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"Shall we Dance?"

THE ART OF AEROBIC DANCE ON IMPROVING HEALTH-RELATED FITNESS AMONG OVERWEIGHT FEMALES

a chapter by

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Abstract

Objective: This study aimed to evaluate the effect of 8-week aerobic dance on body mass index (BMI), body fat percentage and aerobic fitness among overweight female adults (N=32, [body mass index (BMI) ≥ 23 kg/m², age 18-25 years). The aerobic dance program was conducted three sessions per week for 8 weeks at submaximal intensity. Results: After the 8-week intervention, the aerobic dance group had significantly more changes in BMI, body fat percentage and aerobic fitness than the control group. Conclusion: An 8-week aerobic dance intervention with submaximal intensity can considerably reduce BMI and body fat and improve aerobic fitness among overweight female adults. Good program adherence was attributed to this study.

Keywords: *aerobic dance, aerobic fitness, body fat, body mass index, overweight.*

Introduction

World Health Organization (WHO) defines weight status according to the body mass index (BMI), the ratio of weight in (kg) divided by height squared (m2) (kg/m²). The BMI categorization for Asian adults is 18.5 kg/m² as underweight, 18.5 to 22.9 kg/m² as normal weight, 23.0 to 27.5 for overweight, and equal to or more than 27.5 for obese. It is a convenient rule of thumb used to estimate the body fat based on height and weight. Out of 50.1% of Malaysian adults, 30.4% were overweight and 19.7% obese, according to the National Health and Morbidity Survey (NHMS) 2019. Obesity rates are also rising yearly, from 14% in 2006 to 15.1% and 17.7%, according to the NHMS studies conducted then. Females were reported to outnumber the males in the overweight and obesity rate 2 which was worrying.

Being overweight is related to energy imbalance and lifestyle. If the energy intake exceeds the energy expenditure, weight gain will take place. To lose weight, excess calorie-burning activities are one of the solutions, which can be achieved by regular exercise. Untreated overweight could lead to obesity, which is related to chronic diseases such as high blood pressure, diabetes, cancer and osteoarthritis. Therefore, it can help to protect from chronic diseases associated with overweight and obesity.

Men and women have different body fat percentages. Typically, it ranges from 2 to 5% for men and 10 to 13% for women. Generally, the healthy body fat range for men is 8 to 19%, whereas the healthy range for women is 21 to 33%. Numerous studies examine how aerobic exercise affects body composition. In particular, it is evident that regular, controlled exercise reduces body fat and improves lean body weight, as revealed in the growing body of research. One form of aerobic exercise is dancing. When practised at a target heart rate between 50 and 80% of the maximum heart rate, aerobic dance has been shown to increase maximal oxygen consumption in studies. This indicates that overall aerobic fitness has improved.

Dancing has become a popular form of exercise among women. It is a fun, interactive form of exercise and has been shown to sustain motivation to participate in exercise and improve attitudes toward exercise. Dance workouts that increase or sustain motivation to be physically active might be effective in overcoming barriers. The most reason for unsuccessful weight loss programs is a high rate of dropout. As aerobic dance is viewed

as fun and highly acceptable as an exercise form among females, it should be promoted as an exercise program for this population. Therefore, this study aimed to measure the effectiveness of an 8-week intervention of aerobic dance on BMI, body fat and aerobic fitness among overweight, sedentary females.

Methods

A randomized group design with the purposive sampling technique was utilized in this study. The inclusion criteria of the participants were a) sedentary, not currently engaged in any exercise program, b) BMI of 23.0 to 27.5 kg/m², and c) free from chronic diseases and orthopaedic injury. In addition, they were excluded from becoming the participants if they were a) regular exercises (more than 3 sessions per week of moderate to high-intensity exercise), b) had a history of myocardial infarction, had a pacemaker, c) were pregnant or lactating, or d) were unable to commit to the intervention.

