Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

European Journal of Experimental Biology, 2013, 3(1):228-231

ISSN: 2248 –9215
CODEN (USA): EJEBAU

The effects of swimming combined training on body composition in academic level athletes women

Farnaz Zahedmanesh[1], Ardeshir Zafari[2] and Foruzan Zahedmanesh[1]

[1]*Faculty of Physical Education and Sport Sciences, Islamshahr Branch, Islamic Azad University, Tehran, Iran*
[2]*Department of Physical Education and Sport Sciences, Zanjan Branch, Islamic Azad University, Zanjan, Iran*

ABSTRACT

The World Health Organization, at the beginning of the third millennium, was warned the obesity epidemic in the world. Exercise training and physical activity decreased body mass, body fat and obesity rate in females, but the influences of different types of swimming and combination of them on body composition factors has rarely been investigated. The aim of this study was to investigate the effects of 8 weeks swimming combined training included aerobic and anaerobic swimming on body composition factors in academic level athlete's women. 20 subjects randomly selected from 30 volunteered healthy academic level athlete's women (20-25 years) based on American College of Sports Medicine and Physical Activity Rating Questionnaire in Islamshahr branch of Islamic Azad University (Tehran, Iran). This subjects randomly divided in Training (n= 10) and Control groups (n= 10). Subjects in training group were swimming for 8 weeks, 2 sessions in week, and 60 minute in sessions with 55-85 percent of Heart Rates Reserve (HRR). Combination training program include aerobic and anaerobic swimming was performed based on progressive overload training principal. Body composition factors have been measured before and after 8 weeks training program. Body fat percent was calculated by Jackson and Polack skin folds equation (three point methods included; chest, abdomen and thigh skin folds) by used Harpenden Caliper. Body mass index was calculated by Quetelet index. Data compared with two tailed paired and independent sample t test ($p \leq 0.05$). The results showed that levels of body mass, body mass index and body fat percent significantly decreased after 8 weeks training ($p \leq 0.05$). These results indicated that moderate-to-High intensity combined training included aerobic and anaerobic swimming have positive effect on some body composition factors in academic level athlete's women.

Key Words: Swimming, Body Composition, Women, Exercise Training, Obesity.

INTRODUCTION

The World Health Organization, at the beginning of the third millennium, was warned the obesity epidemic in the world [18]. Prevention, control and treatment of obesity are designed based on two principles; reduce energy intake and increase energy expenditure [7, 10]. Increment of exercise training and physical activity levels is the best way for increase energy expenditure [1, 10, and 13]. Sedentary lifestyles and increment of obesity has been considered as important factors in the start of the third millennium. Increment of age & gender related factors such as lipids and lipoproteins disorder, abdominal obesity and metabolic syndrome accompanied by decrement of physical activity levels in females [7, 10, 13, and 18].

On the other hand, increment of physical activity levels and exercise training modified body composition and decrement of body fat and body mass. Creating an active lifestyle with physical activity is the best prevention of obesity and its risk factors [7, 10]. The results of previous study indicated that long-term physical activity and exercise training is the best way in primary and secondary prevention of chronic diseases, especially obesity and metabolic disorders in men and women with different age ranges. The results of previous study indicated that long-term physical activity and exercise training have beneficial effects on body fat and body mass [2-6, 8, 9, 11, 12, and 15]. Conroy (2007) showed in a 10 years period study about role of sports and physical activity in prevention of cardiovascular diseases risk factor that increased physical activity levels would lead to decrease these risk factors. Active women also have a healthier life, lower body mass and better risk factors pattern compared to inactive women. Body mass index are lower in active women compared to inactive women [5]. Some researchers studied aerobic, anaerobic and combined training on body composition, physical fitness and health related metabolic factors levels in women. Results showed that decrement of weight in aerobic groups was significant, but weight changes in combined and anaerobic training groups weren't significant. There was a significant decrease of body fat percent and significant increase of VO_2max in combined and anaerobic training groups. They concluded that aerobic training, anaerobic training and combined training had positive effects on fitness, body composition and metabolic risk factors related to obesity in females [2, 3, 6, 8, and 9]. Mora (2006) showed that aerobic training would lead to significant changes in cardiovascular fitness, body composition and weight. Aerobic training would lead to significant decreased in body weight, waist circumference and sub skin folds fat [12].

