Original Article

Effect of 8-week Zumba training on overweight women's body composition

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Abstract

Introduction:
Sedentary lifestyle is one of the factors that increase obesity. Zumba exercise has a positive effect on body composition and rate of calorie burn and also improve people's cardiovascular endurance. The present study aimed to investigate the effects of 8-week selected Zumba fitness trainings on the body composition of overweight women.

Materials and methods:
Twenty-nine volunteer women participating in Zumba fitness exercises at Artay Club (branch 2), were selected as the statistical sample and divided into two groups: experimental group (16 participants) and control group (13 participants). The experimental group practiced Zumba for three one-hour sessions a week for eight weeks while the control group only did their daily activities. The participants' body composition was initially measured at the beginning of the study, and once at the end of the eighth week by means of the body composition evaluator. Kolmogorov-Smirnov, independent and dependent t- tests were used for statistical analysis of data (α=0/05).

Results:
The results showed that the 8-week Zumba fitness training had a significant effect on decreasing women's body fat percentage (p=0.001); body mass index (p=0.001); fat mass (p=0.001); and waist-to-hip ratio (p=0.004). However, it had no significant effect on protein mass in overweight women (p=0.92).

Conclusion:
Based on the findings, eight weeks of Zumba exercise can improve body composition in overweight women.

Keywords: Zumba training, Women, Body fat, Protein mass

Introduction

Obesity is a serious general health problem in the world and a major problem of sedentary lifestyle, which requires proper measures and treatments (1). According to the World Health Organization, overweight and obesity were the fifth most common cause of death in 2004 (1). Having physical activities and proper fitness is therefore crucial for human life and health (2 & 3). Regular physical activities cause significant changes in the body, which manifest themselves as improved health and fewer risk factors in inactive people's life (4). Aerobic exercises improve body composition by reducing weight and fat level (5). There

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are a variety of aerobic exercises including rhythmic aerobic exercise, which was particularly well-known among women in the late twentieth century. All participants in this type of sport perform specific movements in the same pace and rhythm as the music and work on different muscles. Zumba was invented as a rhythmic aerobic exercise to reduce body composition, improve fitness and perform physical activities (6). This type of exercise positively affects all the body organs, helps improve the caloric balance and controls the body weight. It also improves muscles, joints and the bone structure, reduces the risk of cancer and hypertension and improves cardiovascular functions (7). This type of exercise is inspired by music and is a combination of rhythmic Latin American movements including cumbia reggeaton, salsa and merengue, in which the main aerobic steps are used and combined with other rhythms such as hip hop, belly dance as well as Indian and African rhythms to enrich the whole work. Despite the necessity of a close coordination between rhythm and movements in Zumba, the musical background helps reduce the fatigue and improve memory (8). Zumba is a combination of principles of interval exercises, aerobics and stretching exercises, increases the calorie consumption and improves the cardiovascular system and the general body power (9). This type of exercise can significantly improve the mobility and functional performance (10) and change body composition in women (11). Zumba advantages include improving health and helping with weight reduction in adults (12 and 13) as well as reducing the fat level (14).

Zumba has been proposed by Sternlicht et al. as an appropriate alternative to cycling and running for having a proper weight and avoiding diseases (15). Moreover, Adriana Ljubojevic et al. reported that Zumba is a body building exercise and a team sport that affects women's body composition (16). This new approach to fitness is appropriate for achieving objectives such as the whole body coordination, improvement of the body posture and empowering the bony joints (17). BAŞTUĞ et al. found Zumba to positively affect weight reduction and BMI as the indices of body composition (18).

Zumba has so far attracted many people in the world and is currently considered a popular sport. Given the novelty of Zumba, it is rarely addressed in literature especially by Iranian authors. The present study therefore seeks to find whether a selected Zumba training program can significantly affect body composition in overweight women.

Materials and Methods

The present semi-experimental study was conducted on a control and experimental group using a pretest-posttest scheme. The statistical population comprised all overweight female non-athletes participating in sport activities in the ARTA Club in Shiraz, Iran. A statistical sample comprising 29 volunteers with a mean age 31.50±6.97, mean height 163.37±6.18 cm and mean weight 74.37±16.09 kg were randomly divided into a control group (n=13) and an experimental group (n=16). The experimental group did not participate in any sport activities except Zumba (Pre: 5.77 ± 1.84m; Post: 4.51 ± 1.42; Effect size: 0.976; α =0.05; Power: %80; n = 11) (19).

