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ORIGINAL ARTICLE

Comparison of three Methods of Massage therapy and Effects of Stability and Combined exercises on Postural Fluctuations in Patients with chronic non-specific Low Back Pain

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ABSTRACT
Low back pain is considered to be one of the major disorders of the neuromuscular system. For this reason, many studies on the causes, prevention and treatment of this ailment have been performed. Although, so much attention has been drawn to evaluation of the balance of the neurological lesion, it has not received careful consideration for patients with low back pain. The aim of this study was to compare the effect of three massage therapies, stability and combined exercises effects on postural fluctuations in patients with chronic non-specific low back pain. This research is considered to be an experimental model with pretest-posttest designs. The test was performed on 30 men with chronic non-specific low back pain. After signing an informed consent form, patients were randomly divided into three groups of 10 stabilization exercises, massage therapy, and combination therapy groups. All three groups had equal 12 sessions (4weeks, every other day) and same situation of treatment based on pre-established programs. In order to evaluate pretest-posttest static balance (considering postural fluctuations under 4 various sensory situations) the force plate (Neurocam) was used. Data provided by the SPSS software (version 16) were analyzed. To determine the normality of the data distribution Shapiro-Wilk test was used. To evaluate the results before and after the test, and also, to compare the intergroup results among 3 studied groups, ANCOVA test was implemented. The analysis of statistical data in terms of intervention effects within each treatment group revealed that all three intervention therapies had a significant effect on improving static balance (fluctuation velocity variable under 4 various sensory situation) (p≤ 0.05) Moreover, The analysis of statistical data in terms of comparison between groups, Stabilization exercises and massage therapy groups as well as massage therapy and combination therapy groups showed significant results. (p≤0.05). The results of this study showed that, any of the intervention stabilization Exercises, massage therapy, and combination therapy in the short-term period (4weeks), have beneficial effects on reducing sowing posture of patients with chronic nonspecific low back pain. Also, the findings of this study indicate a further effect of combination therapy on improvement of these patients. So, combined stabilization exercises with massage therapy are more beneficial than using each of them lonely.
Keyword: *Massage, Stability exercises, postural fluctuations, Chronic Non-Specific Low Back Pain.*

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INTRODUCTION

Despite of development of science in the field of spine diseases and progress toward treatment methods, back pain still remains as the most prevalent general health problem in industrial and developing countries. Evidences show that back pain is one the most common skeletal disorders in a way that 58-84 percent of society suffer from it at least one time a year. Annual prevalence of back pain is 50% of adults in their working years [1-2]. Generally and based on pain record, back pain can fall into three categories: acute pain (less than 6 weeks), subacute pain (6 to 12 weeks) or chronic (more than 12 weeks) [3].

Around 90% of patients with back pain contracting its non-specific type. This type of back pain is not caused by special pathology and the area of pain contains end of rib to the top of gluteus maximus [4]. It is obvious that precaution is the first priority in health maintenance and postural stability is a crucial

factors in prevention of injury, also, immune performance of many a person [5]. Moreover, preservation and controlling equilibrium is necessary for daily activities [6]. Equilibrium preservation of whole body is considered to be complicated action. Needing equilibrium among three main sensory systems of body (visual, vestibular, somato- sensory) and concerted moving terminals in body's joint [7].

However, upon suffering from back pain comprehensive understanding of problems occurred and process improvement of them during intervention therapies seems to be vital. Several reports indicate intervention in postural control among patients contracting back pain [7-13] that mostly increase in postural vibration in the internal external direction is reported [7, 11, 13, 14]. While there are rare occasions reported about increase in postural vibration in external-internal direction [12]. Reasons of increase in postural vibration among people with back pain are interventions in deep sensory [11], interventions in performance of Muscle spindle paraspinal [9], delay in muscle's response [7] and following intervention in power, harmony and paired performance muscles of back and pelvis and finally decrease in variety of strategic postural [6] controls.

