

RESEARCH ARTICLE

Effects of Different Aerobic Exercises in Overweight and Obese Women's Quality of Life and Obesity Levels

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Abstract

Obesity is a global epidemic that affects health. The aim of this study was to assess the effects of different aerobic exercises in overweight/obese women's quality of life (QOL) and body mass index (BMI) levels. Sixty-nine overweight/obese women (age: 35.9±8.9 years; BMI: 28.8±1.4 kg/m²) were randomly assigned to either step-aerobics (SAG), Zumba (ZG), spinning (SG), or control group (CG). Experimental groups performed exercise sessions for three times per week for 45 minutes during 12 weeks but the control group did not have any intervention. World Health Organization QOL Questionnaire was applied to the subjects. Obesity levels were assessed by using BMI. Following the 12-week intervention, all groups were compared to each other and statistically significant differences (p<.05) were found on BMI levels of the subjects in each exercise category with different amount of decrements, 9.3%, 5.9%, and 9.2% for the SAG, ZG, and SP, respectively. It was also found that exercises had significant effects on physical QOL levels but Zumba was the only exercise that changed the psychological QOL level significantly. No differences in environmental or social relationships QOL levels was observed. All aerobic exercise types found to have positive effects on physical QOL. If psychological enhancement is desired Zumba exercises can be preferred because it is the most effective exercise for the psychological QOL. Although all exercise types were seen to be effective, spinning and step-aerobics exercises are found to be better than Zumba in decreasing BMI.

Keywords

Obesity, Body Mass Index, Energy Expenditure, Physical Activity, Fitness

INTRODUCTION

As a global epidemic in today's world, obesity is well-known for its association with cardiovascular diseases, different types of cancers, metabolic syndrome, type 2 diabetes mellitus, and decreased quality of life (Carbone et al. 2019; Hidayat et al. 2016; Al-Goblan et al. 2014; Puhl and Heuer, 2009). Even a moderate rise in fat mass results in substantial effects, such as the increased risk of mortality and comorbidity (Abdelaal et al. 2017; Santanasto et al. 2017). Body mass index (BMI) is used worldwide to assess obesity and has been accepted as a useful tool in categorizing people into mainly one of these categories: healthy,

overweight, and obese (Nuttall, 2015). Because of its simplicity and being neither expensive nor invasive, BMI has been widely used to determine obesity (Akindele et al. 2016).

Being physically active and increasing energy expenditure are general recommendations to control body weight and these are the most effective non-medical ways against obesity (Donnelly et al. 2009). When compared, aerobic exercises were shown to have better effects on the level of obesity than anaerobic exercises (Klijn et al. 2007; Saif and Alsenany, 2015), but the National Health Interview Survey revealed that just about 20% of women reach to the recommended moderate intensity activity level of 150 mins per

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week (Clarke et al. 2017). It was previously reported that attending to aerobic exercises such as step-aerobics, Zumba and spinning had positive effects on the obese females' body compositions (Arslan, 2011; Krishnan et al. 2015; Yoon et al. 2017).

Some studies were conducted to reveal the effects of different types of aerobic exercises but there was no agreement on which type of aerobic exercise was the best (Gorostegi-Anduaga et al. 2018; Maldonado-Martin et al. 2016). To our current knowledge, any research on the effects of three different types of aerobic exercises has not been conducted before. Consequently, which one of these three aerobic exercises, step-aerobics, Zumba, and spinning, will be more effective in obese women's body composition is skeptical.

Along with the other aspects of health, quality of life (QOL) is also an important component in human health. Although QOL has a wide range of measurement scales, it generally focuses on physical and mental health (Wong et al. 2018). Studies on QOL revealed that physical activity can contribute to improve QOL in the physical domain (Carta et al. 2012) especially in women (Pucci et al.2012).

The objectives of this paper were to assess the effects of different aerobic exercises on obesity, and to examine the effects of aerobic exercises on QOL levels in obese women.

