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THE IMPACT OFBODY-RHYTHMEXERCISEALONG WITH USING APPLE CIDER VINEGAR ON HEMATOLOGIC AND LIPID PROFILE OF YOUNG NON-ATHLETE WOMEN

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ABSTRACT

This research aimed to investigate the impact of four weeks of body-rhythm exercise along with the consumption of apple cider vinegar on hematologic and lipid profile of young female non athletes. 16 young female non-athletes with an average age of 27.44, weight, 64.745 kg and stature163. 875 cm and body mass index of 24.035 were selected and divided into two groups, control group (practice) and experimental group(practice and consuming vinegar).The experimental group ate daily 30 ml of apple cider vinegar. Blood samples taken two days before and after the end of the exercise period were gathered for measuring the number of RBC, WBC, HCT and HB and blood lipids (TC, TG, LDL, VLDL and HDL). The data were evaluated by using the independent and correlated t-test and the significance level of $P \leq 0.05$ were accepted. In the experimental group, there was a significant reduction between the pre and post-test in the amounts of TG ،TC ،LDL and VLDL. The amount of HDL showed a significant increase after four weeks in the experimental group. But the difference was significant between the experimental and control groups in levels of TG, LDL, VLDL and HDL. But there was no significant difference in the amount of cholesterol between groups. The experimental group had a significant increase in levels of RBC, HB and HTC and after four weeks of body-rhythm exercise a significant decrease in WBC. Intergroup significant difference was found in the level

of hemoglobin, white and red blood cells. But there was no significant difference in hematocrit levels. Research findings showed that body-rhythm exercise, alongside using apple cider vinegar can cause favorable changes in some cardiovascular risk factors.

Keywords: Body-rhythm exercise, apple cider vinegar, inactive young women.

1- INTRODUCTION

With regard to the industrialization of societies and development of facilities and industrial equipments, increased immobility can be seen among individuals of the society. Certainly, to improve the quality of life and the provision of health, physical activity along with a balanced diet is necessary (Gholami et al., 2012).Lack of physical activity is a reversible risk factor for cardiovascular disease and a wide variety of other chronic diseases, such as diabetes, cancer, obesity, high blood pressure, bone and joint diseases and depression. It is recognized that the increase in low-density lipoprotein (LDL_C) and total cholesterol (CT) and low levels of high- density lipoprotein (HDL_C), are the main risk factors for coronary heart disease in women. The amount of harmful fat such as LDL, TC and triglycerides (TG) in obese people are more than the normal range (Niamen and others, 2002).

Nowadays, regular physical activity is considered as a factor for improving life quality, improving body composition, prevention of weight gain and the treatment of cardiovascular disease and metabolic disorders such as diabetes and hypercholesterolemia.Research findings have shown that regular endurance activities can increase HDL - cholesterol and lowering LDL- cholesterol. This compatibility plays an important role in reducing the risk of cardiovascular disease (Durstine and Haskell, 1994). Since controlling the feeding program is also important in maintaining health, experts recommend the use of supplements in some training conditions. Due to the side effects of taking medicinal supplements, recently, the consumption of herbal supplements is taken into consideration for the treatment and prevention of some illnesses along with physical activity. It has been reported that apple cider vinegar as a natural compound in the diet is one of the suitable supplements for consumption. Vinegar reduces total serum cholesterol and triglyceride which improves the lipid profile and reduces the risk of cardiovascular disease (Amin and Rudd, 2014). Other effects have been reported for apple cider vinegar, such as the ability for preventing high blood pressure

and also can neutralize any toxic substance that enters the body. The beta-carotene in apple cider vinegar has anti–oxidant and anti-superoxide and hydroxylation properties and can be used to treat high cholesterol diabetes and weight loss (Abdi et al., 2013).

Therefore, in this study, the impact of four weeks of body-rhythm exercise along with the consumption of apple cider vinegar was examined on the hematological profile and blood lipid profile of young female non athletes.