All study procedures were approved by the research committee of the Faculty of Sports Science and Recreation, UiTM Samarahan Campus. Individuals were informed about the study, and written informed consent was obtained by all participants. The participants were randomly assigned to an aerobic dance group (AER; n = 16) or to a control group (CON; n= 16). The intervention period in AER lasted 8 weeks, while the CON received no intervention from the researchers. During the pre-and post-test, all participants completed the 2.4km run test, body weight and body fat measurements.

Measures

For anthropometric measures, height was measured to the nearest 0.1 cm on a stadiometer. Body weight and body fat percentage were measured by using Tanita's Bioelectrical Impedance Analysis electronic scale. To evaluate aerobic fitness, the 2.4 km test was utilized. The participants completed six laps around the 400-m track. Time was recorded as minutes: seconds (min: s).

Aerobic-dance program

The aerobic dance program was a 60-minute session which consisted of 10 minutes of warm-up, 40 to 45 minutes of main activity, and 10 minutes of cooling down. The intensity of aerobic dance was between 65% to 85% of maximum heart rate (HRmax). The HRmax was calculated by 220 minus age. The value obtained was multiplied by 65% to 85% to get the target heart rate. The participants were encouraged to reach the target heart rate in all sessions by monitoring it using the smartwatch.

Aerobic dance is based on walking and step variations, and knee bends, lunges (low impact aerobics), running, skipping and hopping (high impact) and their combination (low-high impact); this exercise was accompanied by the controlled movement of the arms (see Figure 1). This program was adapted from Çakmakçi et al.

Figure 1: The aerobic dance illustration

The sessions were conducted three times per week, which were on Monday, Wednesday and Friday. The aerobic dance program progressed every two weeks, starting with a focus on the lower body, upper body and total body. The training heart rate was taken to ensure the participant's heart rate was in the range of 65% to 85% of HRmax. The aerobic dance program was led by one of the researchers who she has profusely experience in conducting aerobic dance sessions.

Statistical Analysis

All collected data were analyzed using the IBM SPSS Statistics software Version 26. The Kolmogorov-Smirnov revealed normal data distributed in all variables of interest ($p > .05$). Descriptive statistics for all variables were presented in mean and standard deviation (M ± SD). A repeated measure analysis of variance (ANOVA) was conducted to examine the effect of aerobic dance on BMI, body fat percentage, and aerobic fitness. The significant level was set at .05 ($p < .05$).

Results

Table 1 examines the BMI, body fat percentage and aerobic fitness changes across the pre to post-test between the AER and CON. The interaction between time and groups on BMI was significant ($p < .05$), $\eta p^2 = 0.284$ with a moderate effect size. The main effect of the two conditions on BMI was not statistically significant ($p > .05$), $\eta p^2 = 0.001$ in the two groups, in which AER showed and a reduction in BMI but not in CON (Figure 1a). The main effect comparing the AER and CON was not significant, with a small effect size ($p > .05$), $\eta p2 = 0.12$. The BMI score decreased over time in AER with a large slope in post-test. However, there was an increase in BMI in CON from pre-test to post-test (Figure 2a).

For body fat percentage, there were changes in both AER and CON. The interaction between time and groups on body fat percentage was significant ($p < .05$), $\eta p^2 = 0.13$ with a small effect size. The main effect of the two conditions on body fat percentage was statistically significant ($p < .05$), $\eta p^2 = 0.13$ with AER showing a reduction in body fat percentage across the pre-test and post-test but not in CON (Figure 2b). The main effect comparing the AER and CON was not significant, with a small effect size ($p > .05$), $\eta p^2 = 0.03$. The aerobic exercise program was effective in reducing body fat percentage in the AER, as evident in Figure 1b. However, the body fat percentage increased in the CON.

