *et al.*, 2006). A high prevalence rate and high associated economic and social costs were reported in France due to LBP (Gourmelen *et al.*, 2007). About 90% of all patients who present with low back pain will have nonspecific low back pain without an obvious anatomic cause (Koes *et al.*, 2006). Up to 70% of patients who develop acute low back pain have resolution of their symptoms within 6 weeks and up to 90% will have resolution within 3 months (Croft *et al.*, 1998**)**. Low back pain which persists for greater than 3 months has an uncertain prognosis and is more likely to result in some level of disability. Risk factors for developing chronic back pain are multifactorial and include demographic, health, occupational, psychological and spinal anatomy factors (Rubin, 2007). Among various documented risk factors for LBP such as smoking (Mikkonen *et al.*, 2008), obesity (Mirtz and Greene, 2005), pregnancy (Mohseni-Bandpei *et al.*, 2009), physical activity (Hartvigsen and Christensen, 2007), respiratory disorders, incontinence and gastrointestinal problems (Hodges *et al.*, 2007; Smith *et al.*, 2009), recent research has focused on investigation other factor and the most efficacious therapeutic approach to nonspecific low back pain.

The medical literature does not provide clear direction regarding the most efficacious therapeutic approach to nonspecific low back pain. In general, a multidisciplinary approach to nonspecific low back pain is usually most effective and includes medical management, physical therapy, maintaining physical activity level, cognitive behavioral therapy and counseling. Exercise and physical therapy are important

and undervalued modalities in the treatment of low back pain.

Different kinds of therapeutic interventions are available for short-term improvement of pain and function in chronic low back pain but their efficiency is unknown (Deyo, 1983). Therefore, physicians and therapists who are dealing with patient with low back pain have problem with finding optimal treatment strategy. Exercise has been shown to alleviate pain, reduce functional disability and improve depression and anxiety in patients with low back pain (Chatzitheodorou *et al.,* 2008). Furthermore, regular exercise has been shown to be clinically more effective in reducing low back pain and disability when compared to traditional primary-care management techniques (Moffett *et al.,* 1999).

Exercise, however, is not a single treatment. The types of exercise programs for chronic low back pain vary widely e. g. land-based exercise versus exercise in water, individual exercise versus group exercise and isolated trunk exercise versus whole body exercise. Unfortunately there is little or no evidence to help clinicians select the most effective type of exercise for an individual patient. This absence of evidence means that care is likely to be sub-optimal. Therefore, the search for more effective ways to manage chronic low back pain is critical if we are to improve the health and quality of life for many people.

MATERIALS AND METHODS

Participants

The population consisted of 33men gaining from 18 to 45 (mean ± s age 22. 54$\pm$2. 48 years; height 175. 48$\pm$7. 95m and body mass 71. 30$\pm$13. 09 kg) years old with chronic low back pain and idiopathic introduced from specialized orthopedic clinic centers in city to the laboratory of sport sciences. They were divided into three groups: a specific (combined) exercise group (n=11), a Routine exercise group (n=11) and a posture education group (n=11). All subjects with a history of surgery, sciatica or balance disorders were excluded from the study. Delivering an introduction letter, where the primary examinations, the type of low back pain as well as the way of treatment had been reported by the physician, was required. Moreover, all the individuals had signed a form informing them about the procedure of the sport treatment. They had also submitted a consent letter concerning taking part in the sport treatment and the study.

Procedure

Clinical assessment indicates that the subjects are suitable for active exercises. The exponential groups received an exercise treatment and the posture education group did not. They had not participated in any specific treatment training for a sixteen-week period preceding the testing sessions. Personal characteristics (age, gender, weight, height, level of education, employment status, doctor's details and contact information) and information about symptoms of low back pain will be collected, then Outcome measures of dependent variables obtained at baseline, after treatment (at 6rd week).

