International Journal of Human Sciences
ISSN:1303-5134

Volume: 11 Issue: 2 Year: 2014

Examining of the effects of aerobic dance and step dance exercises on some hematological parameters and blood lipids

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Abstract
The aim of the study was to examine the the effects of aerobic and step dance exercises on hematological and blood lipids parameters. 32 university students were voluntarily participated in this study. They were randomly assigned to aerobic dance (N=16) and step dances (N=16). All groups were participated an hour aerobic or step dance exercise session 2 times in a week during 3 months. Wilcoxon Sign test was used to analyze pretest and posttest results of variables. As results, significant differences were found in the pre- and post-intervention scores for triglycerides (TC), red blood cell (RBC), and hematocrit (HCT) in Step dance group. Although there were decreases in triglycerides levels for both aerobic dance and step dance groups, only significant reduction was found in step dance group. Step dance exercises was better than aerobic dance in terms of increasing RBC and decreasing cholesterol, low density lipoproteins (LDL) cholesterol level. Aerobic dance exercises were better than step dance in terms of increasing high density lipoproteins (HDL). Moreover, when comparing the level of decreasing of Hemoglobin (HGB) significantly, aerobic dance group were better than step dance group. HCT increased significantly more in step dance group as compared with aerobic dance group. Step dance cause more increment than aerobic dance in terms of platetes (PLT) level. The data of this study indicates that step dance is more effective than aerobic dance in terms of decreasing LDL cholesterol, triglycerides and cholesterol for university students.

Keywords: Aerobic Dance; Step Dance; Blood Lipids; Hematological Parameters; Aerobic Exercise

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Introduction

Regular physical activities should be an integral part of an active lifestyle of human life. Programs including such activities are more effectively being applied in the prevention and elimination of health problems, especially those that are the result of decreased movement, inadequate nutrition and excessive nervous tension. An active life style increases energy, vitality, helps change bad habits, improves health, and strengthens one's energy and desire for life (Mavric, Kahrovic, Muric & Radenkovic, 2014).

Dance is a kind of physical activity generally advised for protecting dexterity, muscle tone, and coordination (Sofianidis, Hatzitaki, Douka & Grouios, 2009). "Aerobic dance" is called as a certain form of aerobic exercise. Aerobic dance classes generally include rapid stepping patterns while step dance compromise stepping up and down on a single bench in choreographed, group-led movements to cadenced musical arrangements and this patterns with stepping on an elevated bench followed by floor work which includes upper and lower body calisthenics, abdominal endurance exercises, and stretching (Nandhini, 2013; Hallage et al. 2010; Mosher, Ferguson and Arnold, 2005).

Exercise can influence the blood parameters. Physical and physiological responses have great importance in hematology (Astrand & Rodalf, 1986). There are some different studies in the literature which yielded mixed results of exercise on hematological values. Some studies report that aerobic and aerobic exercises affects hematological values (Ricci, Mosatti, Vitali, Vedovate & Zanotti, 1988; Schumacher et al. 2000; Wu et al. 2004; Karakoc, Duzova, Polat, Emre & Arabaci, 2005; Cakmakci, 2009; MohammadNajad, Kandi, Shahidi, MohammadNajad & Masoudian, 2012; Hammouda et al. 2012; Koushi, Mollanovruzib & Rashidlamirc, 2013; Gnanou et al., 2014; Itagi, Veena & Patil, 2014; Findikoglu et al. 2014; Profil, 2014f), Some of them found that exercise do not affect hematological values (Spiropoulos and Trakada, 2003).

The effects of exercise training and physical activity on body fat percents and serum lipid profiles were studied but the influences of different types of exercises and combination of them on body fat percents and serum lipid profiles has rarely been investigated (Ossanloo, Najar and Zafari, 2012). Some studies indicated that exercises cause favorable changes in lipids and lipoproteins (Tran & Weltman, 1985; King, Haskell, Young, Oka & Stefanick, 1995; Durstine et al. 2001; Colakoglu and Senel, 2003; Kelley & Kelley, 2007; Akdur, Sözen, Yiğit, Balota & Güven, 2007; Trejo-Gutierrez & Fletcher, 2007; Narayani and Sudhan, 2010; Hazar, Koç & Hazar, 2010; Guo et al. 2011; Ha & So, 2012; Marandi, Abadi, Esfarjani, Mojtahedi & Ghasemi, 2013; Godara & Bishnoi, 2013; Lee, Kim & Jaeran, 2013; Fathei, 2014; Davis, Vidyasagar & Maiya, 2014; Arnarson,

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Ramel, Geirsdottir, Jonsson & Thorsdottir, 2014; Apostolidis, Bogdanis, Kostopoulos, Souglis & Papadopoulos, 2014; Mann, Beedie & Jimenez, 2014; Choudhary and Narwal, 2014), Some of them reported that exercises have no impact on lipids and lipoproteins (Rahmaninia, Rahnama, Hojjati & Soltani, 2008; Göksu, Harutoğlu & Yiğit, 2003).

