Original article

12-Weeks programmed aerobics dance reduced body mass index and waist circumference of young women

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Abstract:

Background: Body composition is one of the parameters to evaluate the level of physical fitness. Body composition can be assessed by simple tools like body mass index and waist circumference. This tools also usefull to predict risks for cardiovascular diseases such as metabolic syndrome and dyslipidemia in which the prevalence continues to increase worldwide. Programmed aerobic dance is one of the physical exercises that is quite popular these days that is expected can reduce body mass index and waist circumference.

Objective: To determine the effect of programmed aerobic dance on body mass index and waist circumference ***Methode:*** This pre-and post test experimental study was conducted on 33 female individuals aged 15-30 years of Jenderal Soedirman University Purwokerto, Central Java. Programmed aerobic dance as intervention was given for twelve weeks in Sisca's Gymnasium. Health status and PAR-Q (Physical Activity Readiness Quisionnaire) were assessed before enrolling this study. Body mass index and waist circumference were measured before and after intervention. For statistic analyses, basic descriptive statistics and paired t-test or Wilcoxon analyses were applied for dependent variables. ***Result:*** Programmed aerobic dance significantly reduced body mass index from 22, 89 (before intervention) to 22,34 (after intervention), $p < 0,05$. Subjects had lower waist circumference after intervention (75 cm compared with 72 cm, $p < 0,001$). ***Conclusion:*** Twelve weeks programmed aerobic dance reduce body mass index and waist circumference.

Key words: aerobic dance; body mass index; waist circumference; body composition

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Background:

The term overweight refers to excess body weight for a particular height whereas the term obesity is used to define excess body fat (World Health Organization, 2009)[1]. Based on fat distribution, obesity classified in to general and abdominal obesity. General obesity is characterized by the distribution of fat to all parts of the body and abdominal (central) obesity is the excessive accumulation of fat in the abdominal region which resulting in an increase of waist size. Obesity can be measured using simple parameters such as body mass index and waist circumference. This simple parameters also had associations with health risk indicators (Shen *et al.*, 2006)[2].

Nowadays, overweight and obesity and all condition related to them becomes emerging health issue. World Health Organization reported that in 2013, the proportion of adults with a body-mass index (BMI) of 25 kg/m^2 or greater is 36, 9% (36,3–37,4) in men, and 38,0% (37,5–38,·5) in women. The overall prevalence is predicted to be increased (Marie *et al.,* 2014)[3]. Physical inactivity is one of the factors for the increases of obesity and its complications. Physical inactivity levels are rising in many countries with major implications for increases in the prevalence of noncommunicable diseases and the general health of the population worldwide. According WHO report physical inactivity has been identified as the fourth leading risk factor for global mortality (World Health Organization, 2010)[4]

Individuals who are obese have higher rates of cardiovascular events over their lifetimes. Most of the evidence supports that obesity is an independent risk factor for CVD in men and women. Obesity

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becomes major risk factor of cardiovascular disease such as hypertension, cardiac failure, hypercholesterolemia elevated blood sugar and coronary heart disease (Lavie *et al.*, 2009).[5]

Exercise has long been recognized as a cornerstone of metabolic disease management and the prevention of incident metabolic disease. WHO recommended physical activity as one of the major strategy for treating diabetes mellitus, hypercholesterolemia and metabolic syndrome. *American College of Sports Medicine* (2012) recommends aerobic physical 3-5 times a week for 20-60 minutes with medium intensity is useful to maintain health fitness.

Aerobic training is characterized by the execution of cyclic exercises that carried out with large muscle groups contracting at mild to moderate intensities for a long period of time (Belay *et al.*, 2013).[6] Aerobics dance is one of the most popular collective forms of fitness in health centers and fitness clubs. Aerobic dance is held in groups lead by an instructure and accompanied with musical rythm. It has a constant intensity and is a dynamic combination of aerobic activity such as walking, marching, dancing, jogging and jumping exercise, put together in choreographed sequences (Nieman, 1993).[10] Yun (2011)[11] reported that routine aerobic dance for 12 weeks reduced Waist to Hip Ratio (WHR) in young women aged 19-21 years while Okuneye *et al*. (2010)[12] reported 6 weeks aerobic dance reduced WHR in men. This research aimed to determine the effect of 12 weeks programmed aerobic dance on body composition parameters of young women in Purwokerto, Central Java, Indonesia. The parameters also useful to predicts future risk of cardiovascular disease.

Method:

Study Design and Subjects

This quasi experimental study with pre- and post test design were performed in June-December 2013 in Jenderal Soedirman University and Sisca's Gymnasium Purwokerto, Central Java, Indonesia. The request was made for volunteeers to join this study for staff members and students of Jenderal Soedirman University. The subjects of this study is 40 female individuals aged 15-30 of Jenderal Soedirman University Purwokerto, Central Java. Inclusion criteria include: has low physical activity in the last 6 months, were in healthy condition and in fit condition to perform physical activity. Low Physical activity was determined as doing only mild physical activity for less than 30 minutes/day and less than based on FAO definition (2004) and Indonesian Ministry of Health (2005). Subjects' health status and fitness to perform physical activity was assessed with Physical Activity Readiness Questionnaire/PAR-Q before enrolling this study. Subjects who couldn't complete the intervention were excluded from the study. The patients got information about the nature and purpose of the study, and possible risks they may confront during the study and written consent is obtained before participating the study.

