"A Comparison between the Effects of Stabilization and Mckenzie's Exercises on the Pain, Disability, and Lumbo-Pelvic Stability in Patients with Non-Specific Chronic Low Back Pain"

Mohammad Hosseinifar Ph.D Student[1], Mohammad Akbari Ph.D [2*], Hamied Behtash MD[3], Mohsen Amiri Ph.D [4], Javad Sarrafzadeh Ph.D [5]

[1]Ph.D Student, Dept. of Physical Therapy, Tehran University of Medical Sciences, Tehran, Iran
[2]Associate Professor, Dept. of Physical Therapy, Tehran University of Medical Sciences, Tehran, Iran
[3]Associate Professor, Dept. of Orthopedy, Tehran University of Medical Sciences, Tehran, Iran
[4]Associate Professor, Dept. of Physical Therapy, University of Welfare and Rehabilitation Sciences, Tehran, Iran
[5]Assistant Professor, Dept. of Physical Therapy, Tehran University of Medical Sciences, Tehran, Iran
*Corresponding Author: Akbari_mo@tums.ac.ir

Abstract: Stabilization exercises have been used for management of Low Back Pain. These exercises improve stability and increase control of the spine due to neuromuscular changes. Therefore, the effectiveness of stabilization and McKenzie's exercises on intensity of pain, disability and lumbo-pelvic stability was compared in non-specific Chronic Low Back Pain (CLBP) patients. Thirty patients with non-specific CLBP participated in this study. Patients were enrolled through simple non-probability sampling and were assigned into two groups, Mckenzie's and stabilization exercises, randomly. Intensity of pain, disability, and lumbo-pelvic stability were evaluated by Visual Analouge Scale, The Oswestry disability Questionnaire, and Stibilizer Pressure Biofeedback Unit, respectively. The training program was scheduled 18 sessions for both groups. T-tests and ANCOVA test were used for statistical analysis ($p<0.05$). The results showed that although the score of pain decreased in both groups ($p<0.05$), the decrease of intensity of pain was more than in Stabilization Exercises Group ($p<0.05$). Also, the score of disability questionnaire decreased in stabilization exercise group ($p<0.05$). During Knee Lift Abdominal and Bent Knee Fall Out maneouvres, pressure of biofeedback unit did not significantly differ before and after interventions, in both groups ($p>0.05$). The present study supported that stabilization exercises can reduce pain and disability in non-specific CLBP patients.

[Mohammad Hosseinifar, Mohammad Akbari , Hamied Behtash, Mohsen Amiri, Javad Sarrafzadeh. **"A Comparison between the Effects of Stabilization and Mckenzie's Exercises on the Pain, Disability, and Lumbo-Pelvic Stability in Patients with Non-Specific Chronic Low Back Pain"** *Life Sci J* 2013;10(10s):298-302](ISSN:1097-8135). http://www.lifesciencesite.com. 49

Key words: Chronic Low Back Pain, Stabilizaton Exercises, Lumbo-pelvic Stability, Disability.

Introduction

Chronic low back pain (CLBP) is one of the major public health problems, with high economic and social costs, loss of job and disability in many of communities (Chou et al., 2007; Suka and Katsumi Yoshida, 2008). As a result, rehabilitation approaches and exercises have focused on management or treatment of Low Back Pain (George et al., 2007). Accordingly, some of exercises could utilize to spinal stabilization due to improve spinal stability and to increase control of the spine (Limaa et al., 2011).

It is proposed that specific stabilization exercises program might lead to change in central motor program and automatically feedforward recruitment of deep core muscles (Millisdotter and Strömqvist, 2007). Therefore, stabilization exercises are more effective than conventional treatments to decrease of pain and disability in CLBP (Goldby et al., 2006; Franca et al., 2010). However, Some authors found that general exercises with or without stabilization exercises could exhibit the same outcome on improvement of pain and disability in subjects with CLBP (Koumantakis et al., 2005; Cairns et al., 2006). Another approach is McKenzie's method (McCarthy et al., 2004). This approach was focused on sustained postures or repeated movements (Petersen et al., 2007). Although McKenzie's exercises could improve pain intensity in acute, subacute and CLBP (Skikic and Suad, 2003), some studies found that there are no difference between McKenzie's exercises, strengthening exercises and primery care in reduction of pain, and disability in patients with acute and CLBP (Petersen et al., 2007). By reviewing the literature, a study with regard to compare stabilization and McKenzie's exercises in non-specific CLBP were not found.

