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The Effect of 8 weeks of combined training on the angle of lumbar lordosis and pain of women suffering from sciatica pain

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ABSTRACT

Chronic low back pain is among the most commonly pains caused by malfunctions, poor physical condition, and mental stresses. Various non-surgical methods are recommended to reduce pain, to maintain mobility, and to minimize disability in patients. The main objective of this study was to determine the impact of 8 weeks of combined exercises on lumbar lordosis angle, pain, and quality of life of females suffering from sciatic pain. In this study, 15 female patients participated aged between 30 and 50 years with low back pain, sciatic pain, and lumbar lordosis. Lumbar lordosis angle (flexible ruler) and pain (McGill questionnaire) of patients before and after 8 weeks of exercise were evaluated. Data were analyzed using t-test ($P<0.05$). In this study, no significant difference was found in lumbar lordosis angle of sciatica patients before (± 0.1 43.2) and after the exercises (0.8 ± 34.2) ($p<0.05$).Significant difference was observed in pain perceptions between the before (0.8 ± 2.6) and after exercises (0.5 ± 1.8), emotional perceptions of pain between before (0.26 ± 1.4) and after exercises (0.3 ± 1.9) and various pain perceptions between before (0.6 ± 2.2) and after exercises (0.2 ± 1.5) ($P<0.05$). It can be concluded that hydrotherapy exercises along with on land exercises can improve lumbar lordosis and pain in patients with sciatic pain. Therefore, it can be recommended as a modality for these patients.

Key words: sciatic, lumbar lordosis, pain, hydrotherapy, walking, movement therapy

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INTRODUCTION

Low back pain is a leading cause of disability in people under 45 years [1]. The second leading cause is referring to physician [2] and the third leading cause is surgery [3]. Low back pain is the most common musculoskeletal disorder that has affected significant proportion of the working population. About one third of patients referred to orthopedic clinics include patients with low back pain caused by nonspecific disorders. These patients experience pain between the twelfth ribs to gluteal wrinkle in back and they had the experience of referring to family physician more than three months, without any pathological symptoms [4]. Injuries related to back pain have the highest prevalence [60% to 80%], which they have been considered not only from health aspects but also from economic aspects [5]. Back pain may be caused by various reasons. It seems that most of back pains are caused by lifting heavy objects, which results in joint injuries or disorders in soft tissue. These injuries are mainly led to weak bone structures, disorder in flexibility, muscle tone changes, and reduced strength. In addition, other factors have been referred in this regard, including repeated blows, skeletal abnormalities [lordosis and kyphosis] and non-mechanical factors such as metabolic diseases, infectious pathological and neurological lesion [6]. Sciatic pain is one of the common causes of back and foot pain and feet so that its prevalence in industrialized countries have been reported 40% and

spinal disc herniation is one of the its common causes. However, sciatic pain is only a symptom not a disease [7]. Researchers have shown that physical activity in standard sports Standard increases cardiac output up to 15 times, and it leads to increased blood flow in activated tissue, resulting in reduced pain, and accelerated improvement in the relevant organ [8]. Patients with sciatic pain are generally suffering from back lordosis. Studies conducted in this area, including the studies conducted by Ghaderi et al [2003], have stated that following therapeutic exercises, existing and non-active neural connections are activated and strengthened, and synaptic activity is facilitated. As muscle fiber in muscles in back of people is type I, which are appropriate for longer and low severity contractions, used to control standing status, converting these fibers to other type is possible according to muscles elasticity. Size of back muscles can improve the muscle strength and endurence and contribute to the person performance [9]. Granta et al [2001] stated that reduced posterior muscle endurance can be caused by muscle atrophy after immobilization and lack of proper use of muscles, poor circulation of blood in muscle, high levels of metabolites inside the muscle followed by spasm and prolonged stress of muscle. As trunk muscles are considered among the spinal cord stabilizer muscles, atrophy of these stabilizer muscles can affect the back area and increase forced imposed on back spinal cords. Increased forces exerted on the spinal cords causes abnormal force on facet joints and passive organs of areas such as joint capsule and other organs become sensitive to pain followed by back pain. Therefore, it can play important role in physical exercises in the process of exercise therapy [10]. As no research has been conducted so far on the impact of selective combined exercises on women with sciatic pain, the aim of this study was to investigate the effect of 8 weeks of selective combined exercises on pain lumbar lordosis angle in female patients with sciatic pain.