Table 1: Variables changes across the pre to post-test and repeated-measure analysis between AER (n=16) and CON (n=16)

AER ($n = 16$) and CON ($n = 16$).

variables	group	Pre-test	Post-test	Mean difference	
				Pre - Post	% of change
BMI (kg/m²)	AER	26.56 ± 1.50	26.13 ± 1.54	-0.43	- 1.62
	CON	25.59 ± .713	26.03 ± .863	+ 0.44	+ 1.72
	F	*p*	ηp^2		
BMI x main effect	0.001	0.99	0.001		
BMI x group	11.20	.001*	0.284		
AER vs CON	1.70	0.20	0.12		
Body fat %	AER	21.88 ± 2.75	21.63 ± 2.63	-0.25	- 0.78
	CON	22.24 ± 2.163	22.97 ± 2.17	+ 0.73	+ 2.3
	F	*p*	ηp^2		
Body fat % x main effect	4.45	0.04	0.13		
Body fat % x group	18.46	0.01*	0.38		
AER vs CON	1.00	0.33	0.03		
Acrobic fitness (sec)	AER	23.94 ± 2.19	22.31 ± 1.82	-1.63	- 6.8
	CON	24.78 ± 2.47	24.38 ± 2.42	-0.4	- 1.61
	F	*p*	ηp^2		
Aerobic fitness x main effect	46.93	0.001*	0.61		
Aerobic fitness x group	17.08	0.001*	0.36		
AER vs CON	3.49	0.07	0.10		

* Significant at < .05

For aerobic fitness, there were changes from pre-test to post-test in both AER and CON. The interaction between time and groups on body fat percentage was significant ($p < .05$), $\eta p^2 = 0.36$ with a moderate effect size. The main effect of the two conditions on aerobic fitness was statistically significant ($p < .05$), $\eta p^2 = 0.61$ with AER showed a dramatic reduction in time taken for the 2.4 km test (Figure 2c). The main effect comparing the AER and CON was not significant, with a small effect size ($p > .05$), $\eta p^2 = 0.10$. The aerobic exercise program was effective in improving aerobic fitness in the AER, as evident in Figure 2c.

Discussion

This study examined the effectiveness of an 8-week aerobic dance program with three sessions weekly on BMI, body fat percentage and aerobic fitness among overweight females. Participants attended 24 sessions with zero attrition. High adherence to the intervention program was revealed in this study, thus showing a promising design.

After 8 weeks, there was significant improvement seen in BMI, body fat percentage and aerobic fitness in AER. The BMI was reduced by 1.62%

