ORIGINAL ARTICLE

The effect of a water jogging exercise course on older men with knee osteoarthritis

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Received: 15th August, 2020
Accepted: 31st October, 2020

DOI: 10.31382/eqol.201204

Abstract

Knee osteoarthritis is one of the most common joint disorders and a major cause of disability and disability in old age. Although previous research has shown the positive effects of exercise on land to some extent, but due to high pressure on land, the elderly does not want to participate in these exercises. Water exercise has recently been considered to reduce pain in patients with osteoarthritis of the knee, although its effects have not yet been fully elucidated. So, the objective of this study was to investigate the effect of a water jogging training program on the symptoms of knee osteoarthritis in elderly men. 15 elderly men with knee osteoarthritis were purposefully selected as subjects. We used global questionnaire of the consequences of knee injuries and osteoarthritis (KOOS) to collect data. The subjects performed a jogging in water program for 10 weeks under the supervision of a hydrotherapy instructor level. Correlated t-test was used to analyze the data at the significance level ($P<0.05$). Between pre-test and post-test, the mean symptoms ($P=0.033$), knee pain ($P=0.024$), motor function in daily activities ($P=0.014$), motor function in recreational sports activities ($P=0.006$) and Quality of life ($P=0.005$) was significantly different after the program. The results of this study show that regular practice of jogging in water can be a new, safe, effective and low-cost way to improve pain and quality of life in people with knee osteoarthritis. These exercises may reduce the need for surgery and knee replacement in patients with knee arthritis.

Keywords aqua therapy • water exercise • pain • hydrotherapy • osteoarthritis.

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Introduction

Chronic physical pain seems to cause older people to become more dependent on others in their daily lives, which certainly affects their quality of life and psychological factors (Khanjari & Garooei, 2015). Knee osteoarthritis (OA) is a major public health issue because it causes chronic knee joint pain, stiffness, and physical disability. This condition not only diminishes an individual's quality of life but it also enhances anxiety, fear, and even depression (Scopaz, Piva, Wisniewski, & Fitzgerald, 2009). Ageing of the population and increased global prevalence of obesity are anticipated to dramatically increase the prevalence of knee OA and its associated impairments (Fransen et al., 2015). To date, the signs and symptoms of knee OA can only be alleviated with a joint replacement (Gay, Chabaud, Guilley, & Coudeyre, 2016). Although, previous research has shown that Land-based exercise (LBE) as a non-pharmacologic intervention, is highly effective in relieve pain, reduce stiffness and strengthening knee muscles (Fernandes et al., 2013; Hochberg et al., 2012; McAlindon et al., 2014), a systematic re-

view testified that pain relief and improves physical function did not last long with these exercises which is sustained for at least 2 to 6 months after the exercise intervention in patients with knee OA (Bartels et al., 2016). Despite the importance of LBE, excessive exercise dosage may worsen arthritis symptoms by increasing weight-bearing or load (Gay et al., 2016). Statistical analysis shows that people with arthritis have lower physical activity than normal people (Rosemann, Kuehlein, Laux, & Szecsenyi, 2008), and nearly 50% of OA individuals were reluctant to do extra exercise due to pain (Bartels et al., 2016). Therefore, it is necessary to use other exercises that are easier for osteoarthritis patients to do.

Aquatic therapy or Exercise in water is a good non-pharmacological treatment that can reduce pain, increase the flexibility of muscles and joints movements, and thus reduce muscle spasms and increase muscle strength (Becker, 2009). Exercise in water has many advantages, due to the properties of water in creating resistance, lightening and reducing the pressure on the affected joints, exercise is done with less damage and easier learning (Silva et al., 2008). In addition, Exercise in water provides a more comfortable and suitable environment for patients with knee OA who are reluctant to exercise (Kim, Chung, Park, & Kang, 2012). Some studies that have used various tools in the water have reported positive effects of water exercise on reducing pain and improving knee osteoarthritis function (Bartels et al., 2016; Kim et al., 2012). Although water exercise seems to be easier and more beneficial for patients with knee OA, a recent study reported that water exercise is not superior to LBE for patients with knee OA (Dong et al., 2018). Also, some previous research has not conclusively confirmed the effects of water exercise on knee osteoarthritis (Verhagen, Kessels, Boers, & Knipschild, 2000). Therefore, we seem to need more research in this area. On the other hand, although previous research has used a variety of complex exercises (with and without a device) in water exercise on knee osteoarthritis, so far, no simple and fun type of exercise has been used for this type of patients. Therefore, given that some pools may not have the necessary hydrotherapy tools, the present study aims to investigate the effect of a jogging training period in water (jogging movements in water depth) on the severity of knee pain, the rate of symptoms and problems with motor function in Daily, sports, recreational and quality of life activities for elderly men with osteoarthritis of the knee were performed.