The University's Research Ethics Committee in accordance with the Helsinki Declaration approved all procedures prior to the start of the investigation; all volunteers completed a medical screening questionnaire and provided written informed consent prior to participation.

Treatments

1. Combined - physical exercise program (specific therapeutic protocols):

Therapeutic protocol that was selected for this treatment Method includes a combination treatment program of Therapeutic Aquatic Exercise and foam roller and Swiss-ball exercises plus massage. All delivered by experienced Physical therapists, thrice a week for 6 weeks.

Swiss-ball exercises includes: Trunk exercise (Bounce and kick, side foot reach, lateral Glide, pelvic circles, trunk rotation in sitting, trunk rotation in supine, stretch in kneeling, lateral stretch, thoracic stretch, supine leg lift, hip rotation, bridging, back extension in prone, prone leg lift, swimming), seated abdominal strengthening (ball lift, side sit-ups, prone walk-out), lower-extremity exercises (reverse squats, side leg lift, half squat, hamstring curl, side-lying ball lift).

Foam-roller exercises includes: Quadratus massage, Thoracic massage, low back mobilization, cat stretch, quadratus balance, supine lower abdominal exercise, bridging, standing balance.

*Therapeutic Aquatic Exercise includes***:** Forward Walking in shallow water, Toe walking in shallow water, Heel walking Spine Exercise, Single-leg balance Spine Exercise, Lunges Spine Exercise,

Grapevine Spine Exercise, Running Spine Exercise, Spine Flexion-Extension Spine Exercise, Lateral Stretch Spine Exercise, Pelvic Roll Spine Exercise, Standing Crunch Spine Exercise, Trunk Rotation Spine Exercise, Wall Push-Offs Spine Exercise, Pull-Downs Spine Exercise, Double-Leg Lift in Deep Water, Trunk Rotations in Deep Water, Lateral Flexion in Deep Water, Stride walking in Deep water, Cycling in Deep water, Running in Deep water, Cross-country Skiing. Jumping jacks, Double-Knee lift, Flexion with external rotation, Hip abduction, Flutter Kicking.

*Specific massage***:** Too, doing a kind of specific massage while waking up and before going to sleep was added to protocols in order to increase inflexibility and removing pressure over discs and neuron roots.

2. Routine therapeutic protocol:

This treatment Method delivered by experienced Physical therapists, thrice a week for 6 weeks, and includes: step-aerobic training, leg sliding exercise, Knee to chest exercise, Double knee to Chest exercise, Straight leg Raise exercise, Straight leg Raise II exercise, bicycling I exercise, bicycling II exercise, lying Knee to chest exercise, pelvic tilt exercise, Leg Raise exercise, Strength foot and Hand exercise, Hip Rolling exercise, curl up (30 degree) exercise, Hip Extension exercise, Hip extension and Hand lifts I, Hip extension and Hand Lifts II, Cat and Camel, Trunk Rotation, Tail Wagging, Hand knee Rocking, pelvic lift, Hip lift with single foot, Arms lifts, Hip Extension, Press up, Arm and knee lifts (I), Side Lying and knee Lifts, Side Lying and Hip Lifts, Hip Lifts, Trunk and Hip Lifts, Squat wall, Squat, Lateral bending, Back leg Swing to Strengthen hip and Back Muscles, Full Back Release, Seated Bend with Rotation, Upper Back Stretch, Calf Stretch and Shoulder Girdle Strengthen.

3. The posture education group

The posture education group received a postural education treatment and did not. They had not participated in any specific treatment training for a sixteen-week period preceding the testing sessions.

Criterion measurements

The flexor endurance test: required subjects to sit on the test bench and place the upper body against a support with an angle of 60° from the test bed. Both the knees and hips were flexed to 90°. The arms were folded across the chest with the hands placed on the opposite shoulder and toes were placed under toe straps. Subjects were instructed to maintain the body position while the supporting wedge was pulled back 10cm to begin the test. The test ended when the upper body fell below the 60° angle.

