THE EFFECT OF PILATES EXERCISES ON ANXIETY AND QUALITY OF SLEEP IN PATIENTS WITH CHRONIC HEART FAILURE

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ABSTRACT: The purpose of this study was to evaluate the effect of Pilates exercises on the anxiety and quality of sleep in patients with chronic heart failure. The research method was empirical. The statistical population was all patients with heart failure from Gorgan, Iran in 2016. A sample of 60 patients was selected from 2 and 3 grade of cardiac failure patients from Gorgan, Iran hospitals using voluntary sampling method and they were divided into experimental and control groups randomly. The participants' anxiety and quality of sleep before and after 10 weeks Pilates training were measured in each groups using questionnaire. Kolmogorov-Smirnov tests, t-test and covariance analysis were used for data analysis. The findings indicated that 10 weeks of Pilates training can improve quality of sleep and reduce anxiety in patients with chronic heart failure. Maintaining an active lifestyle in these patients is recommended.

KEYWORDS: Pilates exercises, Anxiety, Heart failure.

INTRODUCTION

Congestive heart failure is a clinical syndrome in which, due to disruption of the structure and function of the heart, the heart is unable to fill or release the blood regarding to the needs of metabolized tissues (Loscalzo, 2006). Congestive heart failure is one of the most important chronic diseases worldwide (Azevedo, 2008). In the United States, Congestive heart failure is responsible for a million hospital admissions and five hundred thousand deaths annually. Because congestive heart failure is more common in the elderly, with an older age, the prevalence is likely to increase (Loscalzo, 2006). Congestive heart failure is a chronic medical condition that in spite of existing treatments, affects different aspects of a person's life (Johansson, 2006). Patients with congestive heart failure experience multiple physical and psychological symptoms such as shortness of breath, lack of energy and weakness, fatigue, edema, sleep disturbances, depression and chest pain (Riegel, 2008). The complex of these symptoms is limited in the daily activities of the patient, one engaged in his personal and social affairs (Rector, 2006).

In Iran, the highest mortality rate is related to cardiovascular disease which accounts for about 40% of all deaths of people in the society. According to the World Health Organization (WHO), at the end of the second half of the year, much of the funding was allocated to developing countries for non-communicable diseases, especially cardiovascular diseases, accounting for 50% of all deaths. One way of effective ways to control and progress is diet and exercise. Regular physical activity may reduce the harmful effects of aging by maintaining and increasing physical fitness (Castro, 2010) and this has been confirmed in various studies (Raul 2010,
Manaco 2010, Shim, 2010) and on the other hand, Pilates exercises in rooted in balance, flexibility, respiratory pattern and strength, Pilates exercises are likely to be able to influence the risk factors of cardiovascular disease (Shim, 2010). The Pilates method has six basic principles known as CCCPFB: 1) centering, 2) concentration, 3) control, 4) precision, 5) psychic and integrity of motion, and 6) breathing (breathing) (Caldwell et al, 2009). In recent years, this exercise has been used to achieve fitness and rehabilitation goals. Pilates exercises are known to emphasize abdominal muscles and back ducts (dorsal extensors) especially the shear muscles, as central muscle strengthening exercises.

The Pilates exercises with regard to features such as increased strength and flexibility, low fat muscle building, stomach upgrading, central strength and environmental mobility, helping to prevent injury, enhancing and improving the functional decline of movements considered important by athletes, normal people and those with rheumatoid arthritis. In 2008, Pilates was considered in the seventh rank of the proposed sporting activities (out of 10 training modalities) and remained in place in 2010 (out of 20 exercises ranked ninth) (Walter 2010).

Raul et al (2010) studied the levels of Hs-CRP and other inflammatory indices, as well as blood lipids and body composition indexes, as well as functional fitness in 55 men and women over 64 years of age. They divided the subjects into 3 groups of aerobic exercise, strength training, and control group. The results indicated that at the end of the training period, the functional readiness of both training groups (aerobic and strength) increased significantly. In addition, Hs-CRP values in the control group did not change (Raul 2010). Another research has been performed et al by Neil (2004).

In this study, the researchers surveyed the effect of Pilates exercises on the flexibility and body composition of people over the age of 18 years. At the end of the training period, changes in the non-fat mass, weight or other factors of the body composition were not observed but, the level of flexibility in the training group was increased (Neil 2004). Russell et al (2006) studied the effect of 4 weeks Pilates training on the physical composition of young girls. Weight, body mass index, waist circumference and blood pressure of the subjects were measured before and after the training period. The results of the study indicated that there was no significant change in the indices before and after the training period between the two groups (Russell 2006). Berna et al (2010) examined the effect of Pilates exercises on the degree of independence, static balance and quality of life in elderly women. The results indicated that Pilates exercises had a significant effect on the degree of independence, static balance and quality of life in elderly women (Berna et al., 2010). Shim et al. (2010) studied the effect of the 10 weeks Pilates training program on body weight, body mass index, lumbar spine, leptin levels, and Hs-CRP and cholesterol profiles in obese men. The results of the study revealed that after 10 weeks of Pilates training, the training group experienced a significant reduction in weight, body mass index, and waist circumference. In addition, LDL and LDL / HDL ratios decreased significantly in the training group. The cholesterol and HDL did not change and leptin and Hs-CRP also had a slight decrease in baseline levels in the exercise group (Shim, 2010). Since various studies have shown that Pilates exercises play a significant role in improving the health and well-being of different individuals, this exercise can positively affect the anxiety and improvement of sleep in patients with heart failure and on the other hand, it decreases drug consumption and treatment costs and improves the quality of life of these patients.