As mentioned above, based on lack of consensus on appropriate treatment method, lack of sufficient objective evidences about the effects of stabilization exercises on the lumbo-pelvic stability in LBP, lack of a comparative study between Mackenzie's and stabilization exercises in non-

specific CLBP, the main goal of this study was to compare the effects stabilization and McKenzie's exercises on pain intensity, disability and lumbo-pelvic stability in non-specific CLBP subjects.

Methods

This study was a randomized controlled trial study. Thirty non-specific CLBP patients, referred to Physiotherapy Clinic, Tehran University of Medical Sciences, participated in this interventional study, between 2011 and 2012 years. All participants sign written informed consents. Patients were enrolled through simple non-probability sampling and were randomly assigned into two groups: Mckenzie's exercises group (n=15) and Stabilization exercises group (n=15). The examiner who assessed the outcomes was blineded to group assignment.

Participants

Thirty patients with age between 18-50 years, non-specific CLBP in the area between the costal margin and buttocks, with or without reference to the lower extremity in last 3 months were included in this study. Patients were excluded if they reported a history of recent fracture, trauma or previous surgery at lumbar region, spondylolysis or spondylolysthesis, spinal stenosis, neurological disorders, systemic diseases, pregnancy, cardiovascular diseases, concomitant treatment with physical therapy modalities (Koumantakis et al., 2005; Goldby et al., 2006).

Data collection

Before and after interventions, Visual Analouge Scale (VAS), The Oswestry disability Questionnaire (ODQ), and Pressure Biofeedback Unit (PBU) were applied for outcome measures, based on following procedures

Pain assessment

The VAS was used for pain assessement (Koumantakis et al., 2005). In this scale, pain was rated from 0 to 100 mm, in which the 0 represented no pain and 100 represented maximum pain tolerance. Subjects were indicated the best number described their pain (Skikic and Suad, 2003).

Disability assessment

The ODQ was completed to assesse percentage of functional disability in patients with CLBP. This questionnaire is a golden standard tool to indicate ability of patients with CLBP. This questionnaire consist of 10 sections and each of sections include 6 rates, from zero to five. The first section of this questionnaire rates pain and the other sections assesse activities of daily living. Total score of questionnaire was recorded as percentage (Kofotolis and Kellis, 2006).

Lumbo-pelvic stability assesssment

Stability of lumbo–pelvic region was assessed by the Stabilizer PBU, Chattanooga, Australia (Franca et al., 2010). This device measures pressure changes from 0 to 200 mmHg with accuracy of 2 mmHg (Franca et al., 2010). Monitoring of lumbo-pelvic motion was performed by recording the pressure changes during Knee Lift Abdominal Test (KLAT) and Bent Knee Fall Out Test (BNFOT) (Franca et al., 2010). The baseline pressure was set to 40 mmHg (Roussel et al., 2009). The pressure values was recorded at the end of the manoeuvres. Inter-observer reliability correlations for KLAT and BNFOT were 0.85 and 0.87, respectively (Roussel et al., 2009).

Intervention

For warming up, participants pedaled a stationary bike for 5 minutes and performed stretching exercises for 10 minutes (Koumantakis et al., 2005). Then, Patients were randomaly assigned in stabilization exercises group or McKenzie’s exercises group.The training program was scheduled 18 sessions in 6 weeks for both groups.

stabilization exercises group

The stabilization exercises were performed in 6 steps (O'Sullivan et al., 1997): 1- Segmental Control Exercises (SCE) with emphasis on training the isolated contraction of Transverse Abdominis (TrA), Multifidus (MF), and pelvic floor muscles, 2- SCE with emphasis on co-contractions of TrA, MF, and pelvic floor muscles in the prone, supine, and four foot kneeling positions, 3- SCE in closed kinematic chain, 4- SCE in open chain exercise applied by adding leverage of the limbs, 5- SCE in functional situations, 6- Co-contraction of TrA and MF muscles while external load, complication of movements and light aerobic activities. The patients would go through next step, if they could accurately perform each of steps fot ten times (Sung, 2003; Koumantakis et al., 2005).

McKenzie's exercises group

In the Mckenzie's group, six exercises were performed: four extension type and two flexion type exercises. The extension type exercises were performed in prone and standing positions and the flexion type exercises were carried out in the supine and sitting positions. The final position of each exercise was maintained for 10 seconds (Kinkade, 2007). The McKenzie's exercises were totally repeated 80 and 100 times (Twomey and Taylor, 1994).