2- HISTORY OF THE RESEARCH

The effect of using apple vinegar on blood lipid and anthropometric indices was evaluated in type II diabetic patients suffering from dyslipidemia. Obtained findings didn't have a significant impact on serum concentrations of total cholesterol, triglycerides, LDL and HDL. Also, no difference was observed in the mean weight, body mass index and waist size between the two groups after the intervention (Bashiri *et al*., 2014).

In another study, the impact of eight weeks of periodic training along with taking apple cider vinegar on hematological profile and blood lipids was investigated in young, non-athletic men. 30 non-athletic men, through simple random, were divided into two groups, control group and experimental group (body-rhythm exercise with using vinegar). The experimental group consumed 50 ml apple cider vinegar 3 times per day. The research findings showed that the eight weeks of aerobic training along with eating apple cider vinegar, caused significant increase in the amount of red blood cells and hemoglobin. But, no change was observed in the level of hematocrit. The findings of this research indicated a significant reduction in the amount of cholesterol, TG, LDL, and VLDL after eight weeks of aerobic exercise combined with eating apple vinegarin the experimental group. Level of HDL in the experimental group showed a significant increase (3.73%) in comparison with the control group. The findings presented the effectiveness of periodic exercises along with taking apple vinegar on hematologic profile and blood lipid (Abdi et al., 2013). Also, the effect of eight weeks of aerobic, resistance, and combined exercise training was investigated on the amount of cholesterol, LDL, HDL and cardio respiratory fitness in obese men.48 obese men were randomly divided into four groups: aerobic (12 persons),resistance (12 persons), combination (12 persons) and control group (12 persons). Blood samples were taken from the subjects, before and after eight weeks of exercise (aerobic, resistance and combination

training). The research findings showed that the eight weeks of regular exercise can significantly reduce the cholesterol and LDL. But, no significant changes were seen in HDL. In total, the findings showed that the eight weeks of resistance, aerobic and compound exercises can cause beneficial effects on some cardiovascular risk indicators and it seems that performing compound exercises has higher effectiveness on cardiovascular risk factors than just doing resistance or endurance exercises (Asad, 2012).In another research, the impact of continuous and intermittent exercises was studied on some of the cardiovascular risk factors of young obese women. 36 inactive obese subjects with body mass index over 30 were selected and randomly divided into three groups of 12 subjects (periodic exercise group, continuous exercise group and the control group). The findings showed that TC and HDL significantly decreased and increased respectively in the periodic group. Also, in the continuous group, HDL significantly increased and LDL, TC, VLDL and the weight of the subjects decreased significantly. The intergroup findings showed that weight changes, VLDL, HDL, and TC was significant in the post-test of continuous, intermittent and control groups. These were meaningful differences between the control group and continuous and intermittent groups. As a result, both practice methods caused positive changes in cardiovascular risk factors (Akbar Nezhad et al., 2011).

In a research, the effects of eight weeks aerobic exercise were evaluated on hematologic indices of girls. 16 girls aged 18 to 22 years old, were non-randomly selected among university students andthe Hematologic level, the number of red blood cells, hemoglobin, red blood cells indices, serum iron, the concentration of transferring, serum ferritin and total iron binding capacity of girls was measured. Findings showed a significant decrease on indicators of Hct, RBC, Hb, serum iron, the concentration of transferring and ferritin of girls. It seems that the changes in hematological indices due to endurance exercisesis caused by the increase in plasma volume which is a beneficial compatible mechanism caused by endurance exercises (Mousavi Zadeh et al., 2009).

