Original Article: Exercise and its Effects on Some Physiological Factors in Women: A Case Study of Yoga and Aerobics

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ABSTRACT

This research was quasi-experimental applied attempt in which the subjects were randomly divided into three groups: Aerobics, yoga and control. Subjects in the experimental groups participated in a specific exercise program for 8 weeks, 3 sessions per week and each session for 1 hour. Exercises in the aerobic group included 10 minutes of warm-up, 40 minutes of rhythmic movements and 10 minutes of returning to the original state. Aerobic exercises were performed in the first sessions with an intensity of 55% of maximal reserve heart rate and in the last sessions with an intensity of 75% of maximal reserve heart rate. The exercises in the yoga group included 40 minutes of asana exercises, 10 minutes of Shavasana exercises and 10 minutes of pranayama exercises. The control group did not perform any regular exercise and physical activity during the study and only participated in pre-test and post-test at the beginning and end of the training period. In terms of factors affecting the research variables, such as menstrual cycle regularity, lack of specific diseases not taking drugs, smoking, etc., the subjects had similar conditions. Measurement variables in pre-test and post-test were body composition aerobic power, blood pressure, heart rate, pulmonary parameters, anaerobic power Leg muscles are flexibility and hand strength. Descriptive and inferential statistics were used to analyze the data

Introduction

Advances in technology have led human activity from the body to the mind. Humans today experience a great deal of inactivity, which is an important factor in the emergence of various diseases. This poses a risk to health and reduces the function of the motor, cardiovascular, respiratory, and other organs [1-4].

Decreased functional capacity of the human body in the modern world is associated with an increase in hypertension and obesity. These diseases are among the cases that can be treated with regular physical activity [5-9]. One of the new methods that can be effective in this field is

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yoga. Yoga exercises significantly improve general and cardiovascular vascular health indicators and also improve aspects related to health and physical fitness, without any particular adverse side effects [10-12]. Yoga exercises are also effective in improving psychological factors and reducing anxiety and stress [13-15]. According to the results of Shustopal's research, students' participation in yoga classes provides positive physical and psychological benefits by increasing changes in self-concept and self-esteem and the components of flexibility and endurance. Yoga exercises, in addition to dramatically improving torso and hamstring flexibility, increase strength and improve breathing efficiency [16-19]. In cancer patients, doing yoga exercises can control the symptoms of the disease, reduce stress and improve the quality of life of patients. Yoga exercises reduce the activity of the central and autonomic nervous system during all stressful situations and by reducing the activity of the sympathetic nervous system reduces plasma catecholamine's, even against some exercises such as pranayama, and many factors of Bio-chemicals including serum cholinesterase, serum lipid, serum cholesterol and blood sugar are reduced [20-23]. In most physical activities, the goal is to perform physical movements without the intervention of thought, but this is not the case in yoga because the ultimate goal is to perform every movement in full consciousness, or in other words with focused thought, every movement using thought and it is done regardless of any other feeling, so the body and soul are combined in yoga exercises. During yoga sessions, the exercises are performed in a position that is connected to each other in a chain of sequences of movements in which these chains are without repetition. Evidence shows that regular performance of this sequence of movements increases physical flexibility, muscle strength, increases vitality and reduces stress and cardiovascular disease [24-26]. Due to the development of urban life and its diseases and the different effects of yoga and aerobic exercise on different body systems, the need for more research in this area is felt, so this study aimed at the effect of special yoga and aerobic exercises on body composition, aerobic power, blood pressure, heart rate, pulmonary parameters, anaerobic power, flexibility and hand strength of overweight non-athlete women and compared the effects of these two sports [27-29]. By recognizing the positive physiological effects of these exercises, a positive step can be taken to prevent and treat some diseases and promote physical and mental health [30-33].

Background of the research

Madan Mohan *et al*. (2018) examined the effect of 6 weeks of yoga exercises on hand strength and sweating response to dynamic exercises. They concluded that yoga exercises significantly reduced diastolic blood pressure, but the changes in improving hand strength and reducing heart rate and systolic blood pressure were not significant [34].