Statistical analysis

Results were presented as mean values and standard deviation (SD). Criterion of significancy was set as $p<0.05$. Kolmogrov Smirnov test was used to discribe normal distribution. ANCOVA test was used to compare variables between Mckenzie's and the stabilization groups. Paired t-test was used to compare variables before and after interventions.

Results

From seventy five patients who enrolled in this study, thirty patients with non-specific CLBP participated in this study. Flowdiagram shows our study design (Figure-1). The demographic features of patients were listed in table 1. Analysis have shown that the patients in stabilization exercises group did not differ from the Mckenzie's exercises group, before intervention.

Within group comparison

Paried t-test was used to compare variables within both groups, before and after interventions. After intervention, the score of pain decreased in both groups ($P <0.05$). The mean score of disability decreased in stabilization group ($P <0.05$). The mean values of motor control tests did not show significant differences in both groups ($p> 0.05$) (table 2).

Between group comparison

ANCOVA test was used to compare variables between groups. The mean score of disability and mean values of lumbo-pelvic stability did not showed significant differences between two groups ($P >0.05$). However, the score of pain differed from in both groups ($P <0.05$). The decrease of pain was more in stabilization exercises group ($P <0.05$) (Table 2).

Table 1: Between-Group baseline comparison of subjects' characteristics

	Stabilization Group	McKenzie's Group	P value[c]
Age (y)	40.13±10.82[b]	36.60±8.21	0.323
Hight (cm)	170.53±8.54	172.13±7.98	0.600
Weight (kg)	74.96±12.99	78.42±10.60	0.432
BMI[a]	25.80±4.10	26.66±4.74	0.600

[a]BMI= body mass index.
[b] Values are Means and Standard Deviation.
[c] Statistical different at P < o.o5

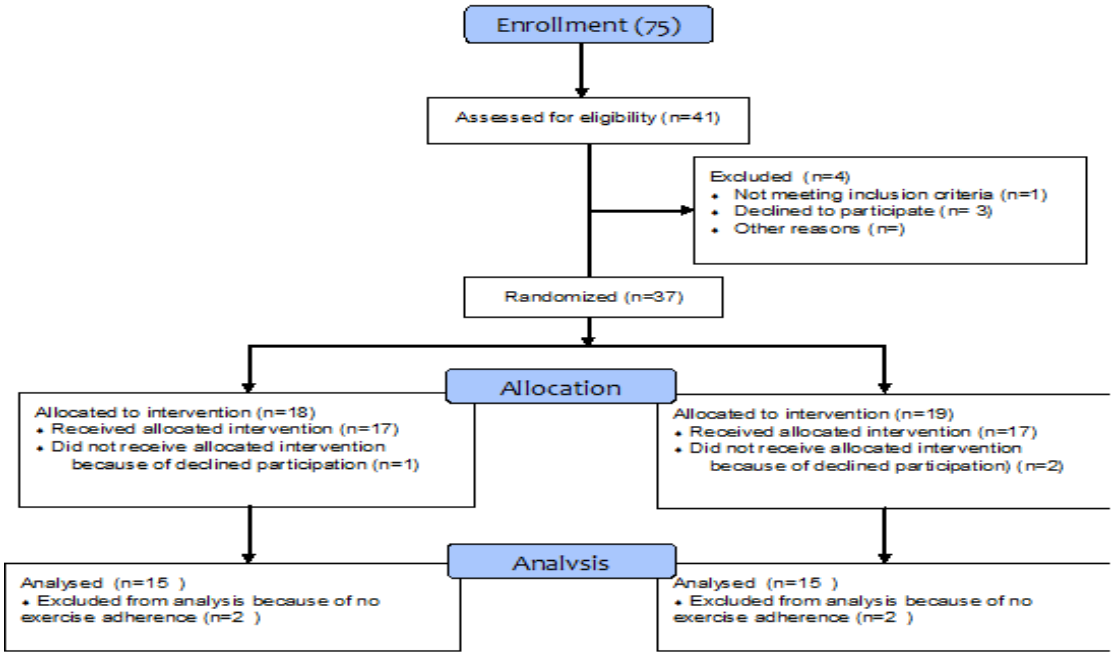

Figure 1) flow diagram outlining progress throughout the trial

Table 2: Means and standard deviations of variables, p-value of within and between group comparison