Method

The nature of the present study was applied and semi-experimental in two stages of pre-test and post-test. The statistical population of this study consisted of all elderly men with chronic knee pain who referred to Shiraz Niayesh Health Center. Initially, the data collection form, which determined age, weight, height, physical activity, medical history or medications, injuries, trauma, or surgery in the knee joint, was completed by the examiner as a face-to-face interview. The health or illness and injury of these people were controlled. People with a history of trauma, injury or surgery, and fractures in the lower limbs, and people who did not want to work with researchers despite any of the above problems, were excluded from the study.

In the end, 15 men were selected. After explaining to the subjects about the purpose of the research, the global and native questionnaire KOOS (Knee injury and Osteoarthritis Outcome Score), designed to measure the degree of osteoarthritis and the severity of knee pain, the number of symptoms, the problems of motor function in daily activities, sports, recreation, and the quality of life in the knee joint (Salavati et al., 2008), was completed by subjects. Subjects answered the questions on a 5-point Likert scale. It should be noted that all samples signed the necessary consent to perform this research. After initial evaluation of the samples, they began a water exercise program for 10 weeks under the supervision of a hydrotherapy instructor.

Training protocol

Water jogging training program (jogging slowly and in place at a depth of 140cm with music) was performed three sessions per week for 45 minutes, increasing and progressing 40 to 60 percent of the maximum heart rate. The water training session consisted of three parts: warming up (10 minutes of simple walking), the main part of training (25 minutes of jogging) and cooling down (10 minutes of stretching movements of the knee joint). It should be noted that due to the weight loss of the subjects up to 90% in this depth of water, people could easily perform movements. Subjects had not previously undergone any water sports training. It was also forbidden to take any non-steroidal anti-inflammatory drugs or other painkillers or antidepressants during the research period. The Correlated t-test was used to statistically analyze the data at a significant level of $P \leq 0.05$. All statistical

analyzes of this study were performed using SPSS18 software.

Results

The mean and standard deviation of demographic and physical characteristics of the research subjects are presented in Table 1 (data are presented as mean±SD).

Table 1. Average personal characteristics of research subjects (n=15)

Variable	Exercise in water
Height (cm)	167.12±7.35
Weight (kg)	75.64±7.64
Age (years)	60±6.5

The results showed that the symptoms and severity of pain, motor function in daily activities, sports, recreation and quality of life were significantly improved in the final evaluation. Mean and standard deviation as well as dependent t-test results are presented in Table 2

Table 2. T-test to examine research variables before and after exercise

Variable	Pre-test M±SD	Post-test M±SD	t	p
Symptom	50.13±6.13	61.11±4.41	-2.08	0.033
Pain intensity	65.35±15.23	77.43±11.30	-2.35	0.024
Motor performance in daily activities	69.39±14.08	81.33±12.25	-2.94	0.014
Motor performance in sports activities and recreational	45.35±15.34	65.18±12.234	-3.81	0.006
Quality of life	72.25±4.45	90.11±3.32	-3.18	0.005

According to the criteria set in the questionnaire, each subject who has a higher score has a better status and a higher average is given to him. As shown in Table 2, the mean of all variables increased after the implementation of the training protocol.

