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The Effect of an Eight-Week Period of in-Water Resistance Training on Pain, Range of Motion and Muscular Stamina of the Postmenopausal Women with Backache

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ABSTRACT

Chronic pain is counted as one of the most significant medical problems in the world as a whole and is at the same time one of the most important causes of human suffering and paralysis, and seriously damage human quality of life. Even in spite of the advancement of science in spinal diseases and the increasing spread of therapies, back pain is still one of the most common musculoskeletal disorders. Whereas bearing body weight is difficult for patients with low back pain, a treatment that can lead to weight loss and strengthening the muscles of back is also very important. Thus, this essay was to evaluate the effect of eight weeks of strength training in water on pain, the range of motion and muscle strength in postmenopausal women with chronic low back pain was nonspecific. In view of the goals and content, this research is semi-experimental and an example of scientific-comparative research type. Research subjects were selected purposefully and according to entry and exit criteria. In other words, 30 women with low back pain were randomly divided into two groups of 15 exercises in water and control (without exercise). Pain intensity was measured by VAS questionnaire, trunk range using spinal muscle and flexor and extensor muscle strength using manual dynamometer. Paired t-test was used for intra-group comparison and independent t-test was used for comparison between groups. Significant differences were observed between the two groups in the pain and range of motion of the trunk and flexor and extensor muscles ($P < 0.05$). Upon the results of this study, one can conclude that the program of strength exercises in water improves pain, trench range and extensor and flexor muscles in postmenopausal women with low back pain, so it is recommended for these patients.

Key words: *back pain, postmenopausal women, pain, range of motion, muscle strength.*

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INTRODUCTION

Backache is one of the most common musculoskeletal disorders scoring a relatively high prevalence in various communities and usually accompanied by a great many of the health-related, social and economical problems that incur the industrial communities with extravagant costs (McDonald and Landgren, 1998). It is estimated that about 60% to 90% of the individuals experience backache at least one time during their lives (Norris and Mathew, 2008). Patients with backache largely sustain motion limitations in their daily activities (Esbati, 2008). Weak muscles cannot support the natural arch of the back as well as the correct functioning of the muscles. This change in the vertebral arch eventually causes a shortening in the muscles and diminishes the vertebral column functioning. Also, the problem provides for the imposition of abnormal or unwanted forces on the joints or the vertebral column ligaments. Therefore, if an individual develops weakness and shortening of the muscles or experiences limitations in range of motions then s/he is more likely to sustain lesion, damage and recurrence of the backache (Davison, 1982). Thus, it seems necessary to devise activities that enable strengthening of the lumbar area. Since weight bearing is difficult for the patients with backache, a treatment that can strengthen the lumbar region's muscles meanwhile bringing about a weight loss is of a high interest (E. Yerntis, 2001). The extra pressure on the spine is easily

controlled in water due to the so-called buoyancy property (Sedaghati, 2012). Moreover, the buoyancy, besides reducing the body weight, contributes to an increase in the range of motions (Esbati, 2008).

One method for treating the back pain is resistance training in water. This method is much welcomed by the patients and the people with backache. And, every year more complete methods and more comprehensive exercises of this type are innovated (Sedaghati, 2012). Such training methods are characterized by a lack of body weight bearing which makes them a good choice for mitigating the back pain and the individuals are found greatly in control of their bodies when in water. In line with this, Esbati et al (2008) have investigated the effects of a selected sport therapy program in water on 19 women. The exercises include stretching activities, warming up, training in deep water and cooling down exercises for 80 minutes.

The study variables were: pain, individual's performance and mobility time. In the end, a significant difference was found between the back pain intensity with individual's performance and mobility time [1].

Mahjour et al (2014) in a quasi-experimental study dealt with the survey of the effect of exercise therapy in water and massage therapy on 24 male patients with chronic nonspecific low back pain (CLBP). The treatment took 6 weeks to complete and 4 sessions were held per week. The obtained results indicated

that the variables "pain intensity" and "disability" were improved in both of the groups; in the meantime, it was figured out that the pain intensity reduction was found significantly higher in the massage group as compared to the group subjected to aquatic therapy [8].

Sedaghati et al (2013) practiced a strength training program in water for 12 weeks with a frequency of 3 sessions per week under the supervision of the researcher on volunteered girl university students (with an average age range of 22.5 years) with back pain. The surveys indicated that the pain intensity decreased to a large extent and lumbar lordosis was considerably improved [9].

Binabito et al (2014) studied the effects of aquatic therapy on the muscular pains and weakness for 2 months, five sessions a week on the sedentary adults. The results showed that this method significantly improves the pain and muscular weakness [21].

Thus, the present study aims at investigating the effect of an eight-week in-water resistance training program on pain, range of motion and muscular strength of the postmenopausal women with back pain.

STUDY METHOD

According to the objectives and the contents of the current research paper, the study is a quasi-experimental research of the causal-comparative type. A total of 30 postmenopausal women, in an age range between 45 and 60 years of age, with nonspecific lower back pain were selected from the study population based on the study inclusion criteria and then they were randomly assigned to two 15-individual groups, strength training in water and control (with no exercise), respectively.

The instruments and the tools utilized in the current research paper were a measure tape, a scale, VAS questionnaire for the determination of the intensity of back pain, a Spinal Mouse Device for measuring the lumbar region's range of motion, a Dynamometer for measuring the muscular strength and the resistance training protocol.