MATERIALS AND METHODS

Out of all the people who have sciatica pain referred to medical centers, 15 were selected using targeted method and they were included in the study. First, McGill pain questionnaire was completed to evaluate the amount of pain as pre-test and lumbar lordosis of subjects was assessed using a flexible ruler. The subjects implemented selective exercise programs for 8 weeks. The exercise protocol was in a way that the subjects carried out the exercises of walking on water without any additional movement for 8 weeks, three times per week and 30-minute each time, outdoor walking exercises 20 to 30 minutes per day, and corrective exercises, 4 sets of 30 seconds in morning and four sets of 30 seconds in the afternoon. Finally, after eight weeks of exercise, lumbar lordosis angle was tested and responds of subjects to McGill pain questionnaire by test subjects were assessed and tested.

Flexible ruler

Flexible ruler used in this study had a length of 30 cm and a width of 7.0 cm that it was flexible. The measurement method was so that the studied person was standing one foamy surface with one holding leg, while his feet were naked. This leg was constructed for preventing from moving forward and back when measuring. The person was clothed so that his spinal cords from the shoulders to the top of the gluteal region were in sight. For measuring lumbar lordosis flexile ruler, there was need for two bone signs in this study, as YOUDAS method, from acanthoid spur of T12 vertebrae as a starting point to acanthoid spur of vertebrae S2 as end of arc. The reason for using T12 point was that the lumbar lordosis to be measured. In this method of measurement, the subjects was asked to put his weight equally on his two feet and does not move his chest and stomach forward and backward and open his foot wide 10 to 15 cm. Then, without change in the form of flexible ruler, it was taken slowly and accurately from west and it was placed on the paper. Accordingly, the curvature of its convex part was drawn on the paper and points T12 and S2 were marked on it. After this, two points were connected to each other with a straight line connects and a vertical line was drawn from the middle of the line to the curvature. The values of these two lines, respectively L and H with a millimeter ruler, was placed in the formula ($X = 4$ (Arc tag ($2H / L$)), and lumbar lordosis angle was calculated.

McGill Pain Questionnaire

Malzack developed McGill Pain Questionnaire (MPQ) in 1997. It consists of 20 phrases, which its objective is to assess the individuals'' perception of pain through its various dimensions (four dimensions of sensory perception of pain, emotional perception of pain, evaluation perception of pain, and diverse pains). McGill Pain Questionnaire one of the important measurement tools of pain used firstly by Malzack on 297 patients who suffered from various pains. Maelzack et al also developed revised version of this questionnaire (SF-MPQ) for a short but useful action, which it was used in 250 studies. McGill Pain Questionnaire included two independent factors: one under the title of perceptual pain describing pain in the person and other explaining the sensory perception of pain experience.

Findings
Lumbar lordosis

Information related to lumbar lordosis of patients is shown in Figure (1).