It is shown in some studies that patients contracting chronic back pain change their center of pressure resulting from their weight in standing state to back in comparison with healthy people. This situation is related to increase in lordotic back and unsymmetrical pushing forces employed on muscle layers and disk that probably cause Protrusions of disk from one side and apply pressure on nervous roots [15]. While in more complex situation like standing on foam, central nervous system of healthy people is less dependent on deep sense of ankle and mostly uses deep sense of other joints like spine. But people with chronic non-specific back pain indicate variety of control strategies in preserving postural equilibrium, moreover, in order to conserve postural stability they still use Proprioception of ankle muscles which improve their postural vibration in comparison with those of healthy people [6]. According to present articles evaluation of postural equilibrium in standing static mode on Firm and tight support surface lacking required sensitivity for Differentiation between healthy people and people is contracting postural equilibrium intervention. One usual method to create perturbation in postural equilibrium is standing on foam. With the person standing on foam the impact of ankle strategy decreases which is needed for postural stability [6]. Many aspects of this ailment still remain unknown and effective cure demands careful recognition of created changes in function of different underlying systems in these diseases. Evaluation of equilibrium parameters can be considered as a factor responsible for total body performance. Therefore, consideration of total body system in patients with back pain can be helpful in careful evaluation and effective cure [16].

Recently, taking into account high cure potential of exercise therapy many researchers have supported this method to control and prevent back pain [17]. Different training protocols available will come in useful for patient with a back pain. Some general sports studies are believed to be effective in curing back pain [18]. The aim of these studies is considered to be minimizing the burdens imposed on spine or programs encouraging people to be active. But taking into consideration the diversity of training methods there is not enough evidences to prove the preference of one method to another [19]. Also, many studies comparing training therapy, reveal contradicting as well as incompatible results. These studies showed that there are not significant differences between training therapy and other therapies and some of them showed effective cure in back pain [20].

On the other hand there are many evidences of using stability exercises in chronic back pain cure but they are under discussion because general agreement on their preferences to other treatment methods in long term or short term period is not reached. It must be taken into consideration that studies mostly had been accompanied by other interventions including handy treatment specially massage. This saying is proof of more effect of combination therapy in comparison with stability exercises [20]. The aim of this study is considered to be comparison of three massage therapies, stability and combination exercises on patient's postural vibrations contracting non-specific chronic back pain.

MATERIAL AND METHOD

Participants: Present research is semi empirical with pretest-posttest design done on 30 men contracting non-specific chronic Back pain (age 33/44±9.02 years, weight 84.33±11.7 kilogram, height 177±4.4 and body mass index 26.58±2.75 centimeter divided by cubic meter) referring to Physiotherapy clinics of 1 and 3 regions of Tehran city. In order to be confident about eligibility of people, criteria of entering and exiting study were put under orthopedic specialist's control to consider criteria while visiting patients. However, in relevant questioner, these criteria along with background information were asked from patients.

Criteria of entering study contains male sexuality, age range of 20 to 50 years, having chronic non-specific back pain, experience of at least three month back pain as well as having general health. Also, numbness

and reduction in muscle power or maybe urinary incontinence indicating cauda equia syndrome and record of spine surgery as well as Herniated Disc, pain in spine region accompanied by fever and chills, stiffness in the morning and so on which are all evidence of infectious spondyloarthropathy, malignity or inflammatory disease, existence of compression fracture result of osteoporosis, constricted canal and spondylosis or spondylolisthesis, fracture in spine, pelvis or lower limb demonstrating Osteoporosis or other diseases, record of neurological nervous system disorders and vestibular disorders, record of dizziness and consumption of drugs with known effects on equilibrium, anomalies in spine and lower limbs, malignity, rheumatism and other infectious diseases, systematic, metabolic and lack of sports record were criteria of excluding from study.