The side bridge endurance test: **C**onsisted of subjects lying on an exercise mat (thickness, 2. 5cm) on their sides with legs extended. The top foot was placed in front of the lower foot on the mat for support. Subjects were instructed to support themselves lifting their hips off the mat to maintain a straight line over their full body length, and support themselves on one elbow and their feet. The uninvolved arm was held across the chest with hand placed on the opposite shoulder. The test ended when the hips returned to the exercise mat (McGill *et al.*, 1999).

*Biering Sorensen Test***:** Sorensen test: This is the most widely used test in published studies evaluating the isometric endurance of trunk extensor muscles. During the test, the patient was on the examining table in the prone position with the upper edge of the iliac crests aligned with the edge of the table. The lower body was fixed to the table by three straps, located around the pelvis, knees and ankles. With the arms folded across the chest, the patient was asked to maintain the unsupported upper body in horizontal position until he or she could no longer control the posture or had no more tolerance for the procedure (Demoulin *et al.*, 2006).

Modified Schober's test: Modified Schober test measures the lumbar range of movement in cm, and the norm is around 7 ±1. 2 cm. Patient standing and measurements made 10 cm above and 5 cm below the lumbosacral junction (dimples of Venus). Repeat measurement with patient in full forward flexion (Cassidy *et al.*, 2005).

McGill Pain Questionnaire (MPQ): The MPQ is one of the most extensively tested multidimensional scales in use. This tool assesses pain in three dimensions (i.e., sensory, affective and evaluative) based on words that patients select to describe their pain. The MPQ can be combined with other tools to improve diagnostic accuracy. A briefer form of the MPQ, the short-form McGill Pain Questionnaire, is also available. The short-form McGill Pain Questionnaire. The Main component of the SF-MPQ consists of 15

Table1: Data of Student's paired T test for the pre and post dependent variables in Routine group.

Dependent variables in Routine group		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Sorensen Test (pre) -Sorensen. Test(post)	-36. 63636	12. 18419	3. 67367	-9. 973	10	*. 000
Pair 2	Trunk. Flexors. Endurance. Test (pre) Trunk. Flexors. Endurance. Test (post)	-92. 09091	44. 68882	13. 47419	-6. 835	10	*. 000
Pair 3	Side. Bridge. Endurance. Test (pre) Side. Bridge. Endurance. Test(post)	-34. 54545	14. 78082	4. 45659	-7. 752	10	*. 000
Pair 4	ROM. Shober. Test (pre) - ROM. Shober. Test (post)	-2. 89091	. 82031	. 24733	-11. 688	10	*. 000
Pair 5	MCGILL. Pain. Questioner (pre) - MCGILL. Pain. Questioner (post)	12. 27273	5. 71123	1. 72200	7. 127	10	*. 000
Pair 6	Roland Morris Disability Questionnaire (pre) Roland Morris Disability Questionnaire (post)	6. 27273	2. 57258	. 77566	8. 087	10	*. 000

Table 2: Data of Student's paired T test for the pre and post dependent variables in Combined - physical exercise program

Dependent variables in Combined - physical exercise program		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Biering Sorensen Test (pre) - Biering Sorensen Test (post)	-47. 63636	23. 40202	7. 05597	-6. 751	10	*. 000
Pair 2	Trunk Flexors Endurance Test (pre) - Trunk Flexors Endurance Test (post)	-100. 18182	26. 55492	8. 00661	-12. 512	10	*. 000
Pair 3	Side Bridge Endurance Test (pre) - Side Bridge Endurance Test (post)	-63. 63636	29. 07670	8. 76696	-7. 259	10	*. 000
Pair 4	ROM. Shober. Test (pre) - ROM. Shober. Test(post)	-3. 87273	. 98091	. 29576	-13. 094	10	*. 000
Pair 5	MCGILL Pain Questioner (pre) - MCGILL Pain Questioner (post)	21. 00000	6. 40312	1. 93061	10. 877	10	*. 000
Pair 6	Roland Morris Disability Questionnaire (pre) – Roland Morris Disability Questionnaire (post)	12. 54545	4. 50252	1. 35756	9. 241	10	*. 000