	Stabilization Group		McKenzie's Group		Between Group
	Before	After	Before	After	P value
Pain (ordinal)	4.33±1.58[b]	1.53±1.40	4.40±1.95	2.66±1.39	0.033[c]
Function (ordinal)	20.66±10.51	12.26±8.87	31.60±17.09	22.93±13.51	0.073
Rt KLAT (mmHg)[a]	61.06±12.51	60.60±11.33	59.80±7.82	58.33±9.17	0.622
Lt KLAT (mmHg)	62.93±10.03	62.66±11.91	58.53±9.72	59.46±9.97	0.894
Rt BNFOT (mmHg)	29.86±1.76	29.33±2.71	29.60±2.77	29.06±2.78	0.887
Lt BNFOT (mmHg)	30.20±1.37	29.26±2.40	29.20±2.33	28.33±2.46	0.428

[a] Rt KLAT= Right Knee Lift Abdominal Test, Lt KLAT= Left Knee Lift Abdominal Test, Rt BNFOT= Rt Bent Knee Fall Out Test, Lt BNFOT= Lt Bent Knee Fall Out Test.
[b] Values are Means and Standard Deviation.
[c] P value for difference between group.

Discussion

Currently results showed that McKenzie's exercises reduced pain and stabilization exercises reduced pain and disability. However, lumbo-pelvic stability did not change after intervention in both groups. Many clinical researchers have focused on the managment of Low Back Pain (Skikic and Suad, 2003; Machado et al., 2010). Althuogh McKenzie's method is a common approach of low back pain management (Battie et al., 1994), there are a few studies with regard to effectiveness of McKenzie's method on LBP (Schenk et al., 2003; Petersen et al., 2007). Currently, stabilization exercises have been used for management of patients with CLBP. Researchers confirmed that stabilization exercises have been influenced on pain and function in CLBP patients (Skikic and Suad, 2003; Machado et al., 2010). Our results showed that stabilization and McKenzie's exercises reduced the score of pain and disability. These results are in accordance with several studies which supported McKenzie's exercises or stabilization exercises could decrease intensity of pain and improve the score of disability in patients with CLBP (Skikic and Suad, 2003; Machado et al., 2010). Our results, also, showed that decrease of intensity of pain was more than in stabilization group. Superiority of stabilization exercises to decrease of pain is in acordance with several studies which supported stabilization exercises are more effective than other treatment in CLBP (Goldby et al., 2006; Franca et al., 2010). As a result, this study supported that stabilization exercises are effective exercises to reduce intensity of pain and improve functional ability in patients with CLBP. It is proposed that the efficient neuromuscular control is necessary for trunk stability and correct patterns of muscle recruitement (Zazulak et al., 2008; Bazrgari et al., 2009). Furthermore, it is reported that central motor program can change after performing stabilization exercises (O'Sullivan et al., 1997). However, our results did not show alternation in lumbo-pelvic stability after intervention in both groups. In addition, the motor control is a complex process that involve multiple systems and sub-systems (O'Sullivan et al., 1998). Therefore, to change a movement pattern, changes in musculoskeletal system, neural systems, and coordination between systems are necessery (Panjabi, 1992). Therefore, based on the current results, we propose that KLAT and BNFOT manoeuvres and PBU instrument are not sensitive enough to measure the lumbo-pelvic stability. Accordingly, lack of change in lumbo-pelvic stability might be due to short duration of exercises protocol which could not lead to learning effects .

Conclusion

The present study supported that stabilization exercises can reduce pain and disability in CLBP patients. However, this exercises do not change lumbo-pelvic stability. The presented method in this research will need further research to evaluate lumbo-pelvic stability with either more sensitive instrument or better manoeuvre.

Acknowledgments

The study was funded and supported by Tehran University of Medical Sciences; Grant No: P/26/d4/738.

References

1. Battie MC, Cherkin DC, Dunn R, Ciol MA, Wheeler KJ. Managing low back pain: Attitudes and treatment preferences of physical therapist. Phys Ther 1994; 74: 219-226.
2. Bazrgari A, Shirazi-Adl C, Lariviere C. Trunk response analysis under sudden forward perturbations using a kinematics-driven model. J Biomech 2009; 42: 1193-1200.
3. Cairns MC, Foster NE, Wright C. Randomized controlled trial of specific spinal stabilization exercise and conventional physiotherapy for recurrent low back pain. Spine 2006; 31(19): E670-681.
4. Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle P. Diagnosis and treatment of low back pain: A joint clinical practice guideline from the

