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Research Article

THE EFFECT OF AN EIGHT-WEEK YOGA AND AEROBIC EXERCISE ON SELECTED BIOMECHANICAL PARAMETERS IN 30-40-YEAR OLD WOMEN

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ABSTRACT
The purpose of this research was to examine the effect of an eight-week yoga and aerobic exercise on selected biomechanical parameters in 30-40-year old women. The participants of this quasi-experimental research were 36 women (34.6 ± 3.7 years, 162.1 ± 5.8 cm, and 66.7 ± 10.9 kg) who were selected using accidental sampling and were randomly divided into yoga, aerobic exercise, and control groups. The yoga and aerobics group's performed their respective exercises for eight weeks (three sessions per week). The following tests were performed before and after the training program: flexibility, muscular endurance (sit-ups), anaerobic capacity (Sargent test), static balance (Stork test), dynamic balance (tandem walking test), and agility (4×9 test). Data were analyzed using the Kolmogorov-Smirnov test of normality and t-tests for independent and correlated samples. The results showed that all the parameters improved in yoga and aerobics groups compared to the controls, except for anaerobic capacity in the yoga group. Moreover, anaerobic exercise, muscular endurance, and agility were higher in the aerobics group than the yoga group. Implications for research are provided.

Keywords: *Yoga, Aerobic Exercise, Women*

INTRODUCTION
Women's sports are a critical issue in the contemporary age. Exercise and physical activity can positively influence women's health during pregnancy, breastfeeding, and old age. Inactivity in women can have negative impacts on the mental and physical health of a major part of the society, including women and children (Mirghafouri *et al.*, 2009). Physical health of young women is essential to the health of the society and can be improved with physical activity (Fazelifar, 2007).
Yoga and aerobic exercise are the most common forms of exercise in women. Yoga is an immediate knowledge and direct perception of the depth of the universe and the rules of nature. Yoga aims to attain the unity of mind, body, and spirit through exercise (asana), breathing (pranayama), and meditation (shavasana) (Villien *et al.*, 2005).
Regular yoga exercises can promote good physical and mental health (Hittleman, 2013). It consists of a series of exercises including stretching, endurance, balance, flexibility, concentration, and breathing. Several health benefits have been reported for yoga exercises, including increased joint range of motion, lower blood pressure, reduced respiration rate, strengthened cardiopulmonary fitness, enhanced body flexibility, improved muscle strength and endurance, improved balance (Fan and Chen, 2011), and increased agility, power, and speed (Gaurav, 2011).
Aerobics is a popular exercise that combines rhythmic aerobic exercise with stretching and strength training routines. Some of the health benefits of aerobic exercises are increased cardiorespiratory endurance, flexibility, agility, balance, and muscular strength and endurance, lower body fat, and higher neuromuscular coordination (Shahana, 2010). Muscular strength and endurance, flexibility, and balance are particularly important for women's health and can prevent potential risks. Previous research has shown that five biomechanical parameters are important in evaluating the effects of aerobic and yoga exercises, namely balance, flexibility, agility, endurance, and anaerobic capacity.

Shahana *et al.*, (2010) examined the effect of a 12-week aerobic exercise program on selected health-related physical fitness components in middle-aged women. They found that cardiorespiratory endurance, flexibility, abdominal strength and endurance, and body fat improved following training. Roma *et al.*, (2013) compared the effect of resistance training and aerobic exercise in elderly people. The results showed that physical fitness improved in both groups, but no significant difference was seen in the short physical performance battery, flexibility, and six-minute walking test. Olufemi and Adaeze (2012) examined the effectiveness of eight week low impact aerobic dance in the management of osteoarthritis. They reported improvement in joint (knee, hip, and trunk) flexibility and cardiovascular fitness (VO_2max).

The present research examines the effect of yoga and aerobic exercises on balance, flexibility, and endurance as important physical fitness parameters (Sadeghi, 2006). Yoga and aerobics are low-cost exercises that can be performed by people of all age groups and can have significant health benefits, especially for women. This research tries to find whether an 8-week yoga and aerobic exercise can affect certain biomechanical parameters in 30-40-year old women.

MATERIALS AND METHODS

Methods

The population of this quasi-experimental, causal-comparative research consisted of all the 30-40-year old women living in District 4, Tehran, who had registered in a fitness club (N = 500). 36 women were selected as the sample using accidental sampling and were divided into yoga, aerobics, and control groups. The yoga and aerobics groups performed an eight-week exercise program (three sessions per week). The following tests were performed before and after the training program: flexibility, muscular endurance (sit-ups), anaerobic capacity (Sargent test), static balance (Stork test), dynamic balance (tandem walking test), and agility (4×9 test). Data were analyzed using the Kolmogorov-Smirnov test of normality and t-tests for independent and correlated samples.

RESULTS AND DISCUSSION

Results

The results of the Kolmogorov-Smirnov indicated the normal distribution of the data for all the parameters. The eight-week yoga exercise program had a significant effect on static/dynamic balance, muscular endurance, flexibility, and agility of 30-40-year old women. The results of t-test showed no significant difference between the pretest and posttest scores of the control group ($P > 0.05$). Moreover, the results of paired t-test showed significant improvement in all the biomechanical parameters after 8 weeks of yoga exercises except anaerobic capacity.

The results of independent samples t-test showed that there was no significant difference between the mean anaerobic capacity of yoga and control groups ($P > 0.05$), while significant improvements were observed in static/dynamic balance, muscular endurance, flexibility, and agility of the yoga group ($P < 0.01$).

In addition, the results showed that the eight-week aerobics program had a significant positive effect on static/dynamic balance, muscular endurance, flexibility, anaerobic capacity, and agility of 30-40-year old women.

The results showed that in the aerobics group compared to the control group.

The results showed that the effect of the eight-week yoga and aerobics programs were not similar in any of the parameters.

The significance level of Levene's test was greater than 0.05 for all the parameters, indicating homogeneity of variance in all the parameters. The results of t-test for independent samples showed that there is a significant difference between the scores of the aerobics and yoga groups in muscular endurance, anaerobic capacity, and agility ($P < 0.01$), with the aerobics group having higher scores in all these parameters. However, no significant differences were observed between the yoga and aerobics groups in flexibility and static/dynamic balance ($P > 0.05$).

Table 1: A comparison of the mean scores of the aerobics and yoga groups in the studied parameters

Parameter	Group	N	Mean	SD	t-value	df	Sig.
Flexibility	Aerobics	12	36.92	7.166	-0.353	22	0.727
	Yoga	12	38.08	8.918			
Muscular Endurance	Aerobics	12	40.67	8.239	5.709	22	< 0.01
	Yoga	12	22.33	7.475			
Static Balance	Aerobics	12	13.45	14.762	0.788	22	0.439
	Yoga	12	9.83	5.884			
Dynamic Balance	Aerobics	12	9.08	3.147	-0.508	22	0.616
	Yoga	12	9.75	3.279			
Anaerobic Capacity	Aerobics	12	30.75	5.413	3.263	22	< 0.01
	Yoga	12	24.42	3.988			
Agility	Aerobics	12	10.65	1.282	-3.585	22	< 0.01
	Yoga	12	12.63	1.414			

Discussion and Conclusion

The present findings suggest that both yoga and aerobics exercises have a positive effect on flexibility, muscular endurance, and agility. Given our findings and the fact that yoga is a static form of exercise and aerobics is a dynamic one, there cannot be a significant difference between the effects of these exercises on flexibility and balance. However, the results showed that aerobics is more effective than yoga in improving anaerobic capacity, muscular endurance, and agility in women. Nonetheless, both forms of exercise can be used to improve parameters such as balance, flexibility, muscular endurance, anaerobic endurance, and agility in women. Our findings are consistent with the results of Shahana *et al.*, (2010), Roma *et al.*, (2013), and Olufemi and Adaeze (2012). Future research can examine the effects of these exercises on men or other age groups.

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