Table 3: Data of Student's paired T test for the pre and post dependent variables in placebo of sham Exercise program (education posture)

Variables in placebo of sham Exercise program(education posture)		Paired Differences			t	df	Sig.
		Mean	Std. Deviation	Std. Error Mean			(2-tailed)
Pair 1	Biering Sorensen Test (pre) – Biering Sorensen Test (post)	-. 45455	. 82020	. 24730	-1. 838	10	. 096
Pair 2	Trunk Flexors Endurance Test (pre)-Trunk Flexors Endurance Test (post)	-. 45455	1. 36848	. 41261	-1. 102	10	. 296
Pair 3	Side Bridge Endurance Test (pre)-Side Bridge Endurance Test (post)	-. 90909	2. 02260	. 60984	-1. 491	10	. 167
Pair 4	ROM Shober Test (pre) - ROM Shober Test (post)	-. 61818	. 81095	. 24451	-2. 528	10	*. 030
Pair 5	MCGILL Pain Questioner (pre)-MCGILL Pain Questioner (post)	. 81818	1. 77866	. 53629	1. 526	10	. 158
Pair 6	Roland Morris Disability Questionnaire (pre) – Roland Morris Disability Questionnaire (post)	1. 09091	1. 37510	. 41461	2. 631	10	*. 025

Table 3: Comparison of the dependent variables Between Groups in post test

Post Hoc Multiple Comparisons

	(I) Grous	(J) Grous	Mean Difference (I-J)	Std. Error	Sig.
Biering Sorensen Test (post)	Routin	Combined	-9. 90909	9. 62996	. 565
		Posture	42. 36364*	9. 62996	*. 000
	Combined	Posture	52. 27273*	9. 62996	*. 000
Trunk Flexors Endurance Test (post)	Routine	Combined	-9. 00000	14. 11007	. 801
		Posture	94. 45455*	14. 11007	*. 000
	Combined	Posture	103. 45455*	14. 11007	*. 000
Side Bridge Endurance Test (post)	Routine	Combined	-20. 90909*	8. 42370	*. 048
		Posture	45. 54545*	8. 42370	*. 000
	Combined	Posture	66. 45455*	8. 42370	*. 000
ROM Shober Test (post)	Routine	Combined	-. 92727	. 58915	. 272
		Posture	2. 66364*	. 58915	*. 000
	Combined	Posture	3. 59091*	. 58915	*. 000
MCGILL Pain Questioner (post)	Routine	Combined	8. 36364*	2. 80338	*. 015
		Posture	-9. 90909*	2. 80338	*. 004
	Combined	Posture	-18. 27273*	2. 80338	*. 000
Roland Morris Disability Questionnaire (post)	Routine	Combined	5. 09091*	1. 84316	*. 026
		Posture	-5. 09091*	1. 84316	*. 026
	Combined	Posture	-10. 18182*	1. 84316	*. 000

**. The mean difference is significant at the 0. 05 levels.*

descriptors (11 sensory; 4 affective) which are rated on an intensity scale as 0 = none, 1 = mild, 2 = moderate or 3 = severe. Three pain scores are derived from the sum of the intensity rank values of the words chosen for sensory, affective and total descriptors (Ronald Melzack., 1987).

Roland-Morris Disability Questionnaire (RMDQ): Disability was assessed by the Roland Morris disability questionnaire. This questionnaire consists of 24 yes/no statements about activities of daily living that could be affected by low back pain. Each statement ticked is worth one point (Roland M MR. 1983).