Research tool: Force plate instrument was used in order to evaluate pretest-posttest variables. To consider static equilibrium Modified Clinical Test of Sensory Interaction on Balance (MCTSIB) was implemented. In this test, subject stands on two legs on force plate so that angular position of each leg to one another and distance between ankles are identified on plastic talc. Toes on the feet have an angle of 30 degree to each other. And heel of feet have a 10 centimeter distance from Medial malleolus. During administration of a test, hands hang beside the body and knee position is normal. This work is done one time by open eye and another time by closed eyes on force plate and foam. Each test is repeated 3 times and each subject takes test 12 times. (3 times with open eyes on force plate, 3 times with open eyes on foam and 3 times with closed eyes on foam. (Figures 1 and 2). Variables which are measured in this test are: relocation velocity mean of center of gravity, overall relocation velocity mean of center of gravity of all tests and center of gravity [21].

Figure 1: standing on force plate
(3 times with eyes open and 3 times with eyes closed)

Figure 2: standing on foam
(3 times with eyes open and 3 times with eyes closed)

Therapeutic controls: Having been given information on research goals and research method as a written form, subjects were divided by three groups: massage, stability and combination exercises. Massage group had 12 sessions (4 weeks as every other day) which took 15 minutes which were hold by a researcher under the supervision of therapist Received surface stroking techniques, deep stroking, needing and friction (each one 3 minutes) [22]. Group of 12 weeks stability training (4 weeks as every other day) had selected stability exercises under the supervision of a therapist. These exercises were in two sections (warm up and main exercises).

At first patients did some primary exercises to build their muscles before doing main exercises. Increase in the degree of intensity of exercises (based on increasing the frequency, duration of exercises as well as replacement of advanced exercises) was changed under the supervision of orthopedic specialist and physiotherapist on the ground that progress in exercise levels must be in accordance with patient's recovery. Time of exercise sessions were started from 20 minutes and reached to 73 minutes. The overall time of exercise sessions were sum of time of contraction Preservation or stretch and break time. (For example, first session comprised of 6 minutes contraction Preservation or stretch and 14 minutes break

and 12th session consisted of 41 minutes of contraction Preservation and 32 minutes of break.) Combination group get 12 sessions (4 weeks, every other day) 15 minutes of massage and stability exercises protocol. Warm up and main exercises were the same for both exercise groups including stability and combination groups. In order to reduce the possibility of error, simple understanding, through doing of exercises and increase in confidence level about careful attention to exercises by patients and lack of mistakes while doing them at home, a protocol including images and explanation about the quality of exercises was prepared by a researcher for every week and people were asked to repeat exercises in every training session and if there had been errors during exercises they could have been removed by researcher.

Statistical analysis: Data were analyzed by SPSS software (16 versions). In order to identify normal data distribution Shapiro-Wilk Test was implemented. To evaluate results before and after test, also, comparing results among three groups studied, ANCOVA test used. In this research significant level ($\alpha = 0.05$) has been considered.

RESULTS

Taking into account proposed results in table 1, after stability intervention exercises, difference between velocity mean of pretest-posttest under 4 different sensory situations, was reported statically significant only on the standing situation on with closed eyes ($p = 0.011$) and standing on foam with closed eyes ($p = 0.034$). On the other hand, factor of stability exercises in two different sensory situations (standing on fixed surface with closed eyes and standing on foam with closed eyes was identifying. In addition to this, difference between Pretest-posttest vibration velocity in standing situation on the fixed surface with open eyes ($p = 0.022$), closed eyes ($p = 0.01$) and standing on foam with closed eyes ($p = 0.014$) after intervention of massage therapy have been reported significant. While after intervention of combinatorial therapy Pretest-posttest vibration velocity in standing situation on the fixed surface with open eyes ($p = 0.007$), closed eyes ($p = 0.028$) and standing on foam with closed eyes ($p = 0.000$) have been reported significant. In other words, massage therapy and combination therapy compared with stability exercises had a greater impact on improvement of vibration velocity factor under different sensory conditions.