Overweight people with a tendency to perform physical activities to improve their body composition were first identified by posting invitation notices in ARTA sports club, branch 2, Shiraz. After performing initial assessments, a total of 29 volunteers were selected as the statistical sample and divided into the control and experimental group. All the research conditions including the benefits and necessary recommendations were provided for every subject in a briefing session. All the subjects declared their

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consent to participate in the study by signing an informed consent form. The initial evaluations conducted before beginning the exercise comprised age, height, weight, body composition, waist circumference and hip circumference while standing in bare feet and sport clothes. A body composition device (BOCA x1, South Korea) was used to measure all the physical parameters. The data entered into the software included height, weight, age, waist circumference and hip circumference and the necessary physical parameters were first scanned and then analyzed (17). In order to match the study groups, the Queens College Step test was used to measure the subjects' aerobic power and to divide them into two matched groups. The experimental group ran the exercise program while the controls followed their daily routine in the absence of any interventions.

Twenty four sessions of Zumba exercise (three sessions a week) were held between 7 and 8 pm. An 8-10 minute warm-up in each session comprised three steps; the first step lacked skips and jumping and comprised Zumba basic steps including step touch, march and side to side, which gradually speeded up with the musical pitches; the second step comprised raising hands and making power movements so as to raise the heart rate and in the third step, muscles were gently tightened and belly movements were carried out while standing although the participants were allowed to slightly bend and crouch. The purpose of warming up was to increase the blood circulation, the heart rate and the body temperature and also to improve joint readiness and the subjects' spirit. The main part of Zumba comprised 8-10 main pieces of the Zumba music, the intensity of which was determined by the pitches. Each piece lasted 3-5 minutes and was followed by a 15-30 second break. Simple movements and light music make up the cool-down stage as the last part of Zumba exercises, which aims at soothing the mind and the body. Stretching was also applied to help the muscles rest, maintain their flexibility and return to their initial state. Pretest and posttest measurements were taken in the club both at 5 pm. The data were analyzed in SPSS using statistical tests such as Kolmogorov-Smirnov, independent t and dependent t. $\alpha \leq 0.05$ was also considered significant.

Results

The pretest difference between the experimental and control group was insignificant in terms of the study variables ($P>0.05$). In other words, the two groups were matched at the pretest although the posttest BMI and fat mass were significantly different in the two groups.

Table 1 and 2 respectively present the subjects' demographic information as well as the pretest and posttest variables. The independent t-test indicates significant differences in the variations of the body fat percentage (BFP) ($P=0.001$), BMI (Figure 2, $P=0.001$), fat mass (Figure 3, $P=0.001$) and waist-hip ratio (WHR) (Figure 4, $P=0.004$).

BFP, BMI, fat mass and WHR in women were found to be significantly lower in the experimental group than in the control group. The 24 one-hour sessions of Zumba exercise over eight weeks can therefore be said to have significantly reduced the BFP, BMI, fat mass and WHR in overweight women. The changes in women's protein mass was however found not to be significantly different in the two groups ($P=0.92$) (figure 5).

Furthermore, the dependent t-test (Table 2) in the experimental group showed a significant increase in the BFP, BMI, fat mass and WHR of the posttest compared to the pretest ($P=0.001$). The pretest and posttest values of the protein mass were not however significantly different in the experimental group ($P=0.87$). The dependent t-test (Table 2) also indicated no significant differences between the pretest and posttest changes in the BFP ($P=0.21$) (Figure 1), BMI ($P=0.06$) (Figure

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2), fat mass (P=0.99) (Figure 3), protein mass (P=0.06) (Figure 5) and WHR (P=0.35) (Figure 4) of the female controls.

Table 1: The demographic characteristics of the experimental and control group

Variable \ Group	Experimental (n=16)		Control (n=13)	
Age (yr)	31.50±6.97		29.85±8.17	
Height (cm)	163.38±6.18		161±5.47	
Weight (kg)	Pretest	Posttest	Pretest	Posttest
	74.37±16.09	71.68±15.44	74.38±13.03	75.65±14.13

Table 2: The results of the independent and dependent t-tests for the variations in the study variables in the experimental and control groups

