



## The Effect of 8 Weeks of the Selected Combined Exercises on Balance and Pain of Patients Suffering from Arthritis of Knee

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### ABSTRACT

Osteoarthritis is considered as the most common joint disease of humans and one of the most common causes of chronic disability among elderly people in the developed countries. The main objective of the present research was to determine the impact of 8 weeks of the combined exercises on the balance and the amount of pain of patients with knee osteoarthritis. 15 patients with knee arthritis were selected purposefully and in form of convenience and they participated in this research. The patients implemented the Training Protocol of walking in water and land and the knee locking and the front thigh exercises for 8 weeks. Dynamic balance (Y test) and pain (McGill questionnaire) of patients with knee arthritis were measured and evaluated before and after eight weeks of combined exercises. The data were analyzed by use of the *t*-dependent ( $P < 0.05$ ). In the dynamic balance of patients with knee arthritis, there was significant difference regarding the anterior side between before-exercises (39.9 7.2) and after-exercises (50.7 6.8), regarding the internal posterior side between before-exercises (28.8 9.2) and after-exercises (38.0 8.7), regarding the external posterior direction between before-exercises (37.5 7.2) and after-exercises (44.4 7.4). ( $P < 0.05$ ). Regarding sense perception of pain by patients, there was significant difference between before-exercises (2.2 0.6) and after-exercises (1.8 0.5), regarding the emotional perception of pain by patients between before-exercises (1.5 0.3) and after-exercises (1.2 0.3) and on perceiving variety of pain by patients between before- (2.1 0.8) and after-practices (1.8 0.7) ( $P < 0.05$ ). From the findings of the present research we can conclude that the hydrotherapy exercises combined with exercises on land can cause to improve the dynamic balance and the pain of patients with knee arthritis; therefore we can recommend it as a modality for these patients.

**Keywords:** arthritis, balance, pain, hydrotherapy, walking

### INTRODUCTION

Nowadays, the subject of human health has attracted highly the researchers' attention. The physical activities are recommended for preventing chronic diseases such as osteoarthritis. Rheumatoid arthritis is meant to be the joint surface destruction and joint wear and consequently deformation, pain and limitation in joint; it is a chronic and systemic inflammatory disease that is specified by the progressive involvement and deformation of joints symmetry. This disease can lead to the movement disabilities in patients and the diarthroid joints and soft tissue around it get mainly involved with it; it is the most important cause of inflammation of the joints and their shape change. Rheumatoid arthritis is a chronic disease that is happened at most during the fourth and fifth decades of life; it causes the disorder in normal daily activities and is often associated with different degrees of disability that through

the exercise therapy we can reduce to some extents its effects such as morning drought, reduction of the mobility and flexibility. (1) Statistics show that this disease has afflicted about 1-3% of the population of the United States of America (2). The symptoms of this disease are pain, morning stiffness and limitation of joint movements. (3). So far, several factors associated with osteoarthritis of the knee joint have been introduced. Age is the most important uncontrollable risk factor for osteoarthritis. With increasing age the prevalence of osteoarthritis is increased. The type of joints involvement before 55 years is identical in both genders, but with increasing age the hip joints can be more involved in men and the joints of the hand in women. Race, genetics and the sexual hormones are among other factors associated with being created the osteoarthritis of the knee. The existence of a family history of afflicting the osteoarthritis exposes the individual to a higher risk of developing the disease. Due to the high incidence of poly-articular osteoarthritis in women over 50 years, the correlation of osteoarthritis with reduction of estrogen has been raised; researches have shown that estrogen replacement therapy has caused the risk of osteoarthritis of the knee and the hip to be reduced. Obesity is considered as an important factor for the progression of osteoarthritis, especially in the knee. Severe joint trauma, excessive pressure to the joint caused by job type or sport, congenital defects or disorders, infectious or inflammatory diseases of joints and endocrine or metabolic disorders including diabetes, hyperparathyroidism and acromegaly are also associated with osteoarthritis (4). Patients with knee osteoarthritis suffer generally from a lack of balance and pain. Researches done in this field included the researches of Ali H. Alnahdi et al (2012), which examined the muscular disorders in patients with osteoarthritis of the knee. The muscles of the quadriceps, the hamstring and hip muscles have been disrupted significantly in people with arthritis of the knee compared with the control group. Muscle strength, especially the quadriceps muscle, has been reported as the main factor determining performance. Muscle disorders are considerable in patients with knee osteoarthritis. Muscular disorders affect people's physical performance and through the optimal sport should be increased the power of the quadriceps and knees (5). Roddy et al (2005) investigated the impact of aerobic walking or strengthening exercises for osteoarthritis of the knee; they came to the conclusion that the aerobic walking and strengthening the muscles of the quadriceps causes to decrease pain and disability caused by arthritis of the knee, but there was not observed any difference, in an indirect comparison, between the aerobic walking and strengthening the sport among them (21).