Table 1: Compare pre- and post-test static balance

Groups	conditions	unit	Pre test mean	Post test mean	Means difference	T	df	P
Stability exercise	Swing speed on a fixed surface with eyes open	Deg / sec	0. 53 ± 0.48	0.41 ± 0.31	0.12	1.13	8	0.29
	Swing speed on a fixed surface with eyes close	Deg / sec	0.55 ± 0.35	0.30 ± 0.16	0.25	3.29	8	0.011
	Swing speed on foam with open eyes	Deg / sec	1.12 ± 0.55	0.76 ± 0.13	0.36	2.07	8	0.072
	Swing speed on foam with close eyes	Deg / sec	1.78 ± 0.40	1.40 ± 0.41	0.38	2.56	8	0.034
MASSAGE THERAPY	Swing speed on a fixed surface with eyes open	Deg / sec	0.84 ± 0.37	0.55 ± 0.23	0.29	2.93	7	0.022
	Swing speed on a fixed surface with eyes close	Deg / sec	0.88 ± 0.41	0.49 ± 0.11	0.39	3.48	7	0.010
	Swing speed on foam with open eyes	Deg / sec	1.16 ± 0.57	0.82 ± 0.28	0.34	2.29	7	0.055
	Swing speed on foam with close eyes	Deg / sec	1.87 ± 0.44	1.36 ± 0.22	0.51	3.24	7	0.014
COMBINED EXERCISES	Swing speed on a fixed surface with eyes open	Deg / sec	0.49 ± 0.24	0.32 ± 0.13	0.17	1.64	7	0.143
	Swing speed on a fixed surface with eyes close	Deg / sec	0.70 ± 0.37	0.29 ± 0.06	0.41	2.76	7	0.028
	Swing speed on foam with open eyes	Deg / sec	1.23 ± 0.46	0.59 ± 0.12	0.64	3.74	7	0.007
	Swing speed on foam with close eyes	Deg / sec	2.16 ± 0.33	1.15 ± 0.23	1.01	12.94	7	0.000

It is also obvious form table 1 that in two different sensory situations, standing on fixed surface with closed and open eyes on the foam and intervention in massage therapy improved vibration velocity by 23 and 26 percent, respectively. Improvement in vibration velocity after intervention of stability exercises in two different sensory situations was reported 16 and 19 percent, respectively. On the other hand, in two different sensory situations of standing on fixed surface with closed eyes and standing on the foam with

open eyes, intervention of stability exercises made improvement respectively by 41 and 23 percent while improvement in vibration velocity after massage therapy intervention under two mentioned sensory situations was reported 22 and 37 percent.

Standing in three different sensory situations including standing on fixed surface with closed eyes, standing on the foam with open eyes and standing on the foam with closed eyes With intervention of combination therapy improved vibration therapy by 42, 45 and 46 percent, respectively. Improvement in massage therapy intervention in three different sensory situations was reported 37, 22 and 23 percent, respectively. While, standing on fixed surface with open eyes at sensory situation with the intervention of massage therapy contributed to 26 percent improvement in velocity vibration.

While, improvement in vibration velocity after intervention of combination therapy under aforementioned sensory situation has been reported 17 percent. On the other hand only preference of massage therapy to combinatorial therapy was in improvement of vibration velocity on the standing sensory situation on the fixed surface with open eyes and the more complex MCTSIB test becomes, the more preferable combination therapy becomes to massage therapy. In 4 sensory situations of MCTSIB test, intervention of combination therapy compared with stability exercises had higher impact on improvement of velocity vibration variable under 4 different sensory conditions. After intervention of combination therapy, vibration velocity variable on the position of lying on the fixed surface with open eyes, on the position of lying on the fixed surface with closed eyes, on the position of lying on the foam with open eyes and on the position of lying on the foam with open eyes improved respectively by 17, 42, 45 and 46 percent while after intervention of stability exercises, improvement in vibration velocity variable under 4 different aforementioned sensory situations was reported 16, 41, 23 and 19 percent respectively.