Yadav *et al*. (2018) reported that with the percentage of volume of expiratory pressure per second, maximum intensity of expiratory flow and maximum voluntary ventilation significantly increased. It had a positive effect on pressure capacity and maximum tail current intensity [1]. Karakan (2019) showed that body weight, body mass index and body fat percentage, fat mass weight, resting heart rate systolic and diastolic blood pressure of the specimens decreased significantly while aerobic power and flexibility and hand strength increased significantly. Anvarada Joshi *et al*. (2018) addressed the relationship between body fat percentage and lung function tests on 132 people (64 females and 68 males) aged 18-21 years who had an inactive life. In this study, it was found that there was a negative relationship between the percentage of body fat in men with pulmonary function tests of vital capacity with pressure, maximum voluntary ventilation, maximum intensity of expiratory flow and volume of expiratory pressure in the first second. There was also a negative relationship between women's body fat percentage and pulmonary function tests for maximal voluntary ventilation and vital capacity with pressure. Alkinson and Khalili (2019) investigated the effect of aerobic exercise on pulmonary function, systolic and diastolic pressures and heart rate and maximal oxygen consumption during rest and psychological stress and recovery. The results showed that aerobic exercise reduced cardiovascular activity during recovery and psychological stress in young people. Mohammad Al-Mahgoub *et al.* (2019) examined the effect of a combined program (strength and endurance) on physical fitness, fat profile, and body composition in obese adolescents with mental retardation. The results showed a significant decrease in body weight, body mass index, waist circumference, body fat mass, total cholesterol, low density cholesterol and body triglyceride and a significant increase in hand strength and high-density cholesterol. Lean body mass also increased relatively but the changes were not significant.

Methodology

The present study was of quasi-experimental and applied type with pre-test-post-test design in experimental and control groups. In this study, the effect of yoga and aerobic exercises on body composition, aerobic power, blood pressure, heart rate, pulmonary parameters, anaerobic power, flexibility and hand strength of non-athlete women were investigated. For this purpose, first the research method, population and statistical sample, research variables and stages of research were studied and then the data collection tools, data collection methods and statistical methods were analyzed.

Procedure

After selecting the subjects, the subjects were invited to participate in the pre-test stage for 10 days at 10-12 in the morning to estimate the dependent variables. After dividing the people into groups, the people in the experimental groups were asked to participate in their exercises for eight weeks, and finally, after eight weeks, all the subjects in all three groups were asked to do so between 10-12 in the morning. They came to the same place of their exercises and the dependent variables were measured in the post-test.

Descriptive results

Table 1. Description of anthropometric characteristics of subjects in three groups

Control		Aerobics		Yoga		Group
Post-test	Pre-exam	Post-test	Pre-exam	Post-test	Pre-exam	Variable
73/03 ±5/18	±5/29 72/31	±4/82 67/25	±5/28 69/95	±3/60 74/31	±3/78 75/73	**Body weight (kg)**
31/84 ±1/61	±1/74 31/18	±2/21 29/67	±2/29 32/21	±1/53 30/50	±1/60 32/23	**Body fat percentage (%)**
23/80 ±2/48	±2/61 23/23	±2/71 20/63	±3/17 23/37	±2/07 23/02	±2/27 24/78	**Weight - fat (kg)**
49/22 ±2/89	±2/79 49/07	±2/66 46/62	±2/54 46/57	±1/90 51/29	±1/92 50/95	**Lean weight (kg)**
0/79 ±0/02	0/78 ±0/02	0/79 ±0/01	0/80 ±0/01	0/80 ±0/01	0/81 ±0/01	**Pelvic waist ratio**

Table 2. Description of the physiological characteristics of the subjects in three groups

Control		Aerobics		Yoga		Group
Post-test	Pre-exam	Post-test	Pre-exam	Post-test	Pre-exam	variable
±2/10 27/80	±1/45 27/50	32 ±2/37	±2/10 28/40	±2/12 31/10	±2/02 28/70	**Aerobic Power (Milliliters / kg. Minutes)**
±9/72 109/38	±12/91 108/46	±5/41 104/47	±7/83 115/61	±4/36 106/11	±7/79 113/63	**Systolic Blood Pressure (Mm Hg)**
±7/99 77/27	±9/61 75/26	71 ±1/60	±6/95 76/30	±5/35 72/52	±8/07 78/36	**Diastolic Blood Pressure (mm Hg)**
±3/99 78/37	±3/40 78/66	±2/78 75/34	±3/02 79/38	±3/24 75/46	±5/87 80/60	**Heart Rate-rest (Beat. Minutes)**
±0/48 2/62	±0/47 2/62	±0/28 2/89	±0/31 2/70	±0/23 3/24	±0/42 2/92	**Mandatory vital capacity (liters)**