3- ANALYSIS

3-1- Method of investigation

This was an actual experimental study that was performed with the pre-test and post-test plan. 16young female non-athletes, volunteers of Bandar Abbas with an average age of 27.44, weight 64.745kg, height, 163.875cm and body mass index of

24.035were randomly selected. The condition for selecting volunteers; not taking drugs and supplements, individual health and lack of regular exercise training, no history of blood diseases or diseases affecting the Hematological factors. The subjects completed the consent form and health questionnaire after becoming aware of the goals and training programs of the research. Ethical issues about the participants and how to take blood samples based on ethical issues was observed in medical research. Participants, according to the age range and homogenized anthropometric characteristics were randomly divided into two groups of practice and practice-vinegar. The subjects of vinegar group were used30 ml of vinegar(in three servings, 10 ml each)every day for four weeks. All participants were asked to control their diet during the study by using food recall questionnaire and avoid taking any supplements. Polar watch was used to collect heart rate data and determine the intensity of physical activity. The maximum heart rate of the subjects was determined and 80 to 95% of the obtained HR max was used for each individual. Therefore, participants according to their age and gaining 80 to 95 percent of HR max were doing their physical activity. The protocol of sport activity for sport activity group was in this way. Before the implementation of the main plan for body-rhythm exercise, both groupswarmed up their bodies for 10 minutes with general and specific stretching movements.The periodic programincluded eight turns each three minutes with two minutes rest between every turn. Physical activity was done with 80% of maximum heart rate during the first week, 85% of maximal heart rate in the second week, 90% of maximum heart rate and 95%maximum heart rate in the last week. In the pre-test and 48 hours after the last training session, both groups were fasting and they came into the lab at a specified time (8 am).10 ml blood was drawn from veins of the forearm after 10 minutes of rest in a sitting position. Hematological indices (HB, Hct, WBC, and RBC) and levels of serum lipid profile (TC, TG, LDL, VLDL, and HDL) were measured. Also, at the beginning of the period, the height, weight and body mass index was measured to homogenize the subjects. The weight of the samples were measured by using digital scale with an accuracy of ±0.1 kg without shoes, with the least possible clothing between the hours of 8 to 10 am. Height was measured using a wall stadiometer in standing position beside the wall without shoes and while the shoulders were in a normal mode. The body mass index was calculated by using the formula (body

weight (kg) divided by the square of height (m)). Personal details and hematological indicators and lipid profile were described based onthe mean and standard deviation. Kolmogorov–Smirnov test was used to ensure the normality of data distribution and paired t-test and independent t-test were used respectively to determine the intergroup significant difference in the pre-test and post-test steps and to compare the difference between two groups. All data were analyzed in the significance level of $P \leq 0.05$ by using SPSS version 20.

3-2-THE FINDINGS

In the first stage, two-sample independent t-test was used in order to identify the individual characteristics of each group (experimental group and control group) with no significant difference with each other and with regard to this issue that the selected groups are homogeneous.

The findings of table one showed that selected groups didn't have a significant difference with each other in terms of age, height, weight and BMI (body mass index) and are homogeneous in terms of individual characteristics. Then, Kolmogorov-Smirnov test was used to ensure the normality of data distribution and the normality of data was confirmed with regard to the significant level of the test, which is higher than 0.05.

The correlated t-test was used to investigate the impact of four weeks of body-rhythm exercise along with apple cider vinegar on lipid profile of young non-athlete women. The results of this test are presented in table 2.

Given that the significant level of variables, (0.273)LDL, (0.063) HDL, (0.095) VLDL, (0.19) COL and (0.594) TG is more than 0.05, no significant difference is created for these variables in the control group and it can be concluded that the average of variables is equal in pre-test and post-test for the control group. In the control group, HDL variables, cholesterol and triglycerides were increased respectively 18.4, 14.2 and 8.4% in the post-test in comparison to pre-test which was not a significant increase. Also, the variables of LDL and VLDL were decreased respectively 24.2 and 33.3% in the post-test in comparison to pre-test that was not a significant reduction.

In the experimental group, according to significant level of LDL variable which is 0.006, it can be concluded that the consumption of apple cider vinegar along with body-rhythm exercise had a significant influence on reduction of this variable (from 97.5 to 89.75) among young non-athlete women. The significant decrease in the amount of this variable is 7.9%.Also VLDL

variables, with the significance level of 0.02 (from 15.5 to 12.625), cholesterol with a significance level of0.00(from 184.75 to 143.25)and triglyceride with a significance level of 0.00(from 80.25 to 45.88) had significant reduction and the consumption of apple cider vinegar along with rhythmic exercise, significantly reduced these variables among young non-athlete women.