Sheila C. O'Reillya et al (1999) investigated the effect of sport in the home on pain and disability of osteoarthritis of the knee. They selected 119 men and women 40-80 years old suffering from knee pain from the population and divided randomly into sport group and a group without the intervention. The sport group did resistance exercises daily for six months and came to the conclusion that the amount of the pain of osteoarthritis of the knee had a reduction in the sport group in relation to the control group and the physical performance of sport group has improved, so it can be concluded that a simple sport program for the quadriceps in the home can significantly improve the knee pain and physical function (7). Since there was not carried out so far any research on the impact of the combined exercises on patients with knee arthritis, the aim of this research was to investigate the impact of 8 weeks of the combined exercises on the balance and the amount of pain of patients with knee arthritis.

### **Method**

From between all people with knee arthritis referring to Sports Medical Center, 15 people was selected purposefully and in form of convenience and they got participated in research. The balance of the patients was evaluated by Y-test in three anterior, internal posterior and external posterior sides; the angles of these three directions were specified by rating bars that were fixed in lateral sections of the page of all three directions and an indicator was installed on each bar. Before starting the test the subjects' superior leg was determined in order to do test counterclockwise, if the organ's right foot is superior. The subjects with the superior leg stood by single leg on the page of confluence of three directions, in so far as they do not commit any error (the foot does not move from the Confluence page, does not rely on the foot that acts as gaining access or the person does not fall), with the other foot in the direction that the examiners randomly, they did the action of gaining access through the movement of the indicators and in a normal manner on two feet and a distance that the subject has moved the indicator was recorded as his distance of access. The subjects implemented training program for 8 weeks and each week three meetings selected by the researcher. The training protocol was that the subjects exercised 8 week and each week three 30-minute sessions the walking on the water without any added movement, every day 20 to 30 minutes walking in free space and also the knee lock exercises and the front hip exercise in 4 sets of 30 seconds in the morning and 4 sets of 30 seconds in the afternoon. After 8 weeks of exercises the dynamic balance as well as the pain were measured again by the McGill questionnaire.

**Findings**

Dynamic balance (anterior side)

Information on dynamic balance (anterior side) of patients has been provided in figure (1).