MATERIALS AND METHODS

Participants

The study was carried out by recruiting obese women meeting the following criteria: aged between 18 and 52, BMI>25 kg/m², with no known metabolic or physical disorders, been sedentary at least 1 year, and not on regular medication. Volunteers were chosen among the new subscribers to a gym for either a Zumba, spinning, or step-aerobics class. Eighty-five women meeting the criteria were invited to take part in the study as a subject in one of the three experimental groups but thirty-four of them rejected the invitation. The aim of the study was explained to the subjects and then three groups were formed as Zumba (ZG, n=17), step-aerobics (SAG, n=18), and spinning (SG, n=16). A control group (CG) was also formed by recruiting 18 overweight women. Each group, except the CG, had their exercises 3 times per week and 45 mins per session.

Ethics committee approval was obtained from the Hitit University Non-Interventional Researches Ethics Committee (Approval No: 2019-237) and all participants gave their written consent prior to the study. The research was conducted by strictly following the standards stated in Helsinki Declaration.

Study Design

Participants followed their exercise programs for 12 weeks. Each exercise session was planned to have an intensity between 55-75%. During the exercises, participants were asked to wear wireless heart rate monitors, and each participant's exercise intensity was projected on a screen. If the intensity was below or over the predetermined limits, the participant was asked to keep up with the pace or slow down where appropriate. Anthropometric measurements and BMI calculations were performed as pre- and post-tests. BMI was done by dividing body mass in kg to squared height in meters. World Health Organization Quality of Life Short Form (WHOQOL-BREF) was also applied to the subjects to assess their quality of life levels. WHOQOL-BREF has four dimensions as physical, psychological, social relationships, and environmental. All these scores were calculated as described in the Field Trial Version by the World Health Organization (1996).

Exercise Programs

Each group attended to their exercises for 45 minutes on Mondays, Wednesdays, and Fridays. Qualified trainers, each one is a physical education professional and certified trainer of the relevant exercise, led the training sessions. Before each session, the participants were instructed to have warm-up and stretching exercises to get their bodies ready for the exercises. After the sessions, cool-down exercises were applied. Participants were asked not to attend to another planned physical activity or change daily habits and dietary routines during the 12-week period. No caloric restrictions were made or extra energy intake was recommended.

Data Analysis

Descriptive statistics, mean and standard deviation, were calculated and expressed as mean±SD where appropriate. Normal distribution of the data was tested by Shapiro-Wilk and *Q-Q* Plot test. It was seen that data were normally distributed. Homogeneity of variance was tested by using Levene's test and one-way ANOVA was used to compare baseline differences. Paired samples

t-test was used for pre-post test comparisons. Z-scores for the differences were calculated and analyzed.

RESULTS

General characteristics of the subjects were presented in Table 1. There were no statistically significant differences among the groups by the variables at the pre-test ($p>.05$). Table 1 revealed that the subjects in different groups were not different from each other. When the post-test values in Table 2 were compared to the pre-test values in Table 1, it was seen that attending to exercises had statistically significant effects with large effect sizes on weight, BMI, and physical

QOL values of the subjects ($p<.05$). Along with these, Zumba exercises were found to affect the psychological QOL of the subjects significantly ($p<.05$). No differences were observed in social relationships and environmental domains of QOL ($p>.05$). Figure 1 depicts the changes in the Z-scores from pre- to post-tests. All groups but the CG, presented desired and significant changes in BMI Z-scores (SAG= -0.59 ± 0.39 kg/m²; ZG= -0.02 ± 0.44 kg/m²; SG= -0.65 ± 1.20 kg/m²; CG= 1.20 ± 0.23 kg/m²). The control group's Z-scores revealed a deterioration in BMI and the differences between the exercise groups and the CG were statistically significant ($p<.05$).

Table 1. General characteristics of the subjects prior to the exercise sessions. Data are presented as mean \pm standard deviation.