Water exercise, such as swimming, is one of women' most preferred methods of exercise. Swimming is the exercise of choice for many women who decide to start a fitness program. This is a form of exercise that is done in the water involves using rhythmic movement performed at different levels of intensity or difficulty. Swimming increases cardiovascular conditioning and, at the same time, help to tone muscles in the body. Today women make up the majority of swimming participants. It is the women population's increased interest in this form of exercise that has caused the greatest growth in water exercise fitness programs. Swimming exercise is a good exercise choice for women. Many women refrain from physical activity because they are afraid of injury. Many women suffer physical impairments that limit their ability to participate in land exercise. There is less chance for injuries to occur when exercising in the water. A swimming workout causes less compression on the joints than is experienced during land exercise. The buoyancy of water reduces the muscular-skeletal stress put on the body. Buoyancy also helps to protect women from dynamic and fast movement. It puts less strain on the body and helps to prevent many of the injuries that women receive during land aerobics that produce jarring and bumping movement. Buoyancy also allows for strengthening and toning in muscles with less fatigue and soreness. These results induced by the use of all the major muscles in the body. In the water, women can perform many exercises that would be impossible for them on the land. Swimming is becoming more and more popular with women and, in the future, many women decide to join this type of fitness program [7, 11, and 13].

Several studies have been conducted to determine whether water exercise produces benefits for the women participants. Takeshima et al. (2002) conducted a study on women and reported that swimming helped to improve the cardiovascular fitness, muscle strength, power, agility, flexibility, pulmonary functions, and blood lipids of the women [14]. Wininger (2002) and Wantanabe, Takeshima, Okada, and Inomata (2000) conducted studies on women in swimming programs and concluded that swimming helped to reduce the rate of obesity among the participants [16,17]. Swimming trainings would cause decrease in body composition factors such as body mass, body mass index, body fat percent and waist circumference [2, 8]. In conclusion, water exercises, such as swimming, are many positive outcomes that can be attained from this form of exercise, including physiological, psychological, and other benefits. Swimming is a form of exercise that helps to increase strength, endurance, flexibility, and fitness levels.

Therefore, according to the previous studies results, it seems that combined training included aerobic and anaerobic exercise training has better effects on cardiovascular fitness and aerobic fitness. On the other hand, exercise training and physical activity modified body composition factors, but the influences of different types of exercises and combination of them on body composition factors has rarely been investigated. Swimming training is also more interesting and easier for women compared to other sports and exercise training methods. There was no study executed considering combination of aerobic and anaerobic swimming training effects on body composition factors. Therefore, the purpose of this study was determined and compared of effects of 8 weeks swimming combined training included aerobic and anaerobic swimming training on body composition factors in academic level athlete's women. Whether, the 8 weeks swimming combined training included aerobic and anaerobic swimming training have any effects on body mass, body mass index and body fat percent in academic level athlete's women?

MATERIALS AND METHODS

The purpose of this semi quasi study was to determined and compared of the effects of swimming combined training included aerobic and anaerobic swimming training on body composition factors (body mass, body mass index and body fat percent) in academic level athlete's women. 20 subjects randomly selected from 30 volunteered healthy academic level athlete's women (20-25 years) based on American College of Sports Medicine and Physical Activity Rating Questionnaire in Islamshahr branch of Islamic Azad University (Tehran, Iran). This subjects randomly divided in two groups such as, Training (n= 10) and Control groups (n= 10). All the subjects were informed of their rights to anonymity and confidentiality. The Institutional Review Board for Human Subjects at the university approved this study. In order to participate in the study 20 the subjects signed an informed consent form. At the onset of the study, the subjects were informed about the purpose of the study. They were told that the results would help researchers to develop better strategies for improving methods of obesity treatment. The research study was conducted at a local indoor swimming pool in the university.