±0/45 2/61	±0/45 2/57	±0/17 2/80	±0/26 2/63	±0/23 3/06	±0/31 2/76	**Pressurized exhalation volume per second (liter)**
±26/19 83/40	±21/33 82/80	±13/24 91/67	±16/58 77/09	±9/42 100/67	±23/66 77/94	**Maximum voluntary ventilation (Liters. Minutes)**

Table 3. Describing the physical fitness characteristics of the subjects in three groups

Control		**Aerobics**		**Yoga**		**Group**
Post-test	Pre-exam	Post-test	Pre-exam	Post-test	Pre-exam	**variable**
±6/83 35/75	±18/99 42/49	±6/37 40/45	±9/72 35/13	±5/12 43/39	±10/08 34/86	**Aeronautical power (kg. M/s)**
±8/38 32/36	±10/61 32/27	±5/89 39/23	±4/51 38/19	±3/86 40/41	±6/19 30/93	**Sit Weber (cm)**
±5/76 35/88	±5/85 37/27	±8/83 36/30	±8/69 33/83	±4/08 39/99	±7/10 34/58	**Stiffness (cm)**
±71/15 233/20	±93/36 272	±56/29 279/70	±73/46 268/90	±48/98 277/40	±80/45 256/90	**Hand power (Newton)**

Table 4. Comparison of changes in body fat percentage between the three groups of yoga, aerobics and control

Meaning	**F Value**	**Average of Squares**	**Degrees of Freedom**	**Mean Group + Standard Deviation**	**Group**
0/000	11/63	25/99	2	30/50 ± 1/53	**Yoga**
				29/67 ± 2/21	**Aerobics**
				31/84 ± 1/61	**Control**

Based on the results, there was no significant difference between the mean changes of weight and non-fat in the three groups of yoga, aerobics and control after the training period (α = 0.05).

Table 6. Results of Scheffe post hoc test related to aerobic power in experimental and control groups

Meaning	**Error of Deviation**	**Mean Differences**	**Group**	**Group**	**Variable**
0/245	0/25	-1/169	Aerobics	Yoga	**Aerobic power**
0/008*	0/01	2/225	Control		
0/245	0/25	1/169	Yoga	Aerobics	
0/001*	0/01	3/393	Control		

According to the results of table 6, from the analysis of Scheffe post hoc test, it can be concluded that the average aerobic power in the yoga and aerobics groups has increased significantly compared with the control group. But the two experimental groups are not significantly different from each other (α = 0.05).

Table 7. Comparison of vital and forced capacity changes between the three groups of yoga, aerobics and control

Meaning	**F Value**	**Average of Squares**	**Degrees of Freedom**	**Mean Group + Standard Deviation**	**Group**
0/004	6/89	0/44	2	3/24 ± 0/23	**Yoga**
				2/89 ± 0/28	**Aerobics**
				2/62 ± 0/48	**Control**

Based on the results, there is a significant difference between the mean changes in vital and forced capacity in the three groups of yoga, aerobics and control after the training period (α = 0.05).

Table 8. Results of Scheffe post hoc test related to anaerobic power in experimental and control groups

Meaning	Error of Deviation	Mean Differences	Group	Group	Variable
0/851	2/71	2/965	Aerobics	Yoga	Average anaerobic power
0/015*	2/78	8/526	Control		
0/851	2/71	-2/965	Yoga	Aerobics	
0/168	2/78	5/561	Control		

Also, according to the results of Table 8, from the analysis of Scheffe post hoc test, it can be concluded that the mean anaerobic power of leg muscles in the yoga group has significantly increased compared with the control group. But the two experimental groups are not significantly different from each other (α = 0.05).

Table 9. Results of Scheffe post hoc test related to hand strength in experimental and control groups

Meaning	Error of Deviation	Mean Differences	Group	Group	Variable
1/00	15/05	4/881	Aerobics	Yoga	Hand power
0/005*	15/07	53/236	Control		
1/00	15/05	-4/881	Yoga	Aerobics	
0/010*	15/02	48/355	Control		

Also, according to the results of Table 9, from the analysis of Scheffe post hoc test, it can be concluded that the average hand strength in the yoga and aerobics groups has significantly increased compared with the control group. But the two experimental groups are not significantly different from each other (α = 0.05).