RESULT AND DISCUSSION

Aim of this research is considered to be comparison between three therapeutic methods including massage, stability and combination exercises on postural vibrations among patients contracting chronic non-specific back pain. As it was mentioned before in this present study in order to evaluate static equilibrium force plate instrument and MCTSIB were used moreover vibration velocity variable test was evaluated under 4 different sensory conditions. As it was expected, the more complex sensory situation of MCTSIB test became the more increase in postural vibration can be viewed. Using unstable surface (foam) to evaluate postural injuries made postural deviations of patient high resolution. Increase in vibrations on unstable surface causes pelvis strategy to be activated. In this strategy preservation of postural equilibrium is based on information gathered from proprioceptive in back and torso [23].

In this regard Claeys *et al*. [24] evaluated effect of chronic non-specific back pain on variability of strategic control of postural deep sense. They stated that patients contracting back pain have less variability in selection of postural control strategies even when ankle strategy have less use (like standing on foam) they still are reliant on postural mechanism [24]. On the other hand, Ershad *et al*. [25] considered equilibrium and posture in patients contracting back pain. Meanwhile they considered equilibrium and postural control from different points of view including Neuromuscular and biomechanical aspects in patients with chronic non-specific back pain they reached conclusion that equilibrium and postural control in these patients compared to healthy people are devastated. Changes in deep sense performance were considered as the most important factor in appearance of this disorder. Although, complex and valuable research have conducted on equilibrium disorders of patients with back pain, only handful of research about involved variables in equilibrium and impact of therapeutic methods on improvement of these variables have carried out. This is despite the fact that, considerable research has undertaken about priority of one training method over other prevalent methods therefore the comparison between result of this study and previous studies are impossible. Result of present study regarding comparison between the effect of stability exercises interventions and massage therapy on improvement in postural vibrations in patients with chronic non-specific back pain is indicator of higher impact of stability exercises in comparison with massage therapy. This considerable difference was reported for standing position with closed eyes.

Taking into consideration result of present research priority of stability exercises over massage therapy has rooted in greater influence of massage therapy on improvement of deep sense. Taking stability exercises made some muscles more active, those muscles inactive due to back pain and as a result made it possible for central nervous system to have better and more effective stimulation from cutaneous receptor of these muscles. The more quality this information has, the more suitable dynamic model will be scheduled.

On the other hand improvement in velocity vibration is indicator of high impact which stability exercises have on improvement in variability of strategies involved in postural control, reinforcement of proprioception of back region (lumbosacral) created by improvement in power, stamina, flexibility, muscle balance and finally decrease in unsymmetrical incoming forces on joints and disk. The result of present research regarding the effect of stability exercises is in accordance with result [26-28].The result of present study regarding comparison between effects of interventions of combination therapy among patient with non-specific chronic back pain is indicator of higher impact of combination therapy to massage therapy. Vibration velocity variable in two different situation including standing on foam with open eyes showed considerable difference. But from statistical point of view this difference was only significant while standing on fixed surface with closed eyes and standing on foam with open eyes.

It seems that priority of combination therapy over massage therapy and stability exercises on improvement in postural vibrations is a result of positive effect of stability exercises. Outcomes of present study regarding comparison between effects of interventions of combination therapy and stability exercises on improvement in postural vibrations among patients contracting non-specific chronic back pain is indicator of the same influence of combination therapy influences on improvement in velocity vibration, So that in comparison between effect of these two therapeutic interventions, difference in studied variables was not reported from statistical point of view. There is no preference for combination therapy compared to stability exercises to improve static equilibrium resulting from shortage of training therapies which in not in accordance with results of May and Johnson [29].

CONCLUSION

Posture of patients contracting back pain is involved with injury and intervention. Evaluation of equilibrium parameters of total body performance can lead us to more precise and effective evaluation of cure. Overall results of research showed that each of therapeutic intervention of stability exercises, massage therapy and combination therapy as short term period (4weeks), had effective impacts on improvement of postural vibrations among patients contracting chronic non-specific back pain. Also, present research finding is indicator of higher impact of combination therapy on patient's posture improvement. Combination of stability training with massage therapy was more effective than each of therapies when used lonely.

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