Variables	SAG (n=18)	ZG (n=17)	SG (n=16)	CG (n=18)	<i>p</i>
Age (year)	35.3 \pm 8.9	34.6 \pm 6.9	36.4 \pm 10.3	35.3 \pm 9.8	.95
Height (cm)	166.3 \pm 5.6	163.4 \pm 5.0	164.6 \pm 6.2	164.1 \pm 5.7	.46
Weight (kg)	79.9 \pm 6.8	76.7 \pm 6.2	79.1 \pm 5.7	77.1 \pm 6.3	.37
Body Mass Index (kg/m ²)	28.9 \pm 1.5	28.7 \pm 1.3	29.2 \pm 1.5	28.6 \pm 1.3	.64
Physical QOL	57.1 \pm 14.7	61.9 \pm 14.8	58.4 \pm 18.7	61.1 \pm 18.5	.81
Psychological QOL	63.8 \pm 16.3	68.2 \pm 16.3	59.0 \pm 17.2	60.1 \pm 17.5	.38
Social Relationships QOL	56.8 \pm 19.8	70.5 \pm 15.8	64.6 \pm 16.2	67.2 \pm 16.7	.12
Environmental QOL	57.2 \pm 18.4	61.8 \pm 18.6	65.3 \pm 16.4	64.2 \pm 16.3	.53

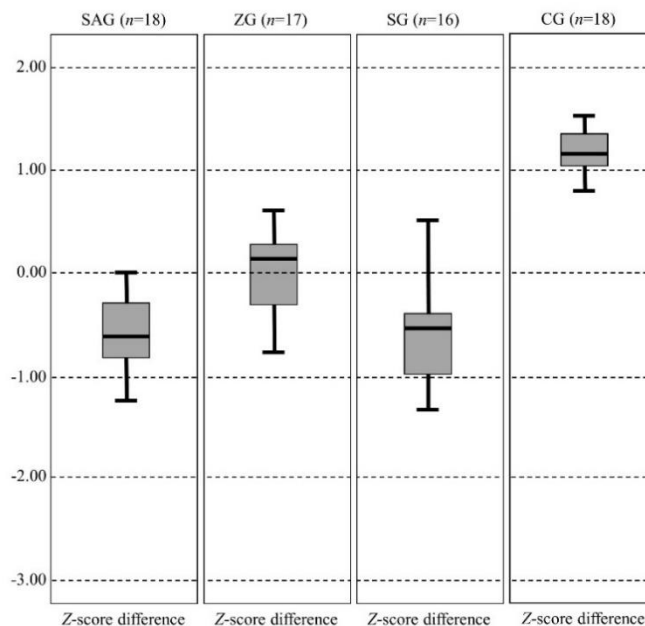


Figure 1. BMI Z-score changes from pre- to post-training of overweight and obese women in groups.

Table 2. Weight, BMI, and QOL scores of the groups at post-training. One-way ANOVA test results.

Variables	SAG (n=18)		ZG (n=17)		SG (n=16)		CG (n=18)		p
	Post	ES	Post	ES	Post	ES	Post	ES	
Weight (kg)	72.6±6.4*	1.11	72.2±6.3*	0.72	71.8±5.4*	1.31	78.5±6.3	-0.22	.02
BMI (kg/m ²)	26.2±1.4*	1.86	27.0±1.5*	1.21	26.5±1.4*	1.86	29.1±1.2	-0.40	.00
Physical QOL	65.3±10.2*	-0.65	69.8±12.2*	-0.58	70.9±13.8*	-0.76	50.8±16.3*	0.59	.00
Psychological QOL	67.7±16.4	-0.24	81.2±13.7**	-0.86	62.3±17.4	-0.19	59.1±16.7	0.06	.00
Social Relations QOL	60.7±19.6	-0.20	74.2±16.2	-0.23	68.3±15.9	-0.23	65.4±16.5	0.11	.14
Environmental QOL	60.7±18.8	-0.19	65.5±19.4	-0.20	68.7±15.7	-0.21	62.6±16.4	0.10	.58

* $p < .05$ vs. control. ** $p < .05$ vs. control. ES=Effect size.

The amounts of decrements in BMI values were found to be 9.3%, 5.9%, and 9.2% for the SAG, ZG, and SP, respectively. The CG's BMI value changed from 28.6±1.3 to 29.1±1.2, resulting in an increase of about 1.7%.