Statistical analysis: Statistical analyses were undertaken using Statistical Program for Social Sciences (SPSS Inc., version 15). Normal distribution of data was analyzed by the Kolmogorov-Smirnov normality test. Student's paired 't' test was applied to compare the pre and post training values. ANOVAs were employed followed with Tukey post hoc for comparing the dependent variables Between Groups. A p-value < 0.05 were considered to be statistically significant. All values are represented as mean ± SD.

RESULTS AND DISCUSSION

Pre-test to post-test comparison for within group improvement was assessed by paired t-test for all performance tests (Table 1-3). There was statistically significant difference between the all dependent variables for primary outcomes (Pre-test) with the secondary outcomes (post-test) in routine and Combined - physical exercise groups (Table 1 and 2) and consequently provided direct evidence that the intervention (Exercise therapy) was successful in bringing about these changes.

But in the sham Exercise group (posture education) comparisons of Pre-test and post-test values for the dependent variables Sorensen Test, Trunk Flexors Endurance Test, Side Bridge Endurance Test, MCGILL Pain Questioner, Roland Morris Disability Questionnaire didn't show a significant differences, but ROM Shober Test showed a significant differences evident between the pre-test and post-test (Table 3).

Baseline values (pre-test) for the all dependent variables showed no differences between the groups.

***Comparison of Biering Sorensen Test between Groups*:** Baseline Biering Sorensen Test were not different between the groups (P>0/05). But the secondary outcomes (post-test) in Between-groups comparison showed difference in the routine, Combined - physical exercise groups compared with the sham Exercise group (posture education) (P<0/05) (Table3). And consequently provided direct evidence that the intervention (Exercise therapy) was successful than posture education. But no differences were found between the routine, Combined - physical exercise groups.

***Trunk Flexors Endurance Test*:** Baseline Trunk Flexors Endurance Test were not different between the groups (P>0/05). But the secondary outcomes (post-test) in Between-groups comparison showed difference in the routine group and Combined - physical exercise group compared with the sham Exercise group (posture education) (P<0/05) (Table3). And consequently provided direct evidence that the intervention (Exercise therapy) was successful than posture education. But no differences were found between the routine and Combined - physical exercise groups.

***Side Bridge Endurance Test*:** Baseline Side Bridge Endurance Test were not different between the groups (P>0/05). But the secondary outcomes (post-test) in Between-groups comparisons of Side Bridge Endurance Test did show a significant differences evident between groups (P<0/05) (Table3). Comparisons of a Combined - physical exercise and Routine Exercise showed significant difference evident between groups. And consequently provided direct evidence that a Combined - physical exercise was successful than Routine Exercise (P<0/05).

ROM Shober Test (post): Baseline Shober Test were not different between the groups (P>0/05). But the secondary outcomes (post-test) in Between-groups comparison showed difference in the routine and Combined - physical exercise groups compared with the sham Exercise group (posture education) (P<0/05) (Table3). And consequently provided direct evidence that the intervention (Exercise therapy) was successful than posture education but no differences were found between the routine and Combined - physical exercise groups.

MCGILL Pain Questionnaire: Baseline MCGILL Pain Questionnaire were not different between the groups (P>0/05). But the secondary outcomes (post-test) in Between-groups comparisons of MCGILL Pain Questionnaire did show a significant differences evident between groups (P<0/05) (Table 3). comparisons of a Combined - physical exercise and Routine Exercise showed significant difference evident between groups, And consequently provided direct evidence that a Combined - physical exercise was successful than Routine Exercise (P<0/05).

Roland Morris Disability Questionnaire: Baseline Roland Morris Disability Questionnaire were not different between the groups (P>0/05). But the secondary outcomes (post-test) in Between-groups comparisons of Roland Morris Disability Questionnaire did show a significant differences evident between groups (P<0/05) (Table 3). comparisons of a Combined - physical exercise and Routine Exercise showed significant difference evident between groups, And consequently provided direct evidence that a Combined - physical exercise was successful than Routine Exercise (P<0/05).