Numerous studies carried out on aerobic dance and step dance and these effect on body (Nikic & Milenkovic, 2012; Najafnia, Bararpour, Amirinejahad & Nakhaee, 2013). These have yielded mixed results of the aerobic dance and step dance on various physiological parameters of the population but there are limited studies examining the impact of step dance or aerobic dance on blood lipids (Kin İşler, 2001), some hematological parameters. The aim of the study was to examine the the effects of aerobic and step dance exercises on blood lipids and some hematological parameters.

Methods

A total of 32 volunteer university students aged 18-22 years participated in this study. They were divided two groups as aerobic-dance (N=16, 10 men and 6 women), step dance (N=16, 12 women and 4 men). Subjects in the aerobic or step dance exercise groups participated in a 12-week exercise program held 2 days per week. Each exercise session lasted ~60 min and was led by a certified instructor (Aerobic or Step dance exercise group).

Hematological Parameters: White blood cell (WBC), red blood cell (RBC), hemoglobin (HGB), hematocrit (HCT), platelet count (PLT) were taken as bases to hemotological parameters. Subjects were warned about not to eat or drink anything after 22:00 pm one day before their blood samples were taken. Blood samples were taken in laboratory between 9:00-10:00 in the morning on an empty stomach. Blood samples were taken into tubes with EDTA, hematological parameters were analysed with architect brand blood count device in laboratory.

Blood lipids measurements: Low density lipoproteins (LDL), High density lipoproteins (HDL), Total cholesterol (TC) and Triglycerides measurements were measured in Hospital laboratory.

Statistical Analysis

The arithmetic means and standard deviations of all statistical data in the study were calculated with SPSS, version 16.0 (SPSS, Chicago, IL, USA). The comparison of test assessments of the subjects with each other pretest and posttest 12-week training was performed with Wilcoxon tests, with a level of $p<0.05$ considered statistically significant.

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Results

Table 1. Aerobic dance Groups variables and Wilcoxon test Results

Variables	Aerobic Dance Group					
	N	Pre-test X±SD	Post-test X±SD	Z	P	Mean Difference (%)
Triglycerides (mg/dl)	16	100.06±39.58	89.68±40.38	-.931	.352	-10.38
Cholesterol (mg/dl)	16	157.06±20.19	157.12±21.8	-.310	.756	0.038
HDL-Cholesterol (mg/dl)	16	50.43±11.89	52.93±13.21	-1.308	.191	4.957
LDL-Cholesterol (mg/dl)	16	86.61±17.65	86.25±19.01	-.465	.642	-0.415
WBC (k/uL)	15	6.37±1.63	6.16±1.80	-.909	.363	-3.29
RBC (m/uL)	15	5.10± .52	5.09±.48	-.275	.783	-0.196
HGB (g/dL)	15	14.67±1.46	14.29±1.22	-2.101	.036*	-2.59
HCT (%)	15	43.42±4.10	44.20±3.76	-1.444	.149	1.79
PLT (K/uL)	15	245.00±49.90	250.46±53.4	-.824	.410	2.23

*p<0.05

No significant differences were found in the pre- and post-intervention scores for Triglycerides (z=-.931, p=.352), Cholesterol (z=-.310, p=.756), HDL-Cholesterol (z=-1.308, p=.191), LDL-Cholesterol (z=-.465, p=.642), WBC (z=-.909, p=.363), RBC (z=-.909, p=.363), HCT (z=-1.444, p=.149), PLT (z=-.824, p=.410) in the Aerobic dance group. Differences were observed in the Aerobic dance group, but only the differences in HGB (z=-2.01, p= .036) was statistically significant (p<0.05).