DISCUSSION

The main finding of this study is that attending to aerobic exercises regularly will cause a decrease in BMI and step-aerobics and spinning exercises are superior to Zumba to lose weight. It was also found that aerobic exercises positively contributed to the subjects' physical QOL. Although Zumba had a less powerful effect on decreasing BMI, in the current study it was the only aerobic exercise that contributed significantly to the subjects' psychological QOL. Social relationships or environmental QOL levels did not differ by attending to exercises.

As it is well-known, weight loss is possible by creating a negative energy balance, which is either by restriction in energy intake or promoting energy expenditure (Donnelly et al. 2009). As the caloric restriction has its own physiological limitations, the experts advise the latter. In this study, neither a caloric restriction was applied nor the caloric intake was controlled. The focus of this study was on the effects of different types of aerobic exercises on BMI and QOL levels in overweight and obese women. To our current knowledge, no similar study was conducted before. Thus, that makes it impossible to compare the results of this study directly with previously published studies.

Some studies investigated the effects of exercise on three groups but the groups differed only either by the intensity or frequency, but not by type (Cavalcante et al. 2018; Nunes et al. 2016). It was previously shown that applying resistance

training in different volumes did not make any significant differences in overweight and obese women's BMI levels and it was hypothesized that the stimuli were not enough (Heden et al. 2011; Mookerjee et al. 2016). Although anaerobic exercises can contribute to decreasing BMI, aerobic exercises were more effective in reducing BMI when compared to anaerobic ones. Effects of attending 12-week exercise sessions on BMI were analyzed by Saif and Alsenany (2015) and it was found that aerobic exercises contributed to reduce BMI levels by 17.6% but anaerobic exercises reduced BMI by only 6.7%. When combined together, aerobic exercises and anaerobic exercises can enhance BMI better. Aerobic exercises, combined with body weight-bearing resistance exercises, for 12 weeks decreased obese women's BMI by 7.9% (Kang et al. 2018).

There are many studies that examined the effects of Zumba, step-aerobics and spinning exercises on BMI, separately. Numerous studies have shown the positive effects of step-aerobics exercises in obese women but the results from the interventions varied. In a study conducted by Arslan (2011), it was reported that attending to 8-week step-aerobics exercises caused a decrease of about 3.2% in obese women's BMI values. Melam et al. (2016) found that obese women lost nearly 5% of their BMI values after 10-week aerobic exercises. In the current study, it was found that attending to step-aerobics exercises for 12 weeks caused a significant reduction in overweight and obese women's BMI levels. The percentage in the decrease was found to be as high as 9.3%. As these studies have shown earlier, step-aerobics exercises contribute to decreasing BMI in women and as the period of attendance extends, the amount of this contribution gets larger. The results of those studies support the results of the current study.

Spinning is another aerobic exercise type that is commonly preferred by women because of being safe and its effectiveness on the energy expenditure, thus benefits on reducing BMI. Yoon et al. (2017) studied the effects of spinning and regular bicycle exercises and found that spinning exercises reduced women's BMI but not a regular bicycle. The reason for this was reported that spinning exercises cost more energy expenditure than regular cycling at the same intensity (Yoon et al. 2017). Kaya et al. (2018) reported that 6-week spinning exercises for three days per week caused a significant reduction in BMI by 4.6%. Amano et al. (2001) found that spinning exercises lowered BMI in overweight women as much as 5.1% in 12 weeks. Current study reveled that spinning exercises had significant effects on overweight and obese women's BMI levels. A decrease of about 9.2% in BMI was observed in the spinning group. The results are in line with the other studies in the literature.

As a relatively new aerobic exercise, Zumba has gained popularity among women because of its free form. Zumba exercises are less formal than in many aerobic exercises and it has fun and party-like dancing choreography. Because of that, Zumba is known as an enjoyable and entertaining exercise, as its motto says: "Ditch the workout, join the party!" (Luetgen et al. 2012). There are many studies showing that Zumba was effective in decreasing BMI levels in women (Ljubojevic et al.2016; Araneta and Tanori, 2015; Barene et al. 2014). Krishnan et al. (2015) evaluated the effects of 16-week Zumba exercises in severely obese (BMI: $37.3 \pm 1.5 \text{ kg/m}^2$) women with type-2 diabetes mellitus and concluded that Zumba intervention improved obesity tendency and reduced BMI values by about 3.5%. According to the results of the current study, it was revealed that Zumba could contribute to enhancing the BMI levels of overweight and obese women by 5.9%.