Discussion

A variety of asana and pranayama situations can dramatically increase metabolism. A 19% increase in oxygen consumption has been observed during a variety of pranayama training programs. Unilateral nasal breathing (right) also results in a 28% increase in oxygen consumption during Surya anolmaviloma exercise. Doing other special asanas can also increase your metabolism for a short time. Oxygen consumption during yoga exercises results from the activity of specific muscles during asana posture exercises or from an intentional deep increase in tail and exhale pranayama exercises. As a result, yoga exercises are associated with energy consumption that can affect body composition. Yoga balances the sympathetic and parasympathetic forces, and this process is mediated by two methods of mind control and proper breathing. Doing yoga exercises reduces the amount of acetylcholine, cholesterol, catecholamine levels, urinary testosterone levels. With long-term breathing exercises, serum cholinesterase, cholesterol and lipid levels, plasma catecholamine and blood sugar are reduced. Therefore, physiological changes in the body can be effective in weight loss by doing physical and respiratory yoga exercises.

The results of the present study in the aerobic group are in line with those of the following studies: Smith *et al.* (2001) on weight loss, body mass index, Anaclodia *et al*. (2004) on the reduction of body mass index, fat percentage and body fat mass, Mayorana (2003) and Kelly *et al*. (2006) on reduction of fat percentage and waist to pelvic ratio, Sami Mohammad Al-Mahgoob (2009) on weight loss, body mass index and fat mass and no change in lean weight and Karakan (2010) on Weight loss, body mass index, fat percentage and body fat mass due to aerobic exercise are consistent. The results of Stoke's (2003) study showed that growth hormone, which is a strong lipolytic hormone, increased significantly during endurance training. This hormone is one of the hormones that activates the enzyme lipase to break down the triglycerides of fat cells and muscle fibers and provides active muscle as a source of energy. Thus, the concentration of free fatty acids in plasma increases increases as a result of cellular uptake of this energy source and its oxidation. As a result, due to aerobic exercise, fat oxidation increases during exercise, leading to the effect of aerobic exercise on body composition. Major physiological adaptations to aerobic exercise improve the distribution of oxygen (glucose and free fatty acids) to active muscles and increase muscle efficiency in absorbing available oxygen. Compared with the inactive state, an increase in mitochondrial density, the capacity of oxidative enzymes in muscle fibers was observed to be twice as much as after aerobic exercise. In addition to increasing the activity of electron transfer cycle enzymes, the activity of lipid oxidizing enzymes, including those involved in beta-oxidation of fatty acids, also increased. In addition, the company also increased energy consumption in its aerobic exercises. The more muscle fibers are used, the more power is generated. It is possible that as a result of yoga exercises, the recall of the number of movement units in one contraction increases and this leads to an increase in anaerobic power. Regarding the effect of aerobic exercise on anaerobic power, no significant change was observed in the anaerobic power of the aerobic group compared to the control group. These results are consistent with those Aslan and Livanligo (2002). The results of the present study showed that aerobic power in the two groups of yoga and aerobic exercise significantly increased. Also, no significant difference was observed between the two groups of yoga and aerobics. The results of this study do not agree with those of Blumenthal *et al*. (1989), Balaso Bramanian *et al*. (1991), and Raju *et al*. (1994), on the lack of effect of yoga exercises on aerobic power. The subjects in the study by Blumenthal *et al*. (1989) were healthy elderly people in the age range of 60-83 years and in the study of Raju *et al*. (1994) they were elite athletes. It seems that the increase in aerobic power may be due to the increase in muscle endurance that results from yoga exercises. Also, according to Teles *et al*. (1993, the available oxygen to the muscles after breathing exercises increases that increases the aerobic capacity of the muscles. As far as increasing aerobic power due to aerobic exercise is concerned, the results of the present study are in line with those of Blumenthal *et al*. (1989), Gary Nobargard (1997), Barra Bara Smith (2001), Aslan and Livanelligo (2002) [106], Mayorana (2002), Kostik and Zagrek (2005), Sasa Pantlik *et al*. (2006) [109], Gorge Kelly *et al*. (2006) and Mark Stuttonberg (2008). According to the available information, the improvement of cardiovascular preparations is done with exercises done continuously or intermittently for 3-5 days with an intensity of 40-85% of the maximum oxygen consumption for 20-60 minutes for 3-5 days. The increase in aerobic capacity due to aerobic exercise is mainly related to the increase in cardiac output and arterial-venous oxygen difference. Increased plasma volume results in increased venous return and ventricular preload, which in turn causes the ventricular end-diastolic volume to increase, resulting in an increase in stroke volume. With this increase, the cardiorespiratory system's ability to transport oxygen increases, and a larger volume of oxygen is drawn to the active skeletal muscles during peak activity, and maximal oxygen consumption increases. On the other hand, aerobic exercise increases the capillary density around the muscle fibers by increasing the maximum blood flow capacity of the muscle and better distribution of blood flow within the muscle, resulting in the length of time the blood is exposed to active muscle fibers. Increases as a result of oxygen uptake and arterial blood difference between arteries and veins increases. In this regard, no research in the literature agrees with the results of the present study. A study of the effects of yoga and aerobic exercise on systolic blood pressure showed that there was no difference between the two exercise programs after 10 weeks of exercise. Yoga exercises also significantly improve systolic blood pressure in people with type 2 diabetes, hypertension and cardiovascular disease.