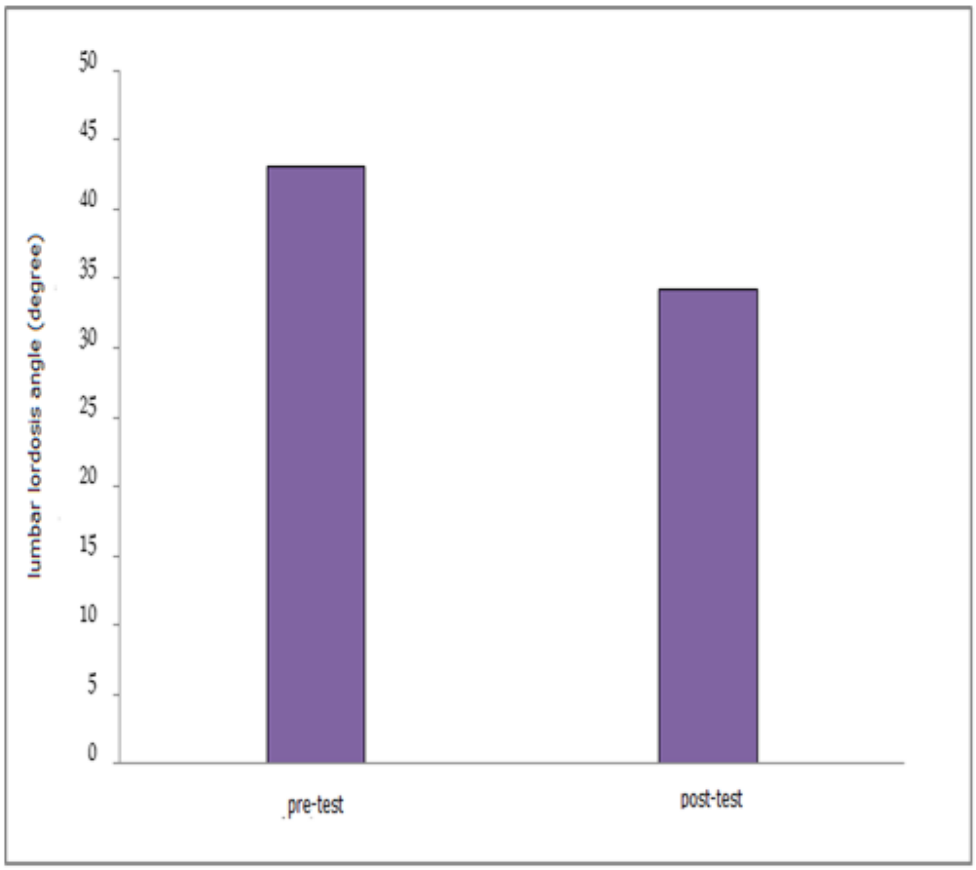

Figure 1- lumbar lordosis angle of patients with sciatic pain

Significant difference was found in lumbar lordosis angle of patients before (0.11±43.12) and after (0.86±34.37) exercises ($P<0.05$).

Sensory perception of pain
Information on sensory perception of pain is shown in Figure (2).