The independent variable was 8 weeks swimming combined training included aerobic and anaerobic swimming training based on progressive overload training principal. Training program was based on Association of Sport Sciences guidelines and it was adjusted by subject's physical condition, gender and age. Training program was performed for 8 weeks, 2 days/week and 60 min/ days. Total time of training program divided as warming up (15 min), swimming program (40 min) and cooling down (5 min) at the morning of days (8 – 9.30 am). Training program was started at 55% of Heart Rates Reserve (HRR) at the beginning week and 85% of HRR at last week. Subjects eating habits and other daily physical activity in groups didn't change. Dependent variables included body composition factors such as body mass, body mass index and body fat percent measured after 12 hours of fasting, 7-8 am, in clinical exercise physiology laboratory at beginning and the end of training program in groups. Heart rate was measured by used a polar heart rate monitor. Body fat percent was calculated by Jackson and Polack skin folds equation (three point methods included; chest, abdomen and thigh skin folds) by used Harpenden Caliper [13]. Body mass index was calculated by Quetelet index [13]. In order to determine whether there were any statistically significant differences in the body composition factors of subjects during training program, a two-tailed independent samples t test was used for comparing of body composition factors means between the training and control groups. The body composition factors means in pre test and post test of each group compared with a two-tailed paired samples t test. The normality of the distribution and homogeneity of variances tested with Kolmogorov–Smirnov and Levene's tests respectively. Significant levels in all tests were $P \leq 0.05$.

RESULTS AND DISCUSSION

Table 1 showed the Means and Standard Deviation (M±SD) of the variables and the results of statistical tests in pre test and post test of groups (Training vs. Control). Mean differences of body mass (T: 61.5 ± 5.4 vs. C: 68.1 ± 5.2 kg) between groups in post test were significant ($p \leq 0.001$**). Decrement of body mass in pre test (68.4 ± 5.6 kg) and post test (61.5 ± 5.4 kg) of training group were significant ($p \leq 0.001$**). Mean differences of body mass in pre test (69.5 ± 5.8 kg) and post test (68.1 ± 5.2 kg) of control group were not significant. Mean differences of body mass index (T: 23.4 ± 2.2 vs. C: 25.3 ± 2.5 $kg.m^{-2}$) between groups in post test were significant ($p \leq 0.001$**). Decrement of body mass index in pre test (25.2 ± 2.1 $kg.m^{-2}$) and post test (23.4 ± 2.2 $kg.m^{-2}$) of training group were significant ($p \leq 0.001$**). Mean differences of body mass index in pre test (25.6 ± 2.6 $kg.m^{-2}$) and post test (25.3 ± 2.5 $kg.m^{-2}$) of control group were not significant. Mean differences of body fat percent (T: 20.2 ± 2.3 vs. C: 22.1 ± 3.9 %) between groups in post test were significant ($p = 0.006$**). Decrement of body fat percent in pre test (22.1 ± 3.5 %) and post test (20.2 ± 2.3 %) of training group were significant ($p = 0.002$**). Mean differences of body fat percent in pre test (22.4 ± 3.2 %) and post test (22.1 ± 3.9 %) of control group were not significant.

Table 1. Means ± Standard Deviation (M±SD) of the variables before and after training in Control & Training groups (P≤0.05).

Variables	Group	Before Training	After Training	Sig
Body Mass (kg)	T	68.4±5.6	61.5±5.4	≤ 0. 001**
	C	69.5±5.8	68.1±5.2	
Sig			≤ 0. 001**	
Body Mass Index ($kg.m^{-2}$)	T	25.2±2.1	23.4±2.2	≤ 0. 001**
	C	25.6±2.6	25.3±2.5	
Sig			≤ 0. 001**	
Body Fat (%)	T	22.1±3.5	20.2±2.3	0. 002**
	C	22.4±3.2	22.1±3.9	
Sig			0. 006**	