American College of Physicians and the American Pain Society. Ann Intern Med 2007; 147(7): 478-491.
5. Franca FR, Burke TN, Hanada ES, Pasqual MA. Segmental stabilization and muscular strengthening in chronic low back pain - a comparative study. Clinics 2010; 65(10): 1013-1017.
6. George SZ, Childs JD, Teyhen DS, Wu SS, Wright AC, Dugan JL, Robinson ME. Rationale, design and potocol for the prevention of low back pain in the military (POLM) trial. BMC Musculoskelet Disord 2007; 8: 92.
7. Goldby LJ, Moore AP, Doust J, Trew ME. A randomized controlled trial investigating the efficiency of musculoskeletal physiotherapy on chronic low back disorder. Spine 2006; 31(10): 1083-1093.
8. Kinkade S. Evaluation and treatment of acute low back pain. Am Fam Physician 2007; 75(8): 1181-1188.
9. Kofotolis N, Kellis E. Effects of two 4-week proprioceptive neuromuscular facilitation programs on muscle endurance, flexibility and functional performance in womem with chronic low back pain. Phys Ther 2006; 86(7): 1001-1012.
10. Koumantakis GA, Watson PJ, Oldham JA. Trunk muscle stabilization training plus general exercise versus general exercise only: Randomized controlled trial of patients with recurrent low back pain. Phys Ther 2005; 85(3): 209-225.
11. Limaa POP, Oliveira RR, Costa LOP, Laurentino GEC. Measurement properties of the pressure biofeedback unit in the evaluation of transversus abdominis muscle activity: A systematic review. Physiother 2011; 97: 100-106.
12. Machado LAC, Maher CG, Herbert RD, Clare H, McAuley J. The effectiveness of the McKenzie method in addition to first-line care for acute low back pain: A randomized controlled trial. BMC Med 2010; 8: 10.
13. McCarthy CJ, Arnall FA, Strimpakos N, Freemont A, Oldham JA. The biopsychosocial classification of non-specific low back pain: A systematic review. Phys Ther Rev 2004; 9(1): 17-30.
14. McKenzie RA. Mechanical Diagnosis and Therapy for Disorders of the Low Back. In: Twomey LT, Taylor JR, editors. Physical Therapy of the Low Back. 2nd ed. New York: Churchill Livingstone; 1994. p. 171-96.
15. Millisdotter M, Strömqvist B. Early neuromuscular customized training after surgery for lumbar disc herniation: A prospective controlled study. Eur Spine J 2007; 16: 19-26.
16. O'Sullivan PB, Twomey L, Allison GT. Altered abdominal muscle recruitment in patients with chronic back pain following a specific exercise intervention. J Orthop Sports Phys Ther 1998; 27: 114-124.
17. O'Sullivan PB, Twomey LT, Allison GA. Evaluation of specific stabilization exercise in the treatment of chronic low back pain with radiologic diagnosis of spondylolysis or spondylolisthesis. Spine 1997; 22: 2959-2967.
18. Panjabi M M. The stabilizing system of the spine. Part II. Neutral zone and instability hypothesis. J Spinal Disord 1992; 5(4): 390-397.
19. Petersen T, Larsen K, Jacobsen S. One-year follow-up comparison of the effectiveness of treatment and strengthening training for patients with chronic low back pain: Outcome and prognostic factors. Spine 2007; 32(26): 2948-2956.
20. Roussel N, Nijs J, Truijen S, Vervecken L, Mottram S, Stassijns G. Altered breathing patterns during lumbopelvic motor control tests in chronic low back pain: A case-control study. Eur Spine J 2009; 18: 1066-1073.
21. Schenk RJ, Jozefczyk C, Kopf A. A randomized trial comparing interventions in patients with lumbar posterior derangement. J Man Ther 2003; 11(2): 95-102.
22. Skikic EM, Suad T. The effects of McKenzie exercise for patients with low back pain, our experience. Bosn J Basic Med Sci 2003; 3(4): 70-75.
23. Suka M, Katsumi Yoshida K. Low back pain deprives the Japanese adult population of their quality of life: A questionnaire survey at five healthcare facilities in Japan. Environ Health Prev Med 2008; 13: 109-115.
24. Sung PS. Multifidi muscles median frequency before and after spinal stabilization exercise. Arch Phys Med Rehabil 2003; 84(9): 1313-1318.
25. Zazulak B, Cholewicki J, Reeves NP. Neuromuscular Control of Trunk Stability: Clinical Implications for Sports Injury Prevention. J Am Acad Orthop Surg 2008; 16: 497-505.

8/15/2013