Discussion

Studies of the most effective types of exercise therapy for chronic or acute LBP are still controversial in literature; however, therapeutic exercises are probably the most widely used conservative treatment. Therapeutic exercises are defined as a set of specific movements with the objective of developing and training the muscle and joints with the use of a practice routine or physical training in order to promote the physical health of the individual (Abenhaim, 2000).

Our data showed that the benefits derived both Therapeutic exercises are objective. Their physical examinations revealed improved range of motion, muscular endurance, pain and disability and an overall global improvement in daily activities.

Because the most obvious benefit of exercise is its ability to improve or maintain musculoskeletal function, exercise may be useful for improving back function for patients with low back pain. With this goal in mind, exercise-based rehabilitation programs are typically designed around the goals of strengthening the back, increasing back flexibility. This focus resulted from research demonstrating that impairments of trunk strength, flexibility and endurance are present in many people with chronic low back pain. These impairments result in part from long-term inhibition of movements and physical inactivity that result in neurological and physiological changes in the spine. These changes include weakness of the paraspinal musculature, with selective loss of Type 2 muscle fibers, alteration of the relaxation response of the paraspinal musculature associated with full spinal flexibility and shortening of muscles and connective tissues of the spinal region. This limitation of movement and activity is largely voluntary, as people both consciously and unconsciously limit activities that induce back pain, or avoid these altogether for fear of producing injury or harm. Inhibition of movements and activities usually begins early in the course of back pain and may be reinforced by health-care providers through their advice to patients to avoid activities and movements that induce pain. Reversal of these impairments in back function can be approached using established principles of exercise (James *et al.*, 2004).

In posture education group their physical examinations revealed exclusively improved range of motion and disability in daily activities. An important component of the posture education programme was patient education regarding optimal working conditions during both professional duties and household chores. Good posture is an important factor in managing, preventing, or facilitating recovery from an episode of LBP (Augustine, 2013).

In our study, the authors demonstrated the greater effectiveness of specific exercises for Side Bridge Endurance Test (increase of 67% routine versus148% combined), range of motion Shober Test (increase of 58. 73% routine versus 79. 46% combined), MCGILL Pain Questionnaire (decrease of 41. 53% routine versus 70. 23% combined), Roland Morris Disability Questionnaire (decrease of 44. 28% routine versus 81. 70% combined) compared with routine exercise in patients with LBP.

The results of this study suggest that a combined - therapeutic protocol could potentially increase the recuperation from LBP and reduces LBP intensity and helps the patient’s recovery.

The result of our study was similar to previous studies Ferreira *et al.,* (2010) did demonstrate the greater efficacy of specific exercises for transverses abdominis compared with general exercise and spinal manipulative therapy in patients with LBP. The effect of motor control exercise on pain reduction was greater compared with other groups. There was also a significant correlation between moderate recruitment of transversus abdominis and decreased disability, which once again demonstrates the importance of this muscle action on lumbar spine stability. The result of our study was dissimilar to studies Ewert *et al.,* (2009) did not demonstrate the effectiveness of a multimodal program versus exercise alone.

In our study a combination treatment program includes aquatic Exerciseand foam roller and Swiss-ball exercises plus massage.

Consider Water affords maximum trunk involvement without gravitational loading which can account for some of our low back pain. Thus, one can sufficiently improve core strength without loading the spine, thereby improving one's response to the physical stresses imposed by daily life.

Massage is known to increase the circulation of blood and flow of lymph. Doing a kind of upward specific massage (avoid massage in both a downward and rotational direction) while waking up and before going to sleep increase inflexibility and removing pressure over discs and neuron roots.

Conclusion

Exercise is more effective in decreasing pain and disability from low back pain than control treatments or physician consultation. The addition of combined exercise programs had greater benefit on pain and large effects on function compared with other exercise programs. And therefore hypotheses about the most effective types of exercise can be developed.

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