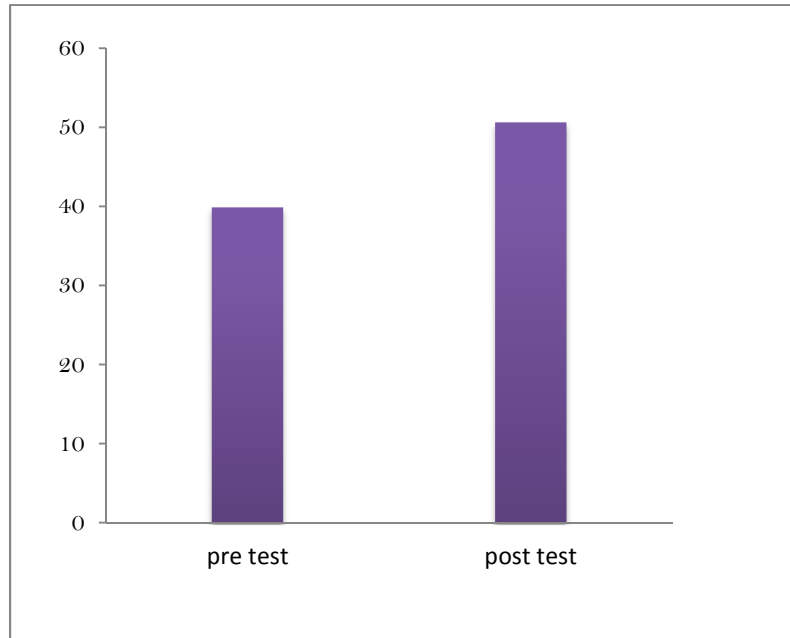


Figure (1): Dynamic balance of anterior side

There was observed a significant difference regarding patients' dynamic balance of anterior side between before exercises (39.9 7.2) and after exercises (50.7 6.8) ( $t = 13.3, p < 0.05$ ), so that the balance of anterior side increased about 5.4%.

Dynamic balance (posterior side)

Information on dynamic balance (internal-posterior side) has been provided in figure (2).

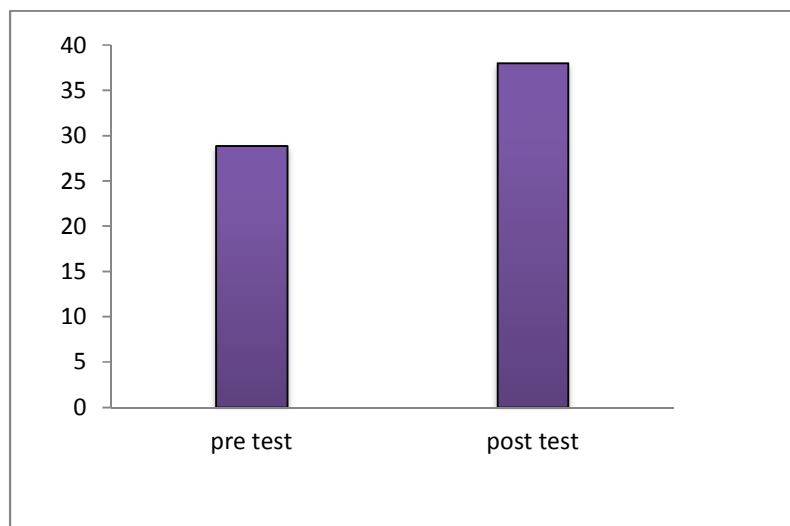
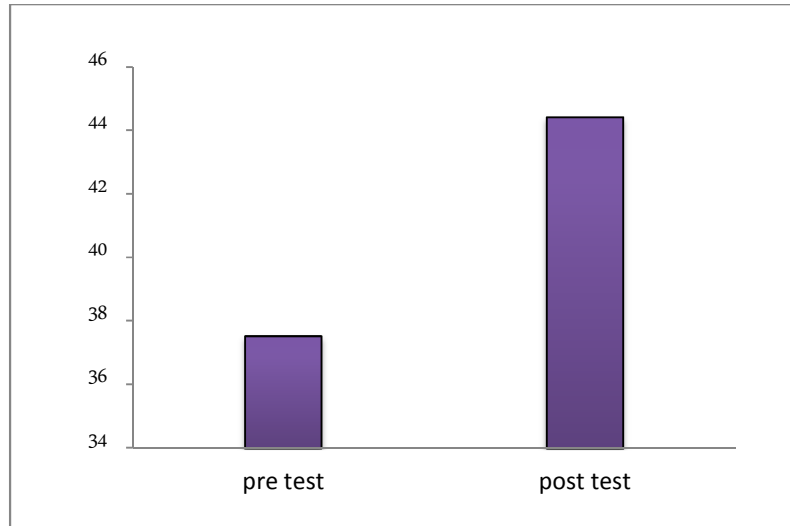


Figure (2): Dynamic balance of internal-posterior side

There was observed a significant difference regarding patients' dynamic balance of internal-posterior side between before exercises (28.8 9.2) and after exercises (38.0 8.7) ( $t = 11.5, p < 0.05$ ), so that the balance of internal-posterior side increased about 4.6%.

Dynamic balance (external-posterior side)

Information on dynamic balance (external-posterior side) has been provided in figure (3).