Intervention

Programmed aerobic dance as intervention was given for twelve weeks in Sisca's Gymnasium. Vital signs of the subjects were measured 15 minutes after doing exercises. The dance is led by a proffesional instructure three times a week with a 60 minutes duration each. The intervention were done according to the American College of Sport Medicine 2012 guidelines. The dance choreography was designed for beginner and consisted of warm-up session, actual exercises and cooling down. The warm-up session was performed in the first 10 minutes including walking and stretching the muscles. Actual exercises would then start by doing aerobic low impact and in the last 10 minutes cooling down exercises were performed to return the body to the initial state.

Data Collection

Body mass index and waist circumference were measured at the baseline before intervention and after completing the intervention. Subjects were agreed to do following things before each measurements: sleep minimal 7 hours before measurement, no intensive physical activity at least 24 hours before measurements, no smoking, no coffee and alcohol drinking before measurement. Body mass indexes were calculated based on height and weight data (kg/m2). Body weight were meassure in standing position in light clothes with empty pockets, with shoes removed using TANITA® electronic body Scale (Series BC541, United States). Height was measured with shoes removed on a wall-fixed stature meter (Onemed®, Series 1013522, Indonesia) with upright standing position with head is positioned in Frankfurt Horizontal Plane. Waist circumference was measured at midpoint between lowest rib and illiac crest with calibrated metline. The circumference was measured in stand upright position, arms streched and at the end of normal expiration. Each measurement were taken twice and the average of the measurement were calculated as the waist circumference if the measurement

Table 1. Changes in demographic and anthropometric chacteristics of the subject

Characteristic	Baseline	After intervention
Age (years)	20,20 ± 1,28	
Height (cm)	153, 89 ± 6, 05	153, 96 ± 6, 82
Body Weight (kg)	54, 27 ± 10, 18	54, 15 ± 10,35
Systolic Blood Pressure (mmHg)	105, 90 ± 9, 34	107, 70 ± 10,20
Diastolic Blood Pressure (mmHg)	72,50 ± 7, 16	71, 30 ± 8,95
Heart rate (beats/minute)	76, 50 ± 12,19	72, 70 ± 13,83
Respiration Rate (rate/minute)	21, 15 ± 2, 21	20, 65 ± 2, 47

