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Effects of 12 Weeks of Interval versus Continuous Aerobic Exercise on Some New Risk Factors of Cardiovascular Disease in Overweight Female Students

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ABSTRACT

History and objectives: Inactivity is one of the major factors that lead to many health problems particularly cardiovascular diseases. The purpose of this research was to determine the effects of participation in an