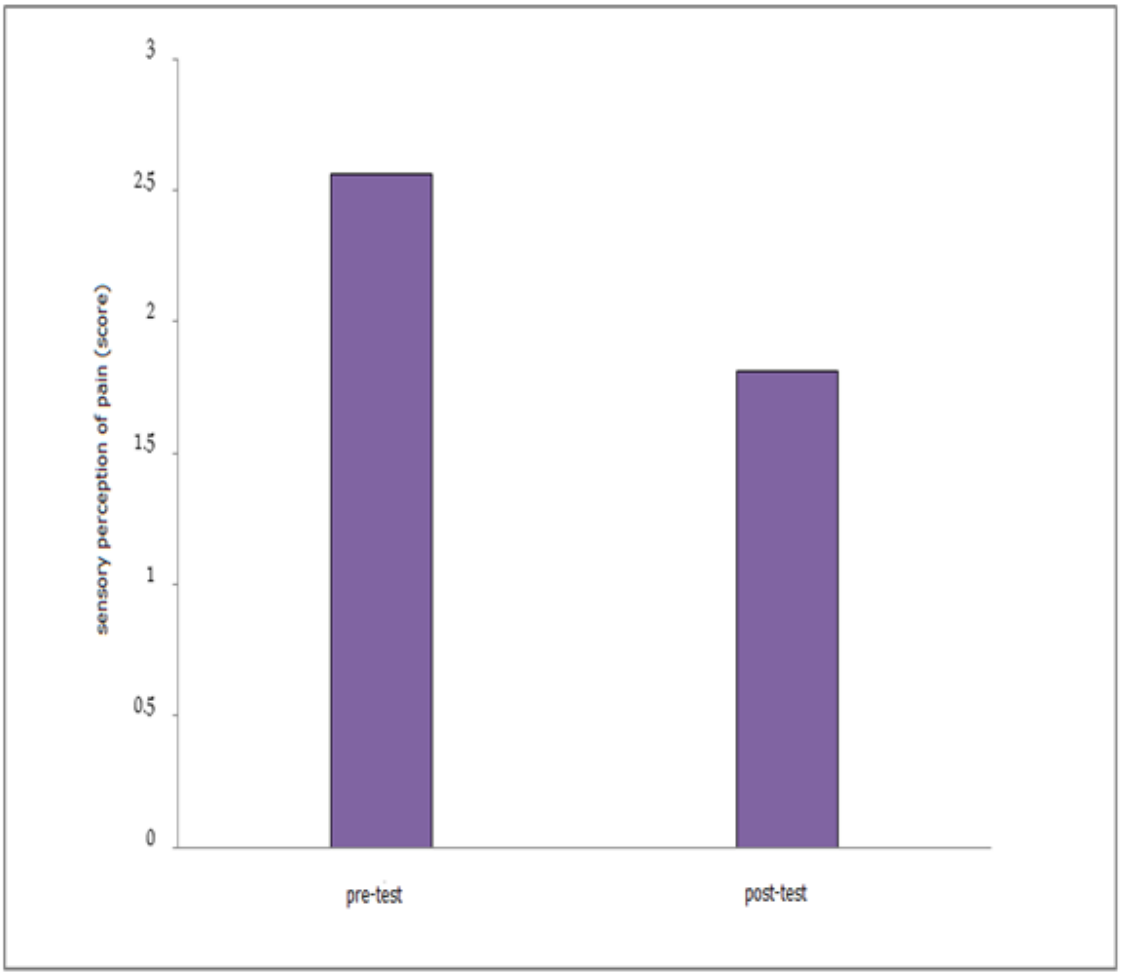

Figure 2- sensory perception of pain

Significant difference was found in level of sensory perception of pain before (0.84±2.56) and after (0.58±1.81) exercises (t=3.3, P<0.05), so that sensory perception of pain reduced by approximately 37.5%.

Emotional perception of pain

Information on emotional perception of pain is shown in Figure (3).

