

Effect of Aerobic Dance on Cardiorespiratory Fitness in Pregnant Women: A Randomised Controlled Trial

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Abstract

Introduction: It is recommended that healthy pregnant women should undertake moderate physical activity for 30 minutes on most days of the week throughout pregnancy^{1,4}. The aim of the present study was to evaluate the effect of a 12-week programme of twice-weekly aerobic dance classes, in addition to 30 minutes of moderate self-imposed physical activity on the remaining week days, on cardiorespiratory fitness in primiparous women.

Material and Method: This study was a secondary analysis of a randomized controlled trial comparing a group undertaking aerobic exercise with a non-exercising control group.

Results and Conclusion: This study showed that a 12-week aerobic dance programme had no effect on cardiorespiratory fitness in pregnant women. It has been reported that even small improvements in cardiorespiratory fitness may cause an overall lower mortality rate in adults^{24,25}.

Keywords: Aerobic Dance, Cardiorespiratory Fitness, Pregnancy.

Introduction

It is recommended that healthy pregnant women should undertake moderate physical activity for 30 minutes on most days of the week throughout pregnancy¹⁻⁴. Observational studies have shown that pregnant women have a low level of physical activity, and few women exercise on a regular basis⁵⁻⁷. It is known that physical fitness is more important than the level of physical activity for the achievement of health benefits in the general population⁸⁻¹⁰. As such, the focus during pregnancy should be to maintain physical fitness

A Cochrane review¹¹ concluded that regular exercise during pregnancy seems to improve or maintain cardiorespiratory fitness. However, the authors stated that the studies were generally of low methodological quality of the reference list and an additional search on PubMed (up to February 2010) only identified two randomized controlled trials of high methodological quality^{12,13}. Pregnancy leads to physiological and anatomical changes that may affect women's cardiorespiratory fitness. Firstly, weight gain leads to a progressive decline in performance¹⁴. Secondly, there is an increase in blood volume and heart rate¹⁵, the maximal heart rate is reduced and the blood has a lower concentration of hemoglobin during pregnancy¹⁴. Thirdly, minute ventilation increases by almost 50%¹⁵. Hence, these changes lead to reduced reserve work capacity in pregnant women.

The aim of the present study was to evaluate the effect of a 12-week programme of twice-weekly aerobic

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dance classes, in addition to 30 minutes of moderate self-imposed physical activity on the remaining week days, on cardiorespiratory fitness in primiparous women

Material and Method: This study was a secondary analysis of a randomized controlled trial comparing a group undertaking aerobic exercise with a non-exercising control group. The study was conducted in the Physiology Department, MNR Medical College, Sangareddy. In total, 105 women were randomized to either the exercise group ($n = 52$) or the control group ($n = 53$). Of these, 62 women (exercise group, $n = 34$; control group, $n = 28$) completed baseline and post-intervention fitness.

Table 1: Aerobic dance exercise programme.

Time	Part	Intensity
5 minutes	Warm-up	
35 minutes	Aerobic dance	12 to 14 (somewhat hard) on the Borg scale
15 minutes	Muscle Exercises	12 to 15 repetitions, maximum three sets

Inclusion Criteria: Healthy primiparous women who had not participated in a structured exercise programme (>60 minutes once per week), including brisk walking (>120 minutes per week), during the past 6 months were eligible for the trial. Other inclusion criteria were gestational age of 12 to 24 weeks, and able to read and understand instructions. Those subjects who were willing to participate in the study were included after obtaining informed consent.

Exclusion Criteria:

Included: Severe heart disease, pregnancy-induced hypertension, history of two or more miscarriages, bleeding after 12 weeks of gestation, uncontrolled thyroid disease, preeclampsia, or other diseases that could interfere with participation¹.

Study Design: Randomized controlled trial

Statistical Analysis: Background variables are presented as means with standard deviations (SD) and frequencies (%). Between the groups at baseline were examined using a two-sided independent sample t-test for continuous variables, and Chi-squared test for categorical variables¹⁶. The principal analysis was based on participants who had completed both baseline and post-intervention fitness tests (exercise group, $n = 34$; control group, $n = 28$). In addition, per-protocol

analysis was undertaken based on participants with 80% adherence to the exercise protocol (19 exercise classes: exercise group, $n = 18$; control group, $n = 28$). The women in the exercise group were significantly older than the women in the control group; therefore, analysis of covariance was used to examine the difference in change in cardiorespiratory fitness between the groups¹⁷. The post-intervention score for cardiorespiratory fitness was set as the dependent variable, and baseline score and age were set as covariates¹⁸. Statistical analyses were conducted in Statistical Package for the Social Sciences Version 18 (SPSS Inc., Chicago, IL, USA), and the level of statistical significance was set at $P < 0.05$.

Results

In total, 105 women were randomized to either the exercise group ($n = 52$) or the control group ($n = 53$). Of these, 62 women (exercise group, $n = 34$; control group, $n = 28$) completed baseline and post-intervention fitness tests. Fig. 1 (see online supplementary data) shows the flow chart of participants. Since there was a high drop-out rate, only women who performed both fitness tests were included in the analyses¹⁹.

The participants' personal characteristics are shown in Table 2. Women in the exercise group were significantly older ($P = 0.03$) than

Table 2: Personal characteristics at baseline in the exercise ($n = 34$) and control ($n = 28$) groups.

Characteristic	Exercise $n = 34$	Control $n = 28$
Age (years), mean (SD)	31.5(3.2)	29.5(4.0)
Gestational week mean (SD)	17.1(3.9)	18.5(4.4)
Height (m), mean (SD)	1.68(0.1)	1.70(0.1)
Pre-pregnancy weight (kg), mean (SD)	64.9(9.5)	66.4(8.4)
Weight (kg) a, mean (SD)	68.9(9.9)	71.3(8.2)
Pre-pregnancy body mass index (kg/m ²), mean (SD)	22.9(3.2)	23.0(2.9)
Married/living together, n (%)	33(97.1)	28(100)
Daily smoker, n (%)	1(2.9)	0(0)

SD, Standard Deviation.
a Measured at baseline.

Women in the control group, Apart from age, there were no significant differences in background variables between the two groups at baseline²⁰. Furthermore, no significant differences in measurement of the outcome variables between the groups were found at baseline (Table 3).

Table 3: Oxygen uptake, work load, heart rate and rating of perceived exertion (RPE) at Levels 1, 2 and 3 in the exercise and control groups at baseline and after the intervention, and mean adjusted difference in change between the groups²¹.

Variable	Group	No. of Participants (<i>n</i>)	<i>P</i> -value of difference in change
VO2 (ml/kg/minute)			
Level 1	Exercise	34	0.48
	Control	25	
Level 2	Exercise	31	0.98
	Control	24	
Level 3	Exercise	24	0.89
	Control	19	
Work load (inclination %)			
Level 1	Exercise	33	0.14
	Control	28	
Level 2	Exercise	32	0.67
	Control	27	
Level 3	Exercise	26	0.22
	Control	21	
Heart rate (beats/minute)			
Level 1	Exercise	34	0.85
	Control	28	
Level 2	Exercise	32	0.52
	Control	27	
Level 3	Exercise	26	0.23
	Control	21	

The women in the exercise group attended a mean of 20 (SD 12) out of 24 aerobic dance classes. Eighteen of 34 women (53%) in the exercise group completed the prescribed exercise, protocol (80%) with 19 aerobic dance classes. Thirty-two of 34 women (94%) in the exercise group returned their exercise diaries. In addition to the aerobic dance classes, women in the exercise group reported a mean weekly exercise time of 90 (SD 73) minutes in their exercise diaries²². Walking was the most common form of exercise, followed by cross-country skiing, biking, muscular strength training and swimming. No exercise-related injuries or other adverse events were reported by the participants in the exercise group. Two of 28 women (7%) in the control group reported that they had exercised at a moderate level of intensity at least twice per week for a minimum of 60 minutes during the intervention period²³.

Change in cardiorespiratory fitness: The numbers of participants in the analyses vary as some participants did not continue the test to Levels 2 and 3 and because of error during tests²⁴.

Oxygen uptake: The differences in change in relative VO₂ (ml/kg/minute) between the groups were not significant at Level 1, 2 or 3 (Table 3). Nine of 34 (26%) women in the exercise group had an increase in VO₂ (ml/kg/minute) after the intervention, compared with five of 25 (20%) women in the control group (*P* = 0.56). Furthermore, there were no significant differences in change in absolute VO₂ (l/minute) between the groups at any level²⁵.

Work load: There were no significant differences between the groups in change in work load at Level 1, 2 or 3 (Table 3). Four of 33 (12%) women in the exercise

group walked at a higher inclination before onset of blood lactate accumulation after the intervention, compared with only one of 28 (4%) women in the control group ($P = 0.36$)²⁶.

Heart rate: There were no significant differences between the groups in change in heart rate at Level 1, 2 or 3 (Table 3). Both groups had a lower heart rate at onset of blood lactate accumulation after the intervention, indicating a lower intensity at the same blood lactate level. There were no differences in the proportion of women with a higher heart rate before onset of blood lactate accumulation after the intervention between the groups ($P = 0.88$)²⁷.

Rating of perceived exertion: The differences between the groups in change in RPE on the Borg scale were not significant at Level 1, 2 or 3 (Table 3). Nineteen of 34 (56%) women in the exercise group and 10 of 28 (36%) women in the control group reported a lower RPE during the post-intervention fitness test ($P = 0.13$).

Per-protocol analyses (data not shown) based on participants with $\geq 80\%$ adherence to the exercise protocol (exercise group, $n = 18$; control group, $n = 28$) did not change any of the above mentioned results²⁸.

Conclusion

A 12-week aerobic dance programme had no effect on cardiorespiratory fitness in pregnant women. Further randomized controlled trials of high methodological and interventional quality on the effect of regular exercise on cardiorespiratory fitness in sedentary pregnant women are warranted.

Conflict of Interest: Nil

Source of Funding- Self

Ethical Clearance: It was given by the institution.

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