Therefore, the present study examined the effect of Pilates exercises on the anxiety and quality of sleep in patients with chronic heart failure.

MATERIALS AND METHODS

The research method was empirical. The statistical population was all patients with heart failure from Gorgan, Iran in 2016. A sample of 60 patients from 2 and 3 grade of cardiac failure patients were selected from Gorgan, Iran hospitals using voluntary sampling method and they were divided randomly into experimental and control groups. Patients were selected on the basis of inclusion criteria (age range 40 to 60 years; people with systolic dysfunction; patients undergoing medical treatment; education and ability to perform Pilates exercises; and lack of ability to perform exercises; heart patients in the classroom; 2 and 3) and exclusion criteria (severe heart valve disease; significant arrhythmia; having a history of heart attacks in the past three months; having a disability for exercise; having skeletal musculoskeletal disorders; history of mental illness and incontinence in medical treatments). Then, the consent was received from the participants for participation in the research. In this research, independent variables were 10 weeks Pilates exercise and dependent variables were quality of sleep and anxiety. After the participants were selected, first the goals and method of conducting the research were explained to the participants and then they were given specific consent sheets for them. In the research phase, all subjects were taken to the practice to get pre-test factors (quality of sleep and anxiety). After recording all of the pre-test values, the experimental group was trained for 10 weeks under the supervision of a coach approved by the Pilates Association of Iran for Pilates training. It should be noted that the Pilates training program began with the degree of readiness of the subjects and changed with regard to their progress. The
control group followed their normal activities while conducting the research. Pilates exercises were performed for 10 weeks, each week three sessions and 45 minutes each session. After the end of the intervention period, participants were evaluated for variables such as quality of sleep and anxiety was tested by post-test.

**Measuring tool**

**Pilates exercises:** Pilates exercises consist of a variety of movements (prevailing over 500 types of moves) that can be performed using a variety of tools. Because subjects were aged between 55 and 65, a set of moves was used that subjects were able to perform and their joints, especially the knee joint, were not pressed. For this purpose, a Pilates training session was conducted for 10 weeks, three sessions per week and 45 minutes for each session. All exercises were conducted under the supervision of a doctor and an instructor in grade 1 Pilates. Each training session was divided into three sections: warm-up, main body and cooling. Pilates training was used at all stages. The intensity of exercise was measured by controlling the heart rate of the subjects (using Polar's pulse rate, 0537 (Polar beat T31, N2965) CE manufactured in Finland) at the training sessions. (Razavi, 2012, Owen, 2011).

**Pittsburgh quality of sleep questionnaire:** One of the best tools for designing and designing quality of sleep measurement is Pittsburgh Sleep Quality Questionnaire (PSQI). The questionnaire was created in 1989 by Dr. Boyce and his colleagues at the Pittsburgh Psychiatric Institute. The questionnaire has nine lines in its original form, but since the 5th question contains 10 sub-items, the entire questionnaire has 19 items which are scored in a 4-point Likert scale from 0 to 3. The questionnaire has 7 subscales: Sleep quality, Sleep delay, Sleep duration, Sleep efficiency, Sleep disturbances, Sleeping pills, Daily functional disorders.

**Beck Anxiety Inventory (BAI):** Beck's Anxiety Inventory was developed by Aaron T Beck and his colleagues in 1988. The questionnaire has 21 items that list symptoms of anxiety and are more similar to the checklist. Beck Anxiety Inventory (BAI) has been developed to measure anxiety in adolescents and adults, and each of its females is one of the common symptoms of anxiety, namely, mental symptoms, physical symptoms and panic. In this research, Kolmogorov-Smirnov test, t-test and covariance analysis were used for data analysis. All statistical analyzes were performed using SPSS20 software and statistically significant (\(\alpha = 0.05\))

**RESULTS**

The results of Kolmogorov-Smirnov test indicated that the distribution of data was normal (p > 0.05). In order to homogenize the groups in the pre-test, the mean of all the indices in the test groups was assessed using independent t-test (Table 1). The results revealed that there was no significant difference between the groups (p<0.05). Regarding the lack of significant differences in the index, the groups were assumed to be homogeneous. Covariance analysis was used to compare quality of sleep with pre-test modulation. The results of covariance analysis indicated a significant difference between the two groups of Pilates exercise and control (\(P = 0.048, F_{1057}= 4.325\)). Regarding to the results, it can be concluded that Pilates exercises had a significant effect on the quality of sleep and has significantly improved it. At the next stage, the anxiety levels of the two groups were compared. The results of covariance analysis for comparison of participants after modifying them based on pretest values showed a significant difference between the two groups of Pilates exercise and control (\(P = 0.034, F_{1057}=8.24\)). Regarding to the results, it can be concluded that Pilates exercises had an effect on anxiety and has significantly reduced it (Table 1).