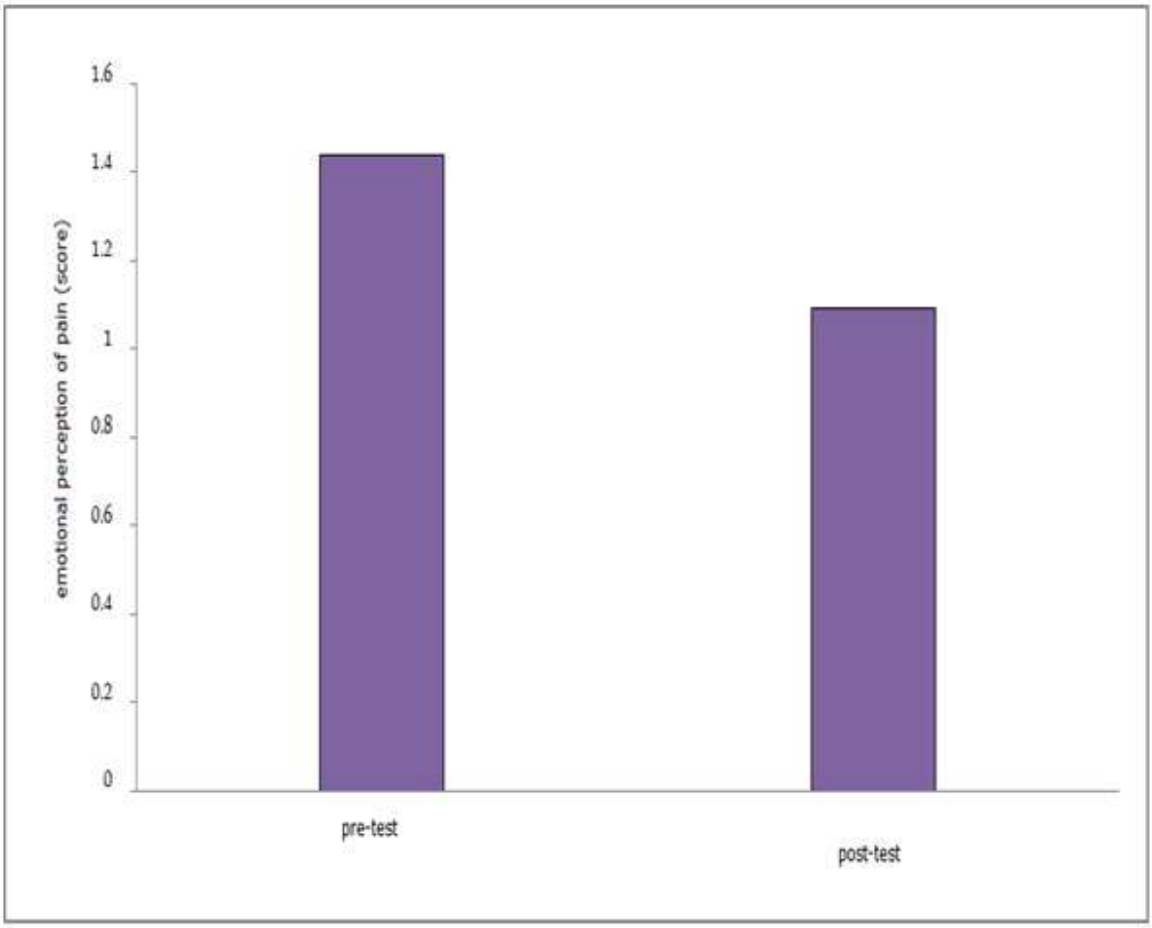

Figure 3- emotional perception of pain

Significant difference was found in level of emotional perception of pain before (0.26±1.44) and after (0.38±1.09) exercises (t=2.4, P<0.05), so that lordosis angle reduced by approximately 17.5%.

Various pains

Information on various pains is shown in Figure (4).