The results of the present study showed that diastolic blood pressure showed a significant decrease in yoga and aerobic groups and also no significant difference was observed between the two groups. The results of this study are consistent with those of Maladi *et al*. (2000), Madan Mohan *et al*. (2004) and Madan Mohan *et al*. (2008) on the reduction of diastolic blood pressure following yoga exercises, while Delaney's research did not show a significant change in diastolic blood pressure due to yoga exercises. The reason for the inconsistency of this study with Delaney Wells (2007) is the difference in the exercise program used. In this study, yoga training programs were performed for a period of 16 weeks for a period of 105 minutes once a week. The decrease in diastolic blood pressure due to yoga is attributed to a decrease in sympathetic nervous system activity. In other studies, the reason for the decrease in heart rate and blood pressure due to yoga exercises has been considered as changes in the autonomic nervous system (superiority of the parasympathetic system and relative reduction of sympathetic tone).

Yoga exercises stimulate blood flow and reduce high blood pressure by establishing regular communication with conscious physical exercise. In addition, because pranayama exercises reduce sympathetic tone and increase parasympathetic activity, they can lower blood pressure. Evidence suggests that by reducing the body weight of participants in aerobic exercise, autonomic neural activity may be modulated, reducing vasomotor effects and leading to lower blood pressure. Brett *et al*. (2000) also attributed the change in blood pressure due to intense aerobic exercise to a decrease in serum concentrations of total cholesterol and insulin resistance. On the other hand, aerobic exercise reduces the resistance of peripheral arteries, which in turn leads to a decrease in blood pressure. The reason for the decrease in heart rate due to yoga exercises can be attributed to the following two factors:

a) During a study, the effects of yoga exercises on healthy people were studied, and the results showed that yoga exercises increase the rate of cardiac vaginal tone. This in itself can be achieved by breathing yoga exercises or by doing yoga relaxation exercises; and

b) also, the hemodynamic effects of yoga exercises increase the volume of strokes. The cause of increased stroke volume due to yoga exercises is related to the mechanism of arterial reflex. As the stroke volume increases through the sinus and aortic pressure receptors, the heart rate decreases at rest.

This result is not consistent with research conducted by Delaney Walsh *et al*. (2007) and Madan and Mohan *et al*. (2008) on the ineffectiveness of yoga exercises on resting heart rate. This is due to differences in the type of exercise program used, as well as the duration of exercise and the initial level of physical fitness in people participating in research and the geographical location of exercise. Alkinson and Khalili (2009) also showed a decrease in heart rate as a result of aerobic exercise. They cited two reasons for the decrease in heart rate due to aerobic exercise: Increased vaginal tone and decreased sympathetic tone. Each of these factors can lead to a decrease in resting heart rate and recovery time. Lots of research evidence has shown an increase in stroke volume due to endurance training. The reason for this increase is related . to the increase in plasma volume, which can occur in the first weeks of aerobic exercise. An increase in plasma volume leads to an increase in venous return, and as a result of this increase in diastolic end volume, followed by an increase in stroke volume. Increased stroke volume, through sinusoidal and aortic pressure receptors, leads to a decrease in heart rate during rest and sub-maximal exercise. Thus, at rest, although the sympathetic effects on the heart are small (sympathetic attenuation), within the Frank-Starling heart law range, the contractility of the heart is maintained, despite sympathetic attenuation. The volume of the heartbeat remains high, but the heart rate is kept low.