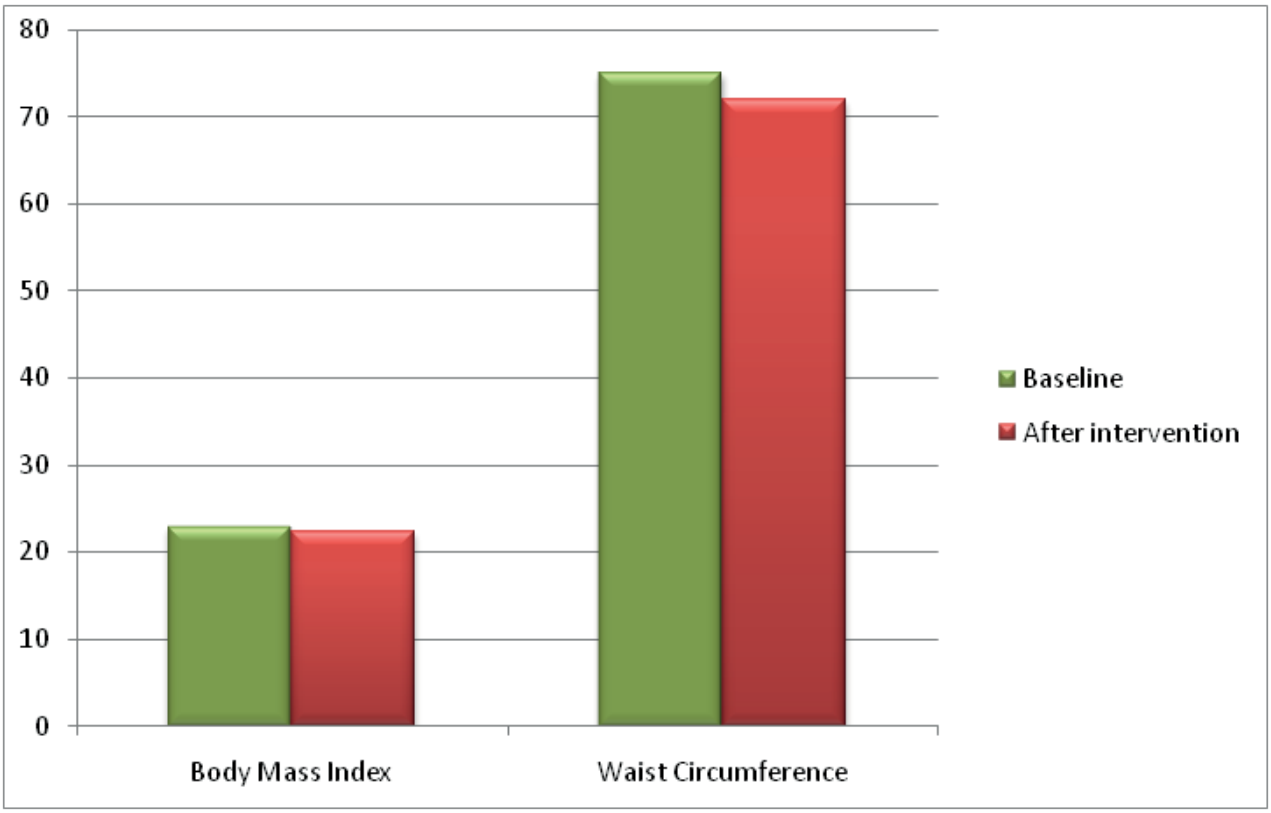

Figure 1. Body Mass Index and Waist circumference at the baseline and after 12 weeks intervention. * $p < 0,05$, ** $p < 0,001$, Wilcoxon's analyses

difference was less than 1 cm. If the difference was more than 1 cm, the measurement was repeated (WHO, 2010). The research was approved by the Ethics Committee of Jenderal Soedirman University number 006/KEPK/III/2013.

Statistical analysis

To determine a normal distribution, Saphiro-Wilk's statistical test was applied. For basic descriptive statistics, normally distributed data was expressed as mean ± SD. To determine the difference between data means at the baseline and after intervention, data were analyzed using paired t-test or Wilcoxon analyses. All analyses were performed with SPSS 15.00 software for Windows and differences between means were accepted significant at $p < 0,05$.

Result:

Fourty young women aged 15-30 years involved the study and 33 subjects completed the study. Demographic and anthropometric data are presented in Tabel 1 and Figure 1.

Subjects' vital signs were within normal range at the baseline and after intervention, although there was a slight increasing in the systolic blood pressure. After 12 weeks of aerobic dance intervention, body weight were decreased from 54, 27 ± 10,18 to 54, 15 ± 10, 35 kg. The body mass index were decreased from 22, 89 (baseline) to 22,34 (after intervention), $p < 0,05$. Waist circumference were also decreased after intervention (75 cm compared

with 72 cm, $p < 0,001$).

Discussion:

This study showed that intervention with programmed aerobic dance exercise for 12 weeks reduced body composition parameters such as body weight, body mass index and waist circumference significantly. Consistent with this study, Arslan (2011)[13] reported that intervention of aerobic dance for 8 weeks reduced waist circumference, hip circumference, waist to hip ratio and suprailliac skinfold of obese women in Turkey. Mezghanni *et al*. (2012)[14] showed a reduction of body composition, lipid profile, and insulin resistance in young obese women in Africa after 12 weeks of aerobic intervention. Mezghanni also reported the reduction is increased with the intensity of the exercise. Yavari *et al*. (2012)[15] reported that aerobic training also give a significant reduction in body fat percentage if given alone or combined with resistance training in patients with type 2 diabetes.

Although some research support the result study, some other study showed inconsistency. Drobnik-Kozakiewicz *et al.*, (2013)[16] demonstrates no statistically significant changes in body composition after ten weeks of step aerobics training. Absence of changes in body composition might be due to the fact that eating patterns or calorie intake of subjects were not controlled during the research. Soon *et al*. (2013)[17] reported there was no significant difference of waist circumference before and after physical intervention combined with dietary intervention for 12 weeks. Absence of changes in waist circumference might be due to different method of intervention. The physical intervention given in Soon *et al.,* (2013)[17] was a mild physical activity consist of daily activity monitored with *lifecorder accelerometer*.

Research studies demonstrate positive effect of aerobic oriented training on fat oxidation and calorie expenditure, which can directly influence changes in body composition (Hansen *et al.*, 2007)[18]. Arobic dance can affect waist circumferenece by reducing body fat. Aerobic (endurance) exercise increases skeletal muscle capitalization and blood flow, muscular GLUT4 levels, hexokinase, and glycogen synthase activities. Aerobic exercise is also known to manage glycaemic control and cardiovascular risk factors. The American Diabetes Association (ADA) recommends at least 150 min every week of moderate-intensity aerobic physical activity or at least 90 min every week of vigorous aerobic exercise distributed over at least 3 day every week and with no more than 2 consecutive days without physical activity (Cauza *et al.*, 2005).[19]

This currect study is limited on measuring variables only before and after intervention, not adjusting with dietary intake. This study also can't explain variety of the outcome due to exercise's intensity among subjects.

Conclusion:

Twelve weeks programmed aerobic dance reduce body mass index and waist circumference among young women of Jenderal Soedirman University.

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Conflict of interest: None

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