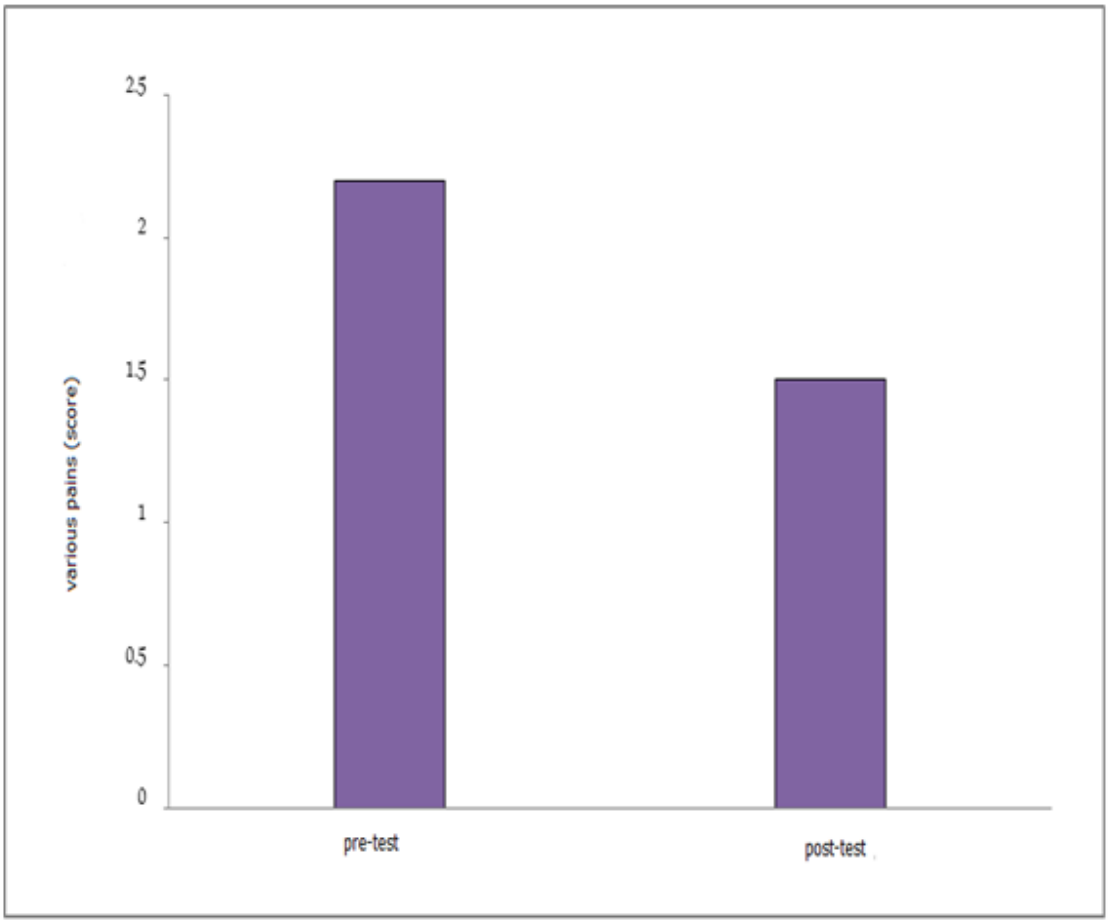

Figure 4- various pains

Significant difference was found in in various pains before (0.6±2.2) and after (0.2±1.5) exercises (t=2.6, P<0.05), so that various pains reduced by approximately 35%.

DISCUSSION

The aim of this study was to determine the effect of 8 weeks of selective combined exercise on the angle of lumbar lordosis and pain in female patients with sciatic pain. The results showed that eight weeks of combined exercise could improve the angle of lumbar lordosis and pain of patients. This improvement was in line results of research conducted by Farzam (1995), Greene et al (1999), Hamill et al (2006) (11,12,13). Carter et al (2002) examined the effect of stretching exercises and concluded that corrective exercises had impact on thoracic kyphosis and lumbar lordosis abnormalities, since they reduced spinal cords curvature (14).

Hindleet al (2012) also investigated the mechanism and effects of stretching neuromuscular exercises on scope of motion and motor function and muscle function and they concluded that stretching neuromuscular exercises improve muscle strength and increase range of motion (15). Meier also found a significant decrease in their study on lumbar lordosis. Strength exercises affect tendon length of muscles and displace different skeletal parts, and cause stability in ligaments. On the other hand, stretching exercises act as agonist and antagonist muscles coordinator. Therefore, such exercises increase muscle length in concavity side and cause increased muscular energy and strength in the convexity side, and eventually reduced abnormality (16). Our results were not in line with results of study conducted by Garshasebi et al (2010) on pregnant women. This study does not show a significant decrease in the lumbar lordosis. This inconsistency can be due to fact that in pregnancy women cannot carry out strengthening exercises of abdomen muscles due to loosening and swelling the anterior tilt abdominal muscle (17). The effect of abdominal

muscles has been considered as a dynamic factor in increasing lumbar lordosis and low back pain since long times ago. According to mentioned sources, human machine life cased that humans feel rarely need for contracting and strong abdominal muscles activities. This gradually weakens stomach muscles leads into back pain (18). In general, according to studies conducted, it can be concluded that the combined exercises can cause stretching and strengthening of agonist and antagonist muscles and reduce lumbar in people with sciatic pain.

CONCLUSION

It can be concluded that combined exercises can reduce lordosis abnormalities and reduce the pains resulting from abnormalities such as sciatic back pain investigated in this study. Combined exercises in water and land can be used as complementary exercises to reduce the fatigue caused by type of exercise and its monotony, and increase exercise effectiveness according to amount of pain.

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