The amount of significant decrease for variables of VLDL, total cholesterol and triglycerides is respectively equal to 18.5, 22.4, and 42.8%. The variable of HDL with the significance level of 0.00 (from 54.75 to 86.75), had a significant increase and it can be noted that consumption of apple cider vinegar along with body-rhythm exercise can cause a significant increase in this variable among young non-athlete women. The amount of the variable's significant increase is 58.4%.

Also, to evaluate the impact of 4 weeks rhythmic exercise along with apple vinegar on lipid profile of young non-athlete women, we use correlated t-test. The results of this survey are listed in table 3.

Noting that the significant level of variables, (0.147) Hb, (0.138) WBC, (0.136) RBC and (0.488) HCT is more than 0.05,no significant difference was created for these variables in the control group and it can be concluded that the average of variables is equal in pre-test and post-test for the control group.

In the control group,the amount of hemoglobin and white blood cells, were increased respectively 3.2 and 9.5% in the post-testin comparison to the pre-test which this increase was not significant. Also, the red blood cells and hematocrit decreased respectively5.2 and 0.06 percent which this reduction was not significant. In the experimental group, the amount of white blood cells with the significance level of 0.00(from 6.85 to 4.91) had a meaningful reduction and the consumption of vinegar along with body-rhythm exercise, caused a significant decrease in the amount of white blood cells in young non-athlete women. The amount of significant decrease in white blood cells is 28.3%. Also, the amount of hemoglobin with the significance level of 0.00(from 11.5 to 12.94), the amount of red blood cells with the significance level of 0.00 (from 4.62 to 5.93), and hematocrit with the significance level of 0.00(from34.76 to 37.63), had a significant increase and it can be stated that consumption of apple cider vinegar along with the rhythmic exercise, caused a significant increase in these variables among young non-athlete women. The amount of significant increase in these variables is respectively 12.5, 28.4 and 8.3%.

We use independent t-test to check if there is a significant difference between lipid profiles after four weeks of rhythmic exercise with and without apple cider vinegar in young non-athlete women in order to investigate the difference of each variable between two control (without using vinegar)and experimental(with using vinegar)groups. The findings of this survey are shown in Table 4.

Since the significant level of variables, (0.21) LDL, (0.142) HDL, (0.159) VLDL, (0.314) COL and (0.102) TG is more than 0.05,these variables had no significant difference in the pre-test between experimental and control group and it can be concluded that the average of variables is equal for the control and experimental groups in the pre-test. In the post test, the significant level of variables, (0.00) LDL, (0.002) HDL, (0.008) VLDL and (0.016) TG, is less than 0.05, so, it can be expressed that there is a significant difference between the control group (without taking vinegar) and the experimental group (with taking vinegar) in young non-athletic women after four weeks of rhythmic exercise. But due to the significant level of cholesterol in the post-test which is 0.053, there is no significant difference for this variables between experimental and control group.

Ultimately, we use independent t-test to check if there is a significant difference between hematologic profiles after four weeks of rhythmic exercise with and without taking apple cider vinegar in young non-athlete women which the findings of this survey are shown in Table 5.

According to the significant level of variables, (0.095) Hb, (0.174) WBC, (0.315) RBC and(0.175) HTC is more than 0.05, therefore, there is no significant difference for these variables in the pre-test between experimental and control group and it can be concluded that the average of variables is equal for the control and experimental groups in the pre-test.

But, in the post test, the significant level of variables, (0.00) Hb, (0.016) WBC and(0.00) RBC is less than 0.05, so, it can be concluded that there is a significant difference between the control group (without taking vinegar) and the experimental group (with taking vinegar) in young non-athletic women after four weeks of rhythmic exercise. But due to the significant level of hematocrit in the post-test which is 0.053, there is no significant difference for this variable between the experimental and control group.