Variable	Group	Pretest (M±SD)	Independent t-test of pretests	Posttest (M±SD)	Independent t-test of posttests	Dependent t-test
BFP (%)	Experimental	37.50±3.69	P=0.95	35.63±7.8	P=0.001*	P=0.001
	Control	37.41±4.72		37.97±5.07		P=0.21
BMI (kg/m^2)	Experimental	27.88±4.60	P=0.65	26.70±4.48	P=0.001*	P=0.001*
	Control	28.66±4.53		29.19±5.07		P=0.06
Protein mass (kg)	Experimental	11.36±2.10	P=0.58	11.40±2.10	P=0.92	P=0.87
	Control	10.99±1.30		10.99±1.03		P=0.99
Fat mass (kg)	Experimental	28.39±8.32	P=0.96	25.86±7.81	P=0.001*	P=0.001*
	Control	28.26±8.44		29.26±9.40		P=0.06
WHR	Experimental	0.86±0.07	P=0.41	0.83±0.08	P=0.004*	P=0.001*
	Control	0.84±0.08		0.85±0.07		P=0.35

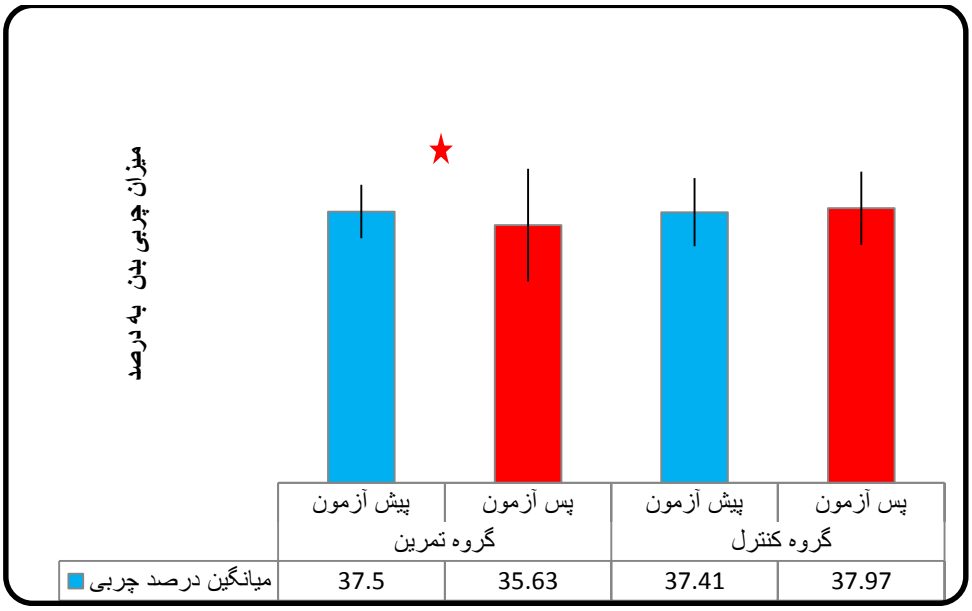

Figure 1: The changes in the pretest and posttest BFP of the study groups
*: Significant difference between the pretest and posttest

Figure 1 indicates a significant decrease in the posttest BFP compared to in the pretest of the experimental group. The increase observed in the posttest BFP of the controls is however insignificant compared to in the pretest.

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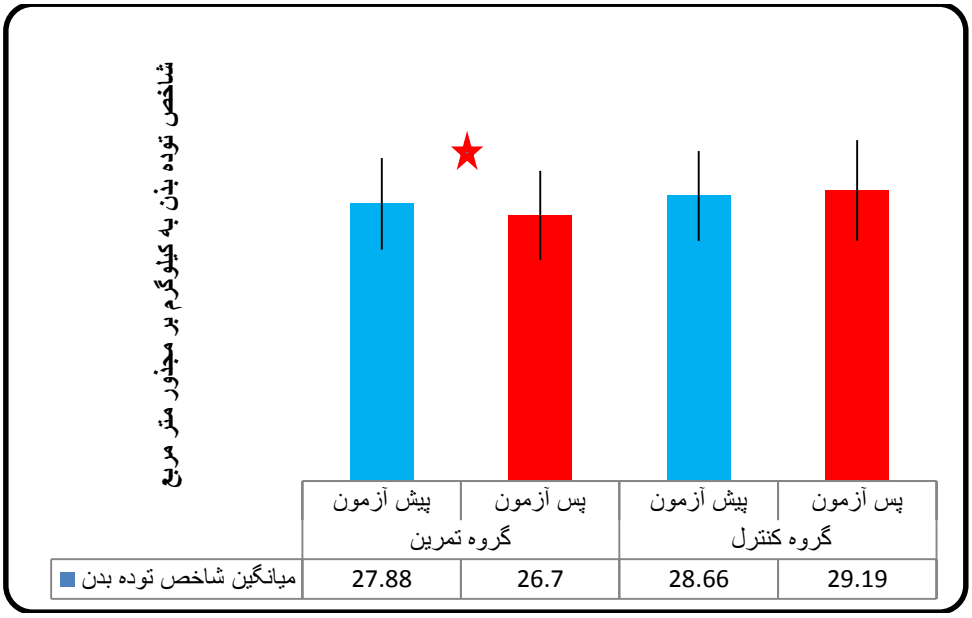