Respiratory function depends on many factors including the nervous system, the strength of the respiratory muscles, and the size of the lungs. Madan Mohan *et al*. (2003) have shown that short-term yoga exercises can increase the strength of respiratory muscles and lung volumes in children. Daniel Mach (2008) has shown that short periods of yoga exercise can improve lung function. Villin *et al*. (2005) also showed that the sense of respiration increases with yoga exercises. On the other hand, continuing to perform various asanas exercises will continuously improve the muscles in the chest, leading to a larger muscle structure and, as a result, increases forced vital capacity. Yoga stretching and balance exercises can also increase the strength and flexibility of the muscles involved in breathing (right abdomen, between internal and external ribs, back, chest, diaphragm). Yoga asanas also cause a) rest, stretching and balance of muscles; b) increasing joint movements; c) improving body position; d) working in pressure areas, e) improve breathing 6- relax the nervous system; and f) improving cardiovascular harmonization. Joshi *et al*. (1992) reported that pranayama exercises improve ventilation performance by increasing the volume of pressure exhalation, the volume of pressure exhalation in the first second, and the intensity of the expiratory flow. Strong exhalations are performed during some pranayama exercises, leading to strengthening the abdominal and diaphragm muscles. Also, slow, deep, and complete inhalations and exhalations during some pranayama exercises strengthen the respiratory muscles. The results of the present study showed that pulmonary parameters (forced vital capacity, volume of forced exhalation in the first second and maximum voluntary ventilation) did not show a significant change in the aerobic exercise group compared with the control group. These findings are consistent with those of Dagoberto *et al*. (2006) and Barbara Smith *et al*. (2001) [130], while it does not agree with the findings of Alkinson and Khalili (2009). The study sample consisted of children with mental disabilities whose mean age was 12 years. Exercises in this study were performed 5 days a week for 8 weeks. One of the reasons for the inconsistency of the present study with the mentioned research is the difference in age and social status and the length and duration of training. It seems that one of the factors that leads to poor pulmonary function is a decrease in abdominal muscle function. As a result, one of the mechanisms of improvement in pulmonary function can be the improvement of abdominal muscle strength. With age, the muscles of the body become sluggish and stiff, and to some extent lose their ability to react and respond flexibly. On the other hand, the slightest movement that involves concentration and breathing stimulates the spinal muscles that hold the body in one direction. As a result, through regular exercise and proper upper body formation, the hip joints become completely soft and flexible. Excess compounds also accumulate in the body due to the consumption of chemicals and excessive consumption of tea and emotional pressures. Because the body is not able to excrete these substances in natural processes, to maintain the health of sensitive organs, these substances accumulate in the joints and cause inflammation and immobility. Yoga exercises facilitate and accelerate the excretion of these toxic compounds due to the improvement of blood flow, reduce the effect of pain and relieve the pressure, and reduce their mobility and strength increases. The increase in range of motion is due to easy yoga exercises. These exercises are static stretching, which is one of the common methods to increase flexibility. In addition, in stretching movements, the temperature of the muscle increases, as a result of yoga exercises, the body improves flexibility. Long-term stretching exercises increase the range of motion of joints and muscles in two ways: by increasing the length of muscle tissue and by increasing the length of connective tissue. The increase in the length of connective tissue is due to the high tendency to variability in their length and the increase in muscle length is done by increasing the sarcomeres to the end of muscle fibers. In this regard, no result was found against the findings of the present study. The results of the present study showed that there was no significant change in the degree of flexibility (rise and fall and brush) of the aerobic group compared to the control group. The results of this study are not consistent with those of Karakan's (2010) study on increasing flexibility as a result of aerobic exercise. This is probably due to differences in the age of the subjects and the length of the training period and the intensity of training. In this study, the effect of a 24-week period of aerobic exercise on 65 postmenopausal women with a mean age of 50.13±3.38 was investigated. Exercises in this study were performed with an intensity of 75-85% of the reserve heart rate. Therefore, it seems that if aerobic exercise is done for longer periods and with higher intensity, it can improve people's flexibility. Many yoga poses, such as Bacasan, Bojangasan, and Shalabhasan, require isometric contraction of the muscles of the hands, shoulders, and chest. As a result, the improvement in the strength of these muscles can lead to an increase in the strength of the hand muscles. Also, the increase in muscle strength due to yoga exercises can be due to the maintenance of static contractions in the yoga asanas. Raj *et al*. (1997) reported that pranayama exercises lead to a significant increase in muscle strength in both hands. They have attributed the increase in hand strength to cognitive and emotional factors. Delaney Walz (2007) and Madan Mohan *et al*. (2008) showed that no significant change in hand strength was observed after yoga exercises. In these studies, the reason for the ineffectiveness of yoga exercises on hand strength was mentioned as the short duration of yoga exercises (4 weeks vs. 8 weeks of the present study). Delaney's (2007) study was also performed on physically active individuals, but a recent study was performed on inactive individuals. Due to the inactivity of the present research samples, it is inferred that yoga exercises in beginners further increase hand strength.