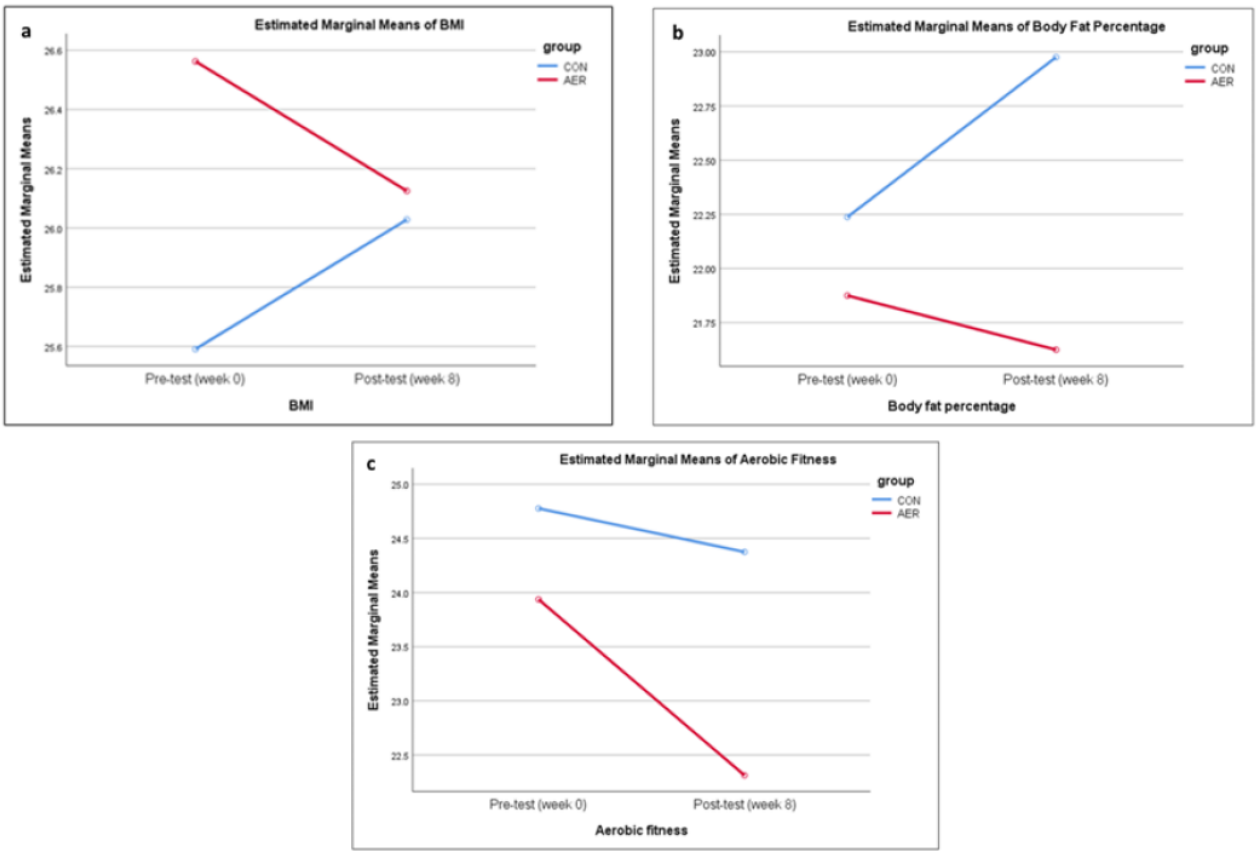

Figure 2: The means plot for pre and post measurement of BMI (2a), Body Fat Percentage (2b) and Aerobic Fitness (2c) in AER and CON

in AER compared to CON. Weight loss was expected, where regular exercise sessions per week do promote improvement in metabolism and energy expenditure. Donnelly et al. reported that females required ~240 minutes per week to achieve the 2000 kcal per week energy expenditure for weight loss to happen. This was also achieved in this very study, where a high energy expenditure was sustained through the 8-week aerobic dance program that promotes weight loss among the participants.

Body fat percentage appeared to be reduced dramatically in AER. The reduction was 0.78% showing some promised effect of the aerobic dance program on the body composition profile. After doing routine activities, a person's weight would likely reduce to do vigorous calorie burning. Many major muscles are mobilized from the top and bottom of the body. Therefore, it helps to burn extra fat as fuel for exercise activities.

Being aerobic does benefit daily activities. This study revealed a great improvement in aerobic fitness (reduced 6.8%). Aerobic dance of ~60 minutes involves highly cardiovascular activity and does adapt to a better function in the AER participants. Along with music, the exercise sessions were enjoyable and able to mask the tiring, thus improving the participants' engagement throughout the aerobic dance routine.

There was a clear reduction in the amount of weight change in AER participants. In addition, they were a significant decrease in BMI, body fat percentage, and aerobic fitness after the exercise program. The CON observed significant differences in BMI and body fat percentage; however, those differences indicated increments. The lifestyle of the CON participants, which might engage in a sedentary lifestyle, could contribute to these negative findings. This strengthens the need for sedentary and overweight individuals to regularly exercise, with at least three sessions of ~180 minutes per week of submaximal intensity exercise to enjoy health benefits

An attractive movement pattern in the aerobic danceable triggers the whole body to move and helps the process of burning calories more thus

can prevent various diseases. As a popular dan friendly form of exercise, especially among females, aerobic dance can be a very important part of improving health and reducing obesity-related diseases, such as diabetes and hypertension.

Conclusion

This study concluded that an 8-week aerobic dance intervention with submaximal intensity could considerably improve the BMI, body fat percentage and aerobic fitness among overweight females. The positive health outcomes indicate promise for the feasibility of an aerobic dance program for females who are overweight or obese. Good program adherence was attributed to this study. It is highly encouraged to design an enjoyable and preferable exercise program for the overweight population to sustain their commitment to the exercise program.

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