<table>
<thead>
<tr>
<th>Variable</th>
<th>(n=30) Test Group</th>
<th>Control Group (n=30)</th>
<th>Summary of covariance analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post test</td>
<td>Pre-test</td>
</tr>
<tr>
<td>Quality of sleep</td>
<td>2.37±0.42</td>
<td>0.79±0.54</td>
<td>2.41±0.57</td>
</tr>
<tr>
<td>Anxiety</td>
<td>18.24±7.8</td>
<td>12.62±7.47</td>
<td>18.3±7.75</td>
</tr>
</tbody>
</table>

* \(p < 0.05\)

**DISCUSSION AND CONCLUSION**
The purpose of this study was to evaluate the effect of Pilates exercises on the anxiety and quality of sleep in patients with chronic heart failure. The findings indicated that 10 weeks of Pilates training can improve quality of sleep and reduce anxiety in patients with chronic heart failure. A few studies have investigated the effect of training on heart patients, some of which have been shown to be consistent with the results of the present study on the effects of Pilates exercises. For example, Isabel et al (2012) conducted a study on 20 women and 19 men over 60 years of age with the following conditions. The results indicated a significant increase in static and dynamic balance-two in the Pilates training group (Isabel, 2012). Ramezankhani et al. (2010) evaluated 46 women with a mean age of 36 years in four different groups (aerobic training group, Pilates training group, diet group and control group).

Aerobic exercises and Pilates were performed for 16 weeks with an intensity of 60-75% of maximum heart rate. Leptin and lipid profile were measured before and after 16 weeks of training. The results showed that leptin levels decreased significantly in all three groups of aerobic training, Pilates exercise group and diet group. The fat profile did not change significantly in any of the training groups. The ratio of HDL / LDL in all three groups was significantly increased (Ramezankhani et al., 2010).

Hashemi et al. (2010) examined the effects of ground and water exercises on the performance of elderly men. For this purpose, 30 elderly men with a mean age of 63 to 70 years were divided into two groups of exercises (water exercises and exercise in water). Before and after the 8 weeks training period, the strength of the lower and upper limbs, walking ability, static and dynamic balance were measured. The subjects of the two groups performed the same training program for 8 weeks. The results of the study indicated that there was a significant difference between all measured values before and after the training period in water. While only muscular strength, walking ability and static balance were observed in the dry training group. Overall results indicated that both types of exercises improved the performance of elderly men, with the difference that these effects were observed in the exercise group in water (Hashemi et al., 2010).

Kloubec et al. (2010) conducted a research entitled “The effect of Pilates exercises on improving muscular endurance, flexibility, balance and body posture”. To this end, 50 subjects (men and women aged 25 to 65 years) were randomly assigned to practice and control groups. They studied the training group for 12 weeks, including 2 days per week and each session for 1 hour, performed Pilates exercises which included 25 different exercises based on abdominal muscle endurance and hamstring muscle flexibility, upper limb muscular endurance, posture and balance. At the end of 12 weeks, the results indicated that there was a positive and significant change in all variables, except balance and posture in the training group (Kloubec et al., 2010).

Berna et al., (2010) conducted a study on 52 women (mean age 66 ± 4 years, weight 62 ± 12.4 kg and BMI 25.8 ± 5.64 m2) with the following conditions: failure to do exercise for at least 6 months, without experience in Pilates exercises. Subjects were assigned to control (25) and Pilates (27) groups. The research period was 8 weeks of Pilates exercises and twice a week. Static balance increased significantly in Pilates training group (Berna et al., 2010).

Raul (2010) and colleagues investigated Hs-CRP and other inflammatory indices, blood lipids, and body composition indices as well as functional fitness in 55 men and women over 64 years of age. To assess the readiness of the subjects, the chair sit-to-stand test was used to measure the strength of the lower extremity and the arm curl test to determine the strength of the upper limb and also the 6 minutes’ walk test to measure aerobic endurance. They divided the subjects into 3 groups of aerobic exercise, strength training, and control group. The training groups were assigned to the activity for 16 weeks (3 sessions per week). All tests were performed immediately before the beginning of the training period, after 16 weeks and at the thirty-second week. The results of their research indicated that at the end of the training period, functional readiness of both training groups (aerobic and strength) increased significantly. In addition, Hs-CRP values in the control group did not change, while in the aerobic group after 10 weeks of aerobic training decreased 10% and in the second week 51%. In the strength training group, this reduction was 11% and 39% respectively (Raul, 2010). According to the results of this study, it is suggested that patients with chronic heart disease should consider active life style.

Conflict of interest
The authors declare no conflict of interest.

REFERENCES


Isabela., et al. (2012). The Pilates method to improve body balance in elderly. Original research manuscript. DOI, 10, 5628.