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Table 2. Step dance Groups variables and Wilcoxon test Results

Variables	Step Dance Group					
	N	Pre-test X±SD	Post-test X±SD	Z	P	Mean Difference (%)
Triglycerides (mg/dl)	14	99.00±33.52	72.31±37.04	-2.354	.019*	-17.86
Cholesterol (mg/dl)	14	168.71±48.63	156.89±30.81	-1.445	.149	-7
HDL-Cholesterol (mg/dl)	14	53.92±11.86	52.22±10.78	-.693	.488	-3.15
LDL-Cholesterol (mg/dl)	14	95.01±47.11	90.13±32.29	-.440	.660	-5.13
WBC (k/uL)	16	7.31±2.94	7.76±3.98	-.414	.679	6.15
RBC (m/uL)	15	4.80± .46	4.93±.50	-1.988	.047*	2.70
HGB (g/dL)	16	13.81±1.66	13.56±1.59	-1.269	.205	-1.81
HCT (%)	16	39.59±3.47	42.01±4.71	-2.898	.004*	6.11
PLT (K/uL)	16	252.70±88.45	259.43±62.06	-.879	.379	-2.66

*p<0.05

Significant differences were found in the pre- and post-intervention scores for Triglycerides (z=-2.354, p=.019), RBC (z=-1.988, p=.047), HCT (z=-2.898, p=.004). No significant differences were found in Cholesterol (z=-.310, p=.756), HDL-Cholesterol (z=-.693, p=.488), LDL-Cholesterol (z=-.440, p=.660), WBC (z=-.414, p=.679), RBC (z=-.824, p=.410), HGB (z=-1.269, p= .205), PLT (z=-.879, p=.379).

Discussion

Aerobic step exercise is aerobic training methods which have a great role in improvement of aerobic fitness, physical health, cardiovascular fitness and body composition profiles (Ossanloo, Najar & Zafari, 2012). In our study, we found significant differences in HGB values in Aerobic dance group. Significant differences were found in the pre- and post-intervention scores for Triglycerides, RBC, and HCT in Step dance group. Although, both aerobic dance and step dance causes reduction in triglycerides level, the reduction in step dance exercise was found to be significantly more than aerobic dance. A step dance exercise was better than aerobic dance in terms of increasing Red blood cell and decreasing Cholesterol, LDL cholesterol level. An aerobic dance exercise was better than step dance in terms of increasing HDL cholesterol. HGB significantly more decreased in aerobic dance group as compared with step dance group. This reduction may be

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associated with malnutrition rather than exercise. HCT significantly more increased in step dance group as compared with aerobic dance group. The consequence of HCT increment might be increased viscosity of the blood (Hu et al., 2008). The reason of increase in hematocrit volume can be explained as depending on hemoconsantration and transferring of high volume hematocrit from splenic circulation to circular circulation (Guyton & Hail, 2000). Step dance cause more increment than aerobic dance in terms of Platetes level. The reason of increase in platetes level can be expressed with hemoconcentration depend on exercise as well as increase in the number of blood-platelets due to the factors putting the body under stress and that this stress induce nervous system activity (Gunay, Tamer & Cicioglu, 2006).

Blood Lipids

Shari, Aiman and Yusof (2014) reported that after 9 weeks exercise programme, significant reductions were found in both land-based and water-based aerobic dance exercise groups on triglycerides, and HDL across three observation periods. However, only triglycerides and HDL showed significant differences between land-based aerobic dance and Water-based aerobic dance group which elicited greater improvement compared to land-based aerobic dance on triglycerides and HDL. Farooque, Singhal, Aslam and Khan (2014) stated that total cholesterol, triglyceride and low density lipoprotein levels were found to be significantly lower in distance runners as compared to football players and basketball players . Whereas High Density Lipoprotein (HDL) level was found to be significantly increased in runners as compared to other groups. Öztürk, Saygın and İrez (2013) indicated that 12 weeks of aerobic training have positive effects on HDL, LDL, total Cholesterol, triglycerides in exercise group performed aerobic exercises at intensity obese boys. Ossanloo, Zafari and Najar (2012) investigated the effects of 12 weeks combination training included aerobic dance, step exercise and resistance training on body fat percents and serum lipid profiles in sedentary females. They found that that levels of HDL-C significantly modified after 12 weeks training. There were no significant changes in total cholesterol, triglyceride and LDL-C. These results indicated that moderate intensity combined training included aerobic dance, step exercises and resistance training have positive effect on some serum lipid profiles and body fat percents in sedentary females. Seok-Am and Seung-Suk (2012) found significant differences in Total cholesterol, triglyceride, HDL-C, and LDL-C levels of exercise group after 12 weeks bowing aerobic dance programme by obese middle-aged women. Parthiban, SekarBabu, Krishnaswamy and Balakrishnan (2011) reported that running exercise found to be more effective in retaining the HDL and altering the coronary risk factors than walking and jogging twelve weeks of exercise training program. Narayani and Sudhan (2010) indicated that there were significant changes in total