The results of the current study proved that regular attendance to aerobic exercises, regardless of the type of the exercise. Each type of exercise contributed to physical QOL levels of the subjects. However, it was also found that spinning and step-aerobics exercises contributed to BMI more than Zumba exercises. The reason to that was thought to be the informal structure of the Zumba exercises. The other exercises might have pushed the attendees to keep up with the group's performance because not being able to keep it up

can be seen clearly but Zumba had an advantage over them by its free-form dancing. It was found that Zumba was superior to the other exercises in terms of psychological QOL. Previous studies shown that Zumba was effective in contributing to women's psychological QOL (Donath et al. 2014; Rossmessl et al. 2016). In the current study, step-aerobics and spinning exercises did not affect the psychological QOL levels of the subjects. Being able to continue exercising freely, without being noticed when the performance is not good enough to keep pace with the group, might have been contributed to the attendants' psychological QOL levels.

It was previously shown that BMI had a disruptive effect on women's QOL (Pazzianotto-Forti et al. 2019; Slagter et al. 2015), and it was a predictor for the physical QOL score having a negative correlation (Hahn et al. 2005). In a study conducted in Italian obese adults, it was shown that QOL levels of the subjects reduced as their BMI levels increased (Sirtori et al. 2012). However, according to a study conducted on 968 Brazilian adult women, aerobic exercises were found to have positive correlations with physical and psychological QOL levels (Pucci et al. 2012). It is known that women are less satisfied with their body image when compared to men and obese women have lower health-related QOL than obese men (Friedman and Brownell, 1995). Obese people were previously shown to have poorer psychological profiles compared to their non-obese counterparts (Sarlio-Lahteenkorva et al. 1995). Obese individuals were shown to be subject to considerable stigma which the individuals might internalize and experience as embarrassment, depression, and nervousness (Kirk et al. 2014). The degree to which the obese individuals feel stressed, concerned, and unhappy because of their body shape and excess weight was studied before and it was found that obese individuals were more prone to feel depressed and losing weight was a successful way to maximize the psychological QOL of obese individuals (Vallis, 2016). In the current study no significant effects on the environmental and social QOL levels in the overweight and obese women were observed.

In this study, it was found that, when compared to each other, step-aerobics and spinning exercises are superior to Zumba to lose weight and to decrease BMI. Physical QOL was positively affected by all of the aerobic exercises examined.

Although the results supported that changes in the physical and psychological QOL levels were in the desired direction, no significant differences were found in the social relationships or environmental QOLs. The reason to this might be due to the social and cultural characteristics of the study group.

Additionally, spare-time activities and social behaviours of the subjects were not controlled or assessed and the extent of the effects of these factors are not clear. Even though these factors were not controlled, the subjects were instructed not to make any major changes in their calorie intake habits or lifestyles during the study. As a conclusion, it can be said that all aerobic exercises found to have effect on physical QOL. If psychological enhancement is desired Zumba exercises can be preferred because it is the most effective exercise for the psychological QOL. Although all exercise types were seen to be effective, spinning and step-aerobics exercises are found to be better than Zumba in decreasing BMI.

Conflict of Interest

The authors declare no conflict of interest. No financial support was received for the study.

Ethics Statement

The ethics permission was obtained prior to the study. The study was approved by the Hitit University Non-Interventional Researches Ethics Committee (Approval No: 2019-237).

Author Contributions

Study Design, YUK; Data Collection, YUK; Statistical Analysis, YUK and ZD; Data Interpretation, YUK and ZD; Manuscript Preparation, YUK and ZD; Literature Search, YUK and ZD. The authors have read and agreed to the published version of the manuscript.

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