To account for the increase in strength of both left and right hands due to aerobic exercise in people with rheumatoid arthritis, Nobargard *et al*. (1997) stated that an increase in energy reserves and a decrease in fatigue levels can lead to such performance.

Conclusion

Regular physical activity is effective in preventing many physical disorders such as cardiovascular disease, high blood pressure, diabetes, osteoporosis and improving and reducing depression and increasing a good mental image of the body and mental health. The findings of the present study on the effect of yoga and aerobic exercises on some physiological factors and physical fitness are as follows:

a) Body weight decreased by 1.87% in yoga group and 3.86% in aerobic group. There was no significant difference between yoga and aerobic training groups;

b) the percentage of body fat in the yoga group decreased by 5.37% and in the aerobic group by 7.89%. There was no significant difference between the two groups of yoga and aerobic training;

c) fat weight decreased in the yoga group by 7.10% and in the aerobic group by 11.27%. There was no significant difference between the two groups of yoga and aerobic training;

d) lean weight increased by 0.66% in yoga group and 0.11% in aerobic group, but no significant difference was observed between the two groups of yoga and aerobic exercise;

e) the waist to pelvis ratio decreased by 1.23% in the yoga group and 1.25% in the aerobic group. There was no significant difference between the two groups of yoga and aerobics;

f) aerobic power increased by 8.36% in yoga group and 12.68% in aerobic group, but no significant difference was observed between the two groups of yoga and aerobic exercise;

g) systolic blood pressure decreased by 6.61% in yoga group and 9.91% in aerobic group. There was no significant difference between yoga and aerobic exercise groups;

h) diastolic blood pressure decreased by 7.45% in yoga group and 6.95% in aerobic group. There was no significant difference between yoga and aerobic exercise groups;

i) heart rate decreased in the yoga group by 6.38% and in the aerobic group by 5.09%. There was no significant difference between the two groups of yoga and aerobics;

j) compulsory vital capacity increased in the yoga group by 10.96% and in the aerobic group by 7.03%. There was no significant difference between the two groups of yoga and aerobic exercise;

k) the volume of pressure exhalation per second increased by 10.87% in the yoga group and by 6.46% in the aerobic group. There was no significant difference between the two groups of yoga and aerobics;

l) maximum pulmonary ventilation increased by 29.16% in the yoga group and 18.91% in the aerobic group. There was no significant difference between the two groups of yoga and aerobics;

m) anaerobic power increased by 24.47% in yoga group and 15.14% in aerobic group. There was no significant difference between yoga and aerobic exercise groups;

n) flexibility (sit and brush) increased by 30.6% in the yoga group and 2.72% in the aerobic group. There was no significant difference between the two groups of yoga and aerobics;

o) flexibility increased in the yoga group by 15.64% and in the aerobic group by 7.3%. There was no significant difference between the two groups of yoga and aerobics; and

p) the strength of the hand increased by 7.98% in the yoga group and 4% in the aerobic group. There was no significant difference between the two groups of yoga and aerobics.

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