Table 1-Comparing the average of individual characteristics of subjects in the control and experimental groups

Variable	Mean ± standard deviation		P
	experimental groups	control groups	
Age (years)	29.25±6.56	25.63±4.81	0.267
Weight (kg)	70.64±16.7	58.85±3.77	0.09
Height (cm)	164.5±6.5	163.25±4.59	0.58
BMI	25.86±4.01	22.21±2.3	0.07

Table 2- Lipid profile changes after four weeks of body-rhythm exercise along with taking apple cider vinegar between pre-test and post-test.

Variable	group	Mean ± standard deviation		P
		pre-test	post-test	
LDL	Experimental	97.5±7.76	89.75±7.38	0.006
	Control	81.5±14.59	61.75±11.13	0.273
HDL	Experimental	54.75±15	86.75±12.57	0.00
	Control	47.38±11.61	56.125±19.69	0.063
VLDL	Experimental	15.5±2.98	12.625±2.13	0.002
	Control	13.5±2.67	9±2.56	0.095
COL	Experimental	184.75±26.67	143.25±17.97	0.00
	Control	142.75±53.74	163±19.43	0.19
TG	Experimental	80.25±10.57	45.88±7.18	0.00
	Control	58.25±24.9	63.125±15.14	0.594

Table 3- Hematologic profile variations after 4 weeks of rhythmic exercise along with taking apple cider vinegar between pre-test and post-test

Variable	group	Mean ± standard deviation		P
		pre-test	post-test	
Hb	Experimental	11.5±1.07	12.94 ±0.68	0.00
	Control	11.15±0.91	11.5±0.58	0.147
WBC	Experimental	6.85±1.6	4.91±0.86	0.00
	Control	5.79±1.27	6.34±1.21	0.138
RBC	Experimental	4.62±0.43	5.93±0.39	0.00
	Control	4.86±0.57	4.61±0.49	0.136
HCT	Experimental	34.76±3.37	37.63±3.29	0.00
	Control	34.85±2.64	34.66±2.37	0.488

Table 4- Comparison of changes in lipid profile after a four-weeks of rhythmic exercise along with taking apple cider vinegar between experimental and control groups

Variable	group	P	
		pre-test	post-test
LDL	Experimental	0.21	0.00
	Control		
HDL	Experimental	0.142	0.002
	Control		
VLDL	Experimental	0.159	0.008
	Control		
COL	Experimental	0.314	0.053
	Control		
TG	Experimental	0.102	0.016
	Control		

Table 5- Comparison of changes in hematologic profile after a four-weeks of body-rhythm exercise along with taking apple cider vinegar between experimental and control groups

Variable	group	P	
		pre-test	post-test
Hb	Experimental	0.095	0.00
	Control		

WBC	**Experimental**	**0.174**	**0.016**
	Control		
RBC	**Experimental**	**0.315**	**0.00**
	Control		
HTC	**Experimental**	**0.175**	**0.058**
	Control		

4- CONCLUSIONS

The findings of this research showed that four weeks of body-rhythm exercise along with using apple cider vinegar can cause a significant reduction in levels of cholesterol, triglycerides, LDL and VLDL and a significant increase in the amount of HDL at the experimental group. These findings indicate that rhythmic exercise along with supplements of apple cider vinegar can create favorable changes in prevention of some cardiovascular risk factors (lipid profile) in non-athlete women.

5. RECOMMENDATIONS

1. Based on this fact that body-rhythm exercise has different effects on blood fat, it is suggested to examine the impact of this exercise with different intensities on blood lipids.

2. According to the positive impact of apple cider vinegar on lipid profile, it is recommended to investigate the impact of apple cider vinegar with different percentages on the amount of blood lipids.

3. Given that the passage of time is an effective factor to create and display the chronic diseases, the use of apple cider vinegar can be examined and compared in a longer period of time.

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