Figure 2: The changes in the BMI of the study groups at the pretest and posttest
*: Significant difference between the pretest and posttest

Figure 2 indicates a significant decrease in the posttest BMI compared to in the pretest of the experimental group. The increase observed in the posttest BMI of the controls is however insignificant compared to in the pretest.

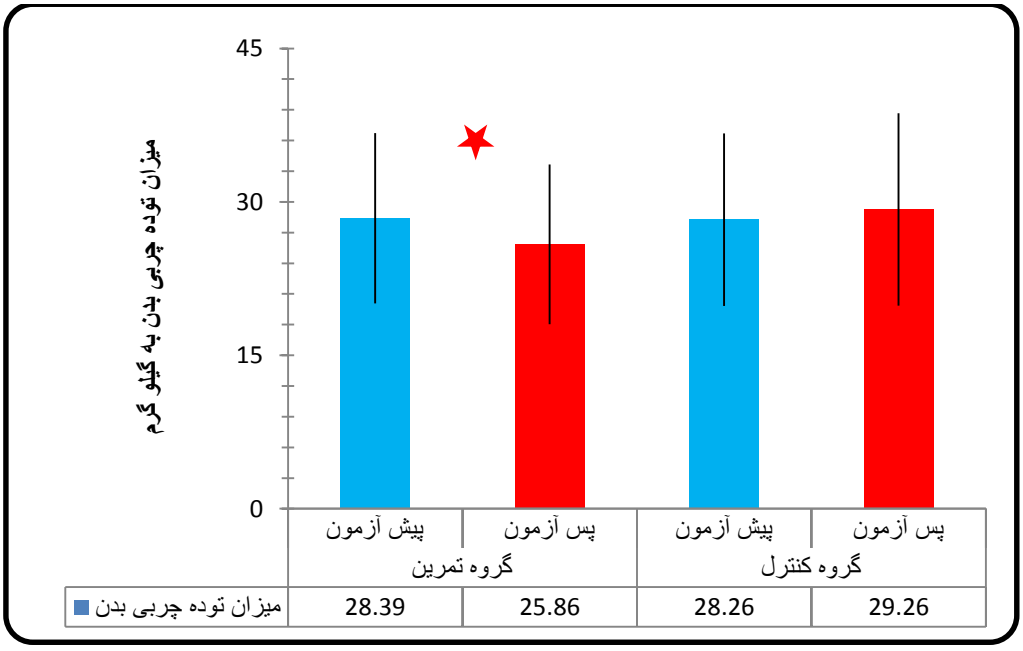

Figure 3: The changes in the body fat mass of the study groups at the pretest and posttest
*: Significant difference between the pretest and posttest

Figure 3 indicates a significant decrease in the posttest body fat mass compared to in the pretest of the experimental group. The increase observed in the posttest body fat mass of the controls is however insignificant compared to in the pretest.