Specifications of the training program: the exercises were carried out thrice a week, in one hour sessions. The training sessions were held in a pool ranging in temperature from 27 to 28 degree centigrade. The stimulation threshold and the work intensity were set at 55% of the maximum heart rate (the maximum heart rate equals 220 minus age). Every move was exercised in three sets with 15 repetitions each. The first and the second weeks the exercises were carried out through taking advantage of water resistance and about 5% was added to the workload every week since the week three.

Finally, after gathering the required information, the data pertaining to the study subjects' characteristics including age, height and weight plus the study variables were analyzed in two parts of descriptive and inferential statistics in SPSS software, version 21. Paired sample t-test was used to perform an intra-group comparison and independent difference t-test was also applied to compare the results obtained between the study groups. Also, the significance level of the study was set at a 95% level with an alpha smaller or equal to 0.05.

FINDINGS

A significant difference was observed in the pain intensity of the experimental group following the eight weeks of strength training in water ($t=4.33$, $p=0.027$) in such a manner that it underwent a reduction about 3.05 degree. But, no significant difference was observed in the control group subjects ($t=3.13$, $p=0.61$). In total, a significant difference was seen between the control group participants and the experimental group's ($t=3.2$, $p=0.005$), thus, the first hypothesis is confirmed.

A significant difference was observed in the body flexion range of motion in the experimental group following eight weeks of strength training in water ($t=3.4$, $p=0.006$) in such a manner that it underwent about a 13-degree increase. But, no significant difference was found in the control group subjects ($t=1.13$, $p=0.66$). In total, a significant difference was seen between the control group and the experimental group participants ($t=3.3$, $p=0.037$), thus the second hypothesis was affirmed.

A significant difference was found in the body flexion range of motion in the experimental group following an eight weeks of strength training in water ($t=1.4$, $p=0.012$) in such a manner that it underwent a 9-degree increase. But, no significant difference was figured out in the control group subjects ($t=0.54$, $p=0.88$). In total, there was found a significant difference between the control group and the experimental group participants ($t=3.27$, $p=0.001$), thus the third hypothesis is confirmed.

A significant difference was observed in the body extensors' strength in the experimental group following an eight weeks of strength training in water ($t=2.4$, $p=0.002$) in a way that it underwent an increase by 10.34 Newton. But, no significant difference was found in the control group subjects ($t=1.54$, $p=0.88$). In total, a significant difference was figured out between the control group and experimental group subjects ($t=1.27$, $p=0.003$), thus the fourth hypothesis is confirmed.

A significant difference was observed in the flexor muscles' vigor of the experimental group participants following an eight weeks of strength training in water ($t=9.4$, $p=0.006$) in such a manner that it increased for about 10.48 Newton. No significant difference was found in the control group subjects ($t=0.54$, $p=0.68$). In total, a significant difference was seen between the subjects from the control group and the ones from the experimental group ($t=1.59$, $p=0.006$), thus the fifth hypothesis is confirmed.

DISCUSSION AND CONCLUSION

The results of the current research paper indicated that there is a significant difference between the control group and exercise group in terms of pain intensity following the strength training in water. This is consistent with the results obtained by Costa et al (2012) who dealt with comparing the effects of such exercises as walking in deep water and general training in water on the pain indices of the patients with nonspecific chronic lower back pain (Costa, 2012). Also, regarding the contradicting results, the findings of the present study are not compliant with the results obtained by Lee et al (1995) who reported the ineffectiveness of an aquatic therapy course on the reduction in pain intensity of the patients with chronic back pain (Lee et al, 1995).

The results of the current research paper showed that there is a significant difference between the control and exercise groups in terms of the body range of motion following a strength training course. The studies by Galantino et al (2004), William

et al (2005), Taghur et al (2008) and Akbari et al (2012) have presented results conforming to what was found herein. They demonstrated that exercise therapy causes an increase in the muscles' flexion and extension ranges of motion in the lumbar region of the patients with chronic back pain; moreover, the results presented herein are not consistent with the results obtained by Karimi et al [16] and Ezzati et al (2012). Reasons that have seemingly given rise to such a contradiction in the results are the differences in the study population and the number of the samples, exercise protocol adopted and the variables assessment method, training course diversity, type of the equipment utilized and gender.

On the other hand, the strength training moves adopted by the current research paper have probably caused an increase in the range of motion through stressing the nervous-muscular systems.

The results of the present study indicated that there is a significant difference between the control and experimental groups in terms of the body muscles flexion and extension strength following the strength training in water. These results conform to the results found by Ahmadipour (2008) who investigated the effect of selected training program on the muscular weakness of the girl university students with back pain (Ahmadipour, 2008); also, the results comply with the results obtained by Sekandiz et al (2007) who surveyed the effects of a novel training course on the strength, flexibility and endurance of the body (Sekandiz, 2007). In addition, the results presented herein are consistent with the results obtained in the studies performed by Ghaderi who evaluated the effects of vertebral column stabilizing exercises on the muscle performance of the lumbar region on its sagittal plane in the individual with chronic back pain (Ghaderi, 2001) as well as with the results obtained by Anderson (2005) who compared the active and passive approaches to the improvement of pain and performance of the patients with chronic back pain or patients with recurring back pain (Anderson, 2005).

Generally, the results of the current research paper indicated that the strength-building water workout program exerts significant effects on the improvement of pain, range of motion and the vigor of the extensor and flexor muscles in postmenopausal women with back pain.

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