The results of this study indicated that 8 weeks of swimming combined training included aerobic and anaerobic swimming training based on progressive overload training principal was significantly decreased body mass, body

mass index and body fat percent. These results indicated that 8 weeks of aerobic and anaerobic swimming training modified body composition factors and corrected the pattern of obesity in academic level athlete's women. The results of previous studies indicated that increment of physical activity levels and VO_2max-indused exercise training modified body mass, body mass index and body fat percent and decrement of obesity rate in females. Decrement of body mass, body mass index and body fat percent in academic level athlete's women in this study resulted from aerobic and anaerobic swimming training or combination of them. Primary levels of body mass, body mass index and body fat percent and intensity, duration and types of physical activity and exercise training are important factors that affect body composition factors [19]. Endurance training such as aerobic swimming increase maximum oxygen consumption, number, size and density of mitochondria and oxidative enzymes. On the other hand, anaerobic training such as anaerobic swimming increased myofibrils proteins and muscle mass. Therefore, aerobic swimming increase the rate of fat catabolism and anaerobic swimming increase the amounts and duration of fat catabolism (increased the muscles fiber and fatigue threshold). These structural and functional changes in body systems resulted to increased aerobic energy expenditure and fat born. Therefore, the amounts of body fat, body size and body mass were decreased. These results indicated that long-term physical activity, exercise training, and combined swimming training have beneficial effects on body mass, body mass index and body fat percent.

CONCLUSION

Therefore, the results of this study indicated that 8 weeks of swimming combined training included aerobic and anaerobic swimming training based on progressive overload training principal were significantly decreased some factors of body composition in academic level athlete's women. Swimming combined training included aerobic and anaerobic swimming training in this study has beneficial effects on body mass, body mass index and body fat percent in academic level athlete's women.

REFERENCES

[1] ACSM. **2000**. *Medicine and Science in Sport and Exercise*, 32:1345-1360.
[2] Akdur, H., Sozen, B., Yigty, Z., Balota, N., Guven, O. **2007**. *Am J Physiol*, 70: 64-69.
[3] Boardley, D., Fahlman M., Morgan L., Mc Nevin, N. **2007**. *Am J Geriatric Cardio*, 16: 3-35.
[4] Buyukazi, C. **2005**. *J Sports Med Physiol*. Mar. 45 (1): 112-120.
[5] Conroy, R., Fitzgerald, A. **2003**. *Euro Heart J*, 24: 987-1003.
[6] Despres, J., Pouliot, C., Moorjani, S. **1997**. *Am J Physiol*, 61: 159-167.
[7] Dishman, K., Washburn, A. *Physical Activity Epidemiology*. **2004**. Champaign: HK.
[8] Hallage, T., Krause, P., Haile, L. **2010**. *J Strength Condi Res*: 24(8): 2261–2266.
[9] Heitkamp, H.C., Wegler, S. **2008**. *J Spo Med and Physi* Fit; Mar 2008; 48, 1; Proquest Health and Medical complete.
[10] Le Mura, L. M., Von Duvillard, S. P. **2007**. *Euro J Apply Physiol*. 99: 291-299.
[11] Le Mura, L.M., Von Duvillard, S.P. *Clinical Exercise Physiology*. **2004**. Philad: LWW.
[12] Mora, S., Lee, M., Buring, E., .2**0**06. *JAMA*. Chicago: Mar 22-29, 295 (12); 1412-28.
[13] Nieman, D. C. Exercise Testing and Prescription. **2003**. 5th Ed. New York: MHHE.
[14] Takeshima, N., Rogers, M., Wantanabe, E., Okada, A. **2002**. *Med Sci Spo Exe*, 33; 544-557.
[15] Thomas DE, Elliott EJ, Naughton GA. **2006**. Cochrane Database of Systematic Reviews, Issue 3.Art. No: CD002968. DOI: 10.1002/14651858. CD002968. pub2.
[16] Wantanabe, E., Takeshima, N., Okada, A., Inomata, K. **2000**. *Percept Mot Skill*, 91; 97-104.
[17] Wininger, S. R. **2002**. *Percept Mot Skill*, 94; 338-348.
[18] World Health Organization. **2000**. Obesity: Preventing and Management the Global Epidemic. Geneva: WHO.
[19] Zafari. A. **2012**. *Annals of Biological Research*, SRL-ABR, 3(1):673-676.