Discussion

The objective of the study was to investigate the effect of a water jogging training course on the symptoms of knee osteoarthritis in elderly men. The results of the present study showed that a period of water jogging training has a significant effect on the symptoms, pain intensity, motor functions in daily activities, sport activities and quality of life in elderly men with knee osteoarthritis. These results are consistent with previous findings that have shown the positive effects of aquatic exercise on knee osteoarthritis (Bartels et al., 2016; Casilda-López et al., 2017; Dong et al., 2018; Etesami, Zamani, Zolaktaf, & Ghasemi, 2015; Khanjari & Garooei, 2015; Lim, Tchai, & Jang, 2010; Taglietti et al., 2018; Zampogna et al., 2020). Numerous reasons for the beneficial effects of water exercise have been cited in various studies. It has been reported in various research results that aquatic exercise profits by the weight-relieving properties of water to obtain pain relief, to allow easier joint movement improving physical function, to reduce muscle stiffness and to cause muscle relaxation in patients with OA (Bartels et al., 2016; Etesami et al., 2015; Wang, Belza, Elaine Thompson, Whitney, & Bennett, 2007). Doing water exercises seems to increase the strength of the muscles around the knee, such as the quadriceps and hamstrings. Stronger muscles reduce the pressure on the knee joint and reduce inflammation and pain (Casilda-López et al., 2017). Improving the quality of life may be due to the fact that the buoyancy force of water reduces the weight of the body in the water, which in turn reduces the pressure on the joints. The hydrostatic force of water also stabilizes the joints and facilitates venous return of blood (reducing swelling). In this way, the more we dive into the water, the less weight pressure will be applied to the joints and intervertebral discs, and the joints will be more stable. This reduces pain and facilitates movement in the water, and its experience for patients is associated with increased motivation to continue the program, and continued exercise improves the complications of the disease and improves the patient's condition (Etesami et al., 2015). All of these are associated with increased muscle strength and improved range of motion of the joints and reduce the devastating effects of the disease. The result of this process is the facilitation of patients' daily activities

and sports. Eventually, weight loss reduces the pressure on the joints and the feeling of pain, and the patient has the opportunity to spend hours during the day with peace of mind, mobility, physical activity and social interaction (Minor, Webel, Kay, Hewett, & Anderson, 1989). On the other hand, exercise therapy in water means going to an attractive and diverse environment that reduces depression, anxiety and psychological stress and is naturally effective in encouraging patients to exercise psychologically (Heiden, Lloyd, & Ackland, 2009). However, some previous research has not conclusively confirmed the effects of water exercise on knee osteoarthritis (Verhagen et al., 2000) and some research has not confirmed its superiority than land-based exercise (Dong et al., 2018; Hale, Waters, & Herbison, 2012). The possible reasons for this can be the lack of proper training with the patient's condition, low number of subjects, short training periods and reluctance to participate in land-based exercises.

In the present study, we used jogging exercises (slow jumps) with deep water music, which had positive results on patients with knee osteoarthritis. Jogging in the water is one of the light and aerobic exercises that patients with osteoarthritis of the knee, especially those who are overweight, can easily do these exercises. Recent research has shown the beneficial effects of water aerobic exercise on patients with knee osteoarthritis. Casilda et al. (2017) in a study of elderly women with knee osteoarthritis showed that an 8-week dance-based aquatic exercise program significantly improved function and cardiorespiratory capacity, and decreased post exercise heart rate and fatigue (Casilda-López et al., 2017). Rewald et al. (2020) in a study Showed that 12 weeks of water cycling (twice a week for 45 minutes per session) had a positive effect on reducing pain and improving function in the elderly with osteoarthritis of the knee (Rewald et al., 2020). It seems that rhythmic and light exercise in water, in addition to reducing the devastating symptoms of osteoarthritis of the knee, cause motivation, vitality and ultimately increase the quality of life of these patients. Also, exercise in water provides a more comfortable and suitable environment for patients with knee OA who are reluctant to land-based exercises. Overall, the results of the present study show that jogging exercise in water has a great effect on reducing the symptoms of osteoarthritis of the knee. Therefore, the exercise used in this study can be considered as a new, very useful and low-cost exercise method in improving pain intensity, function and quality of life in the elderly with knee osteoarthritis.

Acknowledgment

Thanks to all the people who participated in this research.

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How to cite this article:

APA: Khanjari, Y., & Garooei, R. (2020). The effect of a water jogging exercise course on older men with knee osteoarthritis. *Exercise and Quality of Life, 12*(2), 31-35. doi:10.31382/eqol.201204

MLA: Khanjari, Yaser and Razie Garooei. "The effect of a water jogging exercise course on older men with knee osteoarthritis." *Exercise and Quality of Life* 12.2 (2020): 31-35.

Chicago: Khanjari, Yaser, and Razie Garooei. "The effect of a water jogging exercise course on older men with knee osteoarthritis." *Exercise and Quality of Life* 12, no. 2 (2020): 31-35.