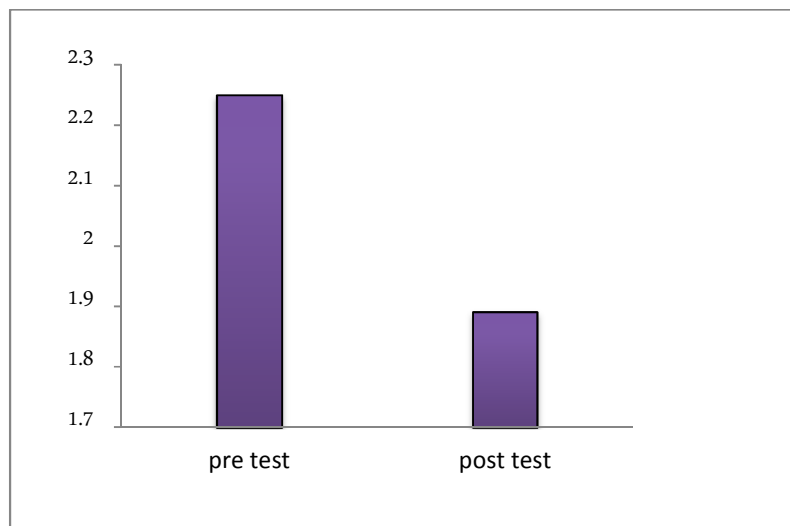


**Figure (3): Dynamic balance of external-posterior side**

There was observed a significant difference regarding patients' dynamic balance of external-posterior side between before exercises (37.5 7.2) and after exercises (44.4 7.4) ( $t = 11.7, p < 0.05$ ), so that the balance of external-posterior side increased about 3.45%.

Pain (sense perception of pain)

Information on sense perception of pain has been provided in figure (4).

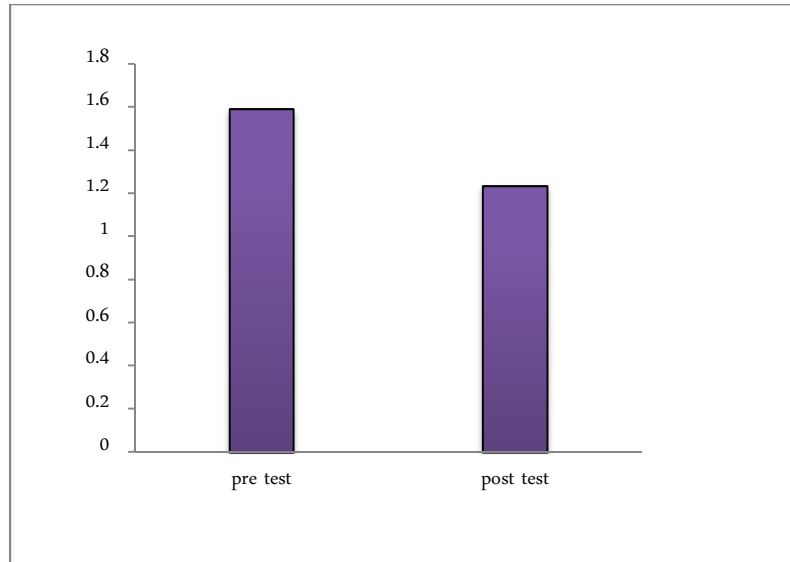


**Figure (4): sense perception of pain**

There was observed a significant difference regarding patients' sense perception of pain between before exercises (2.25 0.61) and after exercises (1.89 0.57) ( $t = 1.9, p < 0.05$ ), so that the sense perception of pain decreased about 3.45%.

**Emotional perception of pain**

Information on emotional perception of pain has been provided in figure (5).

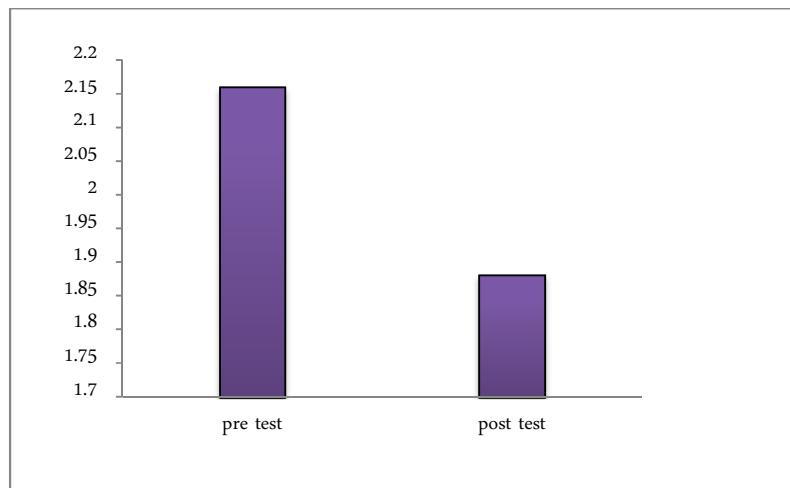


**Figure (5): emotional perception of pain**

There was observed a significant difference regarding patients' emotional perception of pain between before exercises (1.59 0.31) and after exercises (1.23 0.34) ( $t = 1.8, p < 0.05$ ), so that the emotional perception of pain decreased about 18%.

**Perception of various pains**

Information on perception of various pains has been provided in figure (6).



**Figure (6): perception of various pains**

There was observed a significant difference regarding patients' perception of various pains between before exercises (2.16 0.82) and after exercises (1.88 0.73) ( $t = 0.3$ ,  $p < 0.05$ ), so that the perception of various pains decreased about 14%.

### DISCUSSION

The aim of this research was to determine the impact of 8 weeks combined exercises on the amount of balance and pain of patients with knee arthritis. In total, there was observed these eight weeks of combined exercises caused to improve the patients' balance and pain; this improvement is similar to the results obtained in other studies in which the different sport exercises have caused to improve the balance in women with knee arthritis (8, 9, 10, 11, 12). Improving dynamic balance in the experimental group can be referred to the kinetic therapeutic effects, such as the physiological effects, strengthening the muscles and neuro-muscular coordination (13). The muscles play an important role in movement, controlling the balance of body and preventing abnormal movements of the joints. Depending on the type or anatomic location of the muscle, the occurrence of a disorder in sensory and or motor nerves related to a muscle can be associated with different signs and symptoms. This means that by the incidence of muscle weakness the protective effect of the extra burden imposed on the joint is reduced and consequently the pressure on the joint is increased; this causes in turn the microscopic fractures, bone erosion, and cartilaginous bone sclerosis (14). Muscle weakness can cause knee pain that with strengthening the muscle power is reduced (15, 16). The quadriceps muscle has the main responsibility in resistance of knee joint and the weakness of this muscle may weaken its neuromuscular control and cause to be appeared some pathologic movements in joint (17). Some researchers consider the weakness of this muscle as an important indicator in incidence of knee pain and disability associated with it (15, 17). The power of muscles especially the quadriceps muscle in the knee osteoarthritis patients is lower than the healthy witnesses (15, 18). Muscular weakness exists even in osteoarthritis patients without radiographic changes and knee pain (18). In these patients the muscle power is reduced commensurate with the severity of osteoarthritis (15, 18, 19). However, the findings of this study did not correspond with the results of the study of Lound et al in 2008; while 8 weeks of exercises in land and water had not any significant effect on the balance in patients with knee arthritis, in the land exercise group there was observed a significant improvement in the strength of the muscle (20).

Roddy et al (2005) investigated the impact of aerobic walking or strengthening exercises for osteoarthritis of the knee; they came to the conclusion that the aerobic walking and strengthening the muscles of the quadriceps causes to decrease pain and disability caused by arthritis of the knee, but there was not observed any difference, in an indirect comparison, between the aerobic walking and strengthening the sport among them (21).

### CONCLUSION

Generally, according to the results obtained from this research we can conclude that the exercise and physical activity in the water and land can have an important effect on the dynamic balance and the pain of patients with arthritis. Therefore, it is recommended that these patients have the appropriate exercises. Cheerful and exciting environment during the combination of land and water exercises can improve the effectiveness and diversity of the practice.

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