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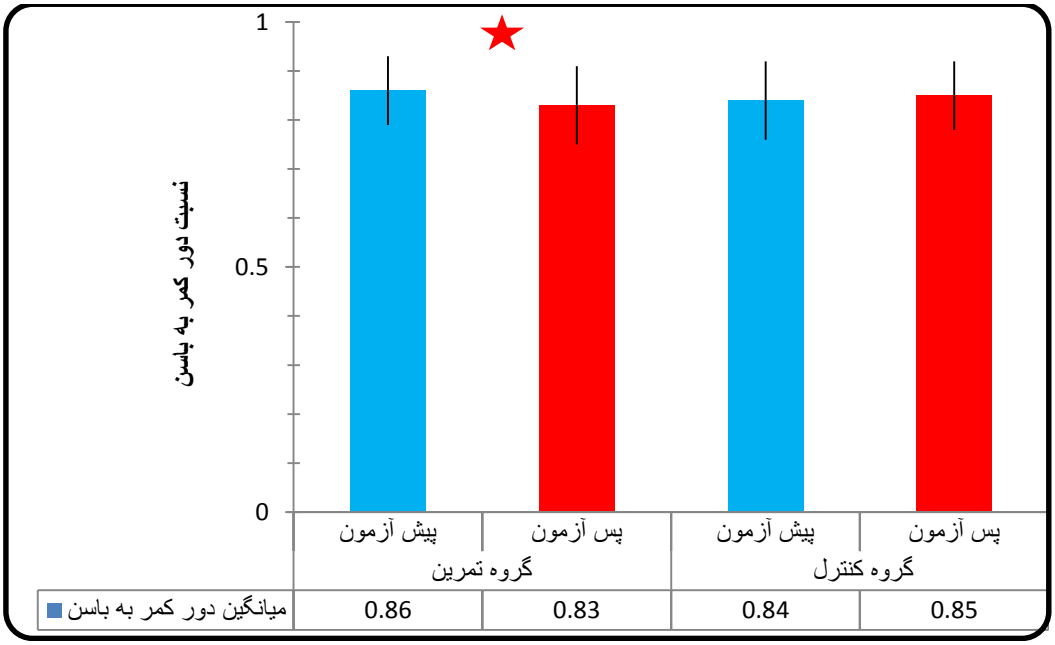

Figure 4: The changes in the WHR of the study groups at the pretest and posttest
*: Significant difference between the pretest and posttest

Figure 4 indicates a significant decrease in the posttest WHR compared to in the pretest of the experimental group. The increase observed in the posttest WHR of the controls is however insignificant compared to in the pretest.

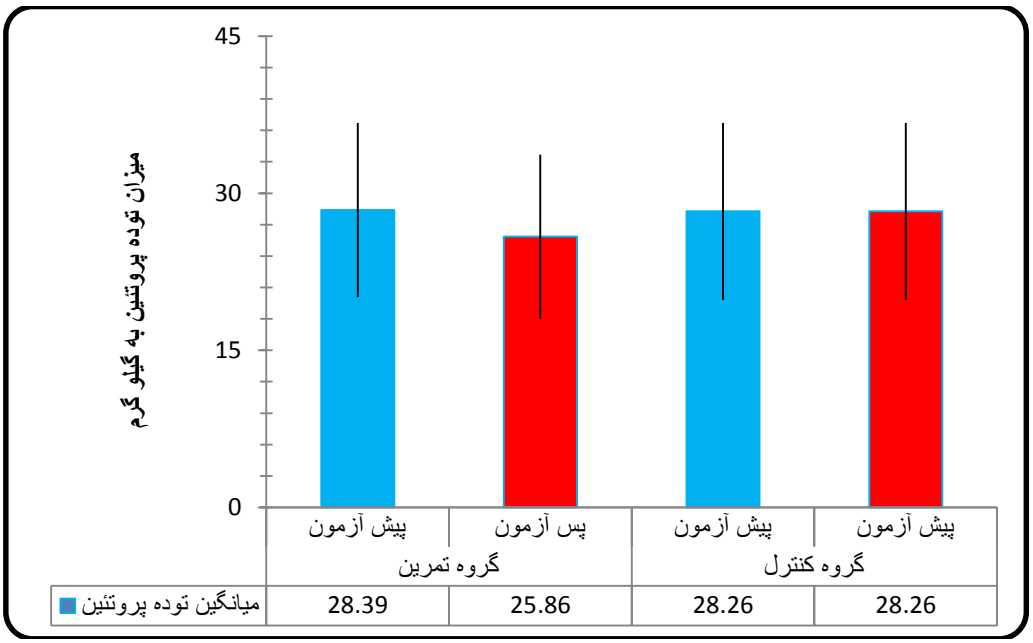

Figure 5: The changes in the protein mass of the study groups at the pretest and posttest

According to figure 5, the reduction observed in posttest body protein mass of the experimental group is insignificant compared to in the pretest. Moreover, the body protein mass remained unchanged between the posttest and pretest.

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Discussion

The findings obtained suggest significant differences between the active and inactive groups in terms of the BFP, BMI, fat mass and WHR although the difference in the protein mass was insignificant. Furthermore, eight weeks of Zumba exercise (three one-hour sessions a week) significantly reduced the BFP, BMI, fat mass and WHR in overweight women. The comparison of the protein mass in the subject with standard tables showed that this exercise has no significant effects on the increase in the protein mass.