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Cholesterol and HDL-C among obese women after aerobic training. Schiffer, Schulte and Sperlich (2008) determined that length and intensity of the Aerobic dance were not sufficient to evoke improvements in blood lipoproteins or body composition. Even though Aaerobic dance partly stresses intensive anaerobic metabolic pathways which are considered to have negative effects on blood lipoproteins low and high density blood lipoproteins were not impaired. Akdur, Sözen, Yiğit, Balota and Güven, (2007) examined the effects of three different exercise regimens on physical and physiological fitness parameters in 60 sedentary obese female subjects without hypertension, diabetes, or cardiovas- cular disease.They showed that total cholesterol changed significantly at the end of the study in step aerobic exercise. While Low Density Lipoprotein (LDL), triglycerides were decreased without reaching statistical significance, HDL-Cholesterol, were increased, no significant differences were found in HDL-Cholesterol, LDL-Cholesterol, Triglycerides after Step-aerobic exercise and low-calorie diet. Kin İşler (2001) examined the effect of 8 weeks of step aerobics and aerobic dancing on blood lipids and lipoproteins. The step aerobics and aerobic dancing groups participated in sessions of 45 min per day, 3 days per week for 8 weeks with 60-70 percent of their heart rate reserve. They found that a significant difference has been found between the step aerobics group and the control group and between the aerobic dancing group and the control group in total cholesterol levels. Significant difference in HDL-C levels has been found only between the step aerobics group and the control group at the end of the 8 week period. Lemura Kim and Jaeran (2000) found that significantly reduced blood concentrations of triglycerides and significantly increased blood concentrations of high-density lipoprotein-cholesterol (HDL-C) after 16 weeks of aerobic training.

Hematological parameters

Erdemir, Ökmen and Savucu (2013) stated that 6-month judo training period cause significant increases in the hematological parameters (hemoglobin and hematocrit) and the biochemical parameters (triglyceride and high-density lipoprotein) of eight internationally competitive male judokas. No significant differences were found in total cholesterol (mg/dl) low-density lipoprotein. Jothi, Rajavel and Chandraleka (2013) investigated the effect of varied aerobic exercise on selected blood parameters among hockey players. They found that there was a significant difference in red blood corpuses cell and white blood corpuses cell due to step aerobic exercise and basic aerobic exercise on college men hockey players. However, there was no significant difference between the experimental groups. Sazvar, Mohammadi, Nazem and Farahpour (2013) reported that during an 8 week aerobic morning exercise the number of red blood cells, hemoglobin levels, and hemotocrit percentage increased, number of platelets decreased

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significantly. Maria et al. (2013) reported that no statistically significant differences were found among the playing positions in all three hematological parameters (red blood cell count, hematocrit, and hemoglobin) of elite soccer players. İbiş, Hazar and Gökdemir (2010) did not find any significant change in any haematological value after aerobic exercise while they found out significant increases in HGB, HCT and WBC values right after anaerobic exercise and significant decreases in 24 hours thereafter. When we compare the same time periods of the two exercises, decreases and increases in anaerobic exercise were found to be more significant. They also reported that intensive exercise parameters and the levels of plasmaproteins and has more impact on haematological parameters moderate exercise does, which is due to the change in Haematocrit level associated with the decreased blood plasma volume during and after exercise. Çakmakçı Sanioğlu, Vatansev and Marakoğlu (2010) found that after and before the exercise of the obese and overweight groups, the understandable increase in the level of RBC, HGB, and HCT. As different from the overweight group, understandable increase in WBC has been seen. The important difference in PLT in the both groups hasn't been seen. When differences between two groups have been examined, after the exercise, the level of RBC in the obese group is higher than those in the overweight group.

Conclusion

Blood lipids as a risk factor for cardiovascular disease so It is important to keep values with the normal reference range for improving health status and a having good quality of life. Although, both aerobic dance and step dance causes reduction in triglycerides level, the reduction in step dance exercise was found to be significantly more than aerobic dance. Step dance exercises was better than aerobic dance in terms of increasing red blood cell and decreasing cholesterol, LDL cholesterol level. Aerobic dance exercises was better than step dance in terms of increasing HDL cholesterol. HGB significantly more decreased in aerobic dance group as compared with step dance group. This reduction may be associated with malnutrition rather than exercise. HCT significantly more increased in step dance group as compared with aerobic dance group. Step dance cause more increment than aerobic dance in terms of Platetes level. The reason of the increase in WBC may be due to the response of the body to exercise and nutrition differences in both exercises. The data of this study indicates that step dance are more effective than aerobic dance in terms of decreasing LDL cholesterol, triglycerides and cholesterol for university students. In the future, Studies are recommended to analyze the effect of step dance or aerobic dance on hematological parameters and blood lipids at different ages in different training intensity and frequency comprehensively.

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