Many health-associated problems are caused by the increased body fat mass and overweight. Given the global prevalence of overweight, using an accurate method is necessary to determine overweight (20). Although Zumba is currently used to lose weight, this type of sport is rarely addressed in practical research as a weight loss method. Different studies were previously conducted on the positive effects of aerobic exercises and Zumba on reducing fat mass, BMI and BFP (21) and some reported no significant impacts (22). Zumba is different from other types of aerobics in terms of the intensity of the exercise, which is different in weight lifting Zumba, Zumba and chair, Zumba for seniors and Zumba for children (17).

Micallef, Lebo Joyce, et al. confirmed the effectiveness of Zumba on body composition including body fat, BMI, body fat and WHR, which is consistent with the present study (16 and 23). Moreover, the results obtained by BAŞTUĞ et al. for the positive effects of Zumba on body composition as weight loss and reduced BMI in the subjects are consistent with the findings obtained in the present study (18). These results emphasize the effects of Zumba on health improvement, weight loss and type-2 diabetes. This type of interval exercise improves BFP and weight in participants (14). All the three recently conducted studies on Zumba suggested that a 12-week Zumba exercise causes significant weight loss and affects the treatment of obesity in people with and without metabolic syndrome. Barene et al. found this type of exercise to reduce the body fat and increase the aerobic capacity by 5% (12).

On the other hand, Sternlicht et al. and Luettgen et al. did not find significant differences in physical features among the participants in terms of BFP, BMI, fat mass and WHR (15 and 24). Different exercise protocols used including the type, duration and intensity of programs as well as the number of sessions may blame for these differences (19 and 28). This type of exercise has been reported to have both statistically significant and insignificant effects on body composition in literature (25-27). The type of the effect of this exercise on body composition found by Rashid Lamir and Jafari, Shenbagavalli and Mary, Mishra, Görner et al. and Pentlic et al. is for instance consistent with the present study (2, 28-30).

The present study found eight weeks of Zumba exercise not to have significant effects on the increase in women's protein mass. This was inconsistent with the findings obtained by Pikosky et al. Macias et al. (31 and 32). Protein mass or the so-called dry matter of muscles is the net protein caused by the balance between protein synthesis and protein degradation and it should surpass the fat level. Exercise and diet play the key role in maintaining protein. Exercise can also increase protein mass.

Najafi et al. showed that rhythmic aerobics significantly increase the muscle power and protein mass, which is inconsistent with the present study (33). Awasare, Bagavinar and Kamalakkannan found this exercise to significantly affect protein mass and muscle power (34 & 35). The discrepancy between the findings obtained in the present study and the cited ones might be a result of the type of exercise, gender, measurement duration, subjects' fitness level and intensity of exercises.

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Given the increased prevalence of overweight in women and its consequences in adulthood, using a proper exercise is crucial for reducing overweight. It is worth mentioning that BMI should be cautiously used as a criterion for body fat mass and overweight. The body weight comprises both fat mass and the fat-free mass, which can be different in different people. All the recently conducted studies suggested that this type of exercise significantly improves body composition by reducing BMI, fat mass, BFP and increasing protein synthesis particularly in women. The present study however found the effect of Zumba on the BFP reduction and protein mass elevation to be insignificant. This may be a result of the large range of age or the exercise intensity or the changes in both. Having more muscle mass than fat tissues in the active group seems to enhance metabolism in the active muscles, which confirms the Awasare's findings. Muscularity leads to weight gain and the increase in BMI. That is why BMI is not accurate index and the error introduced can be minimized by measuring the subcutaneous fat (36).

Lifestyle, diet and exercise are the factors contributing to one's health. Given the modern automatized lifestyle in recent years, particular attention should be made to have physical activity, particularly aerobics, at least five times a week as this type of exercise prevents obesity and many diseases and partly ensures health (37 & 38). The younger generation is recommended to be briefed on the positive effects of exercise on health so as to prevent the prevalence of the illnesses that might endanger the public health in the future (39).

Conclusion

The present study found eight weeks of Zumba, three one-hour sessions a week, to significantly reduce BFP, BMI, fat mass and WHR and improve body composition in overweight women.

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Conflict of interest

The Authors declare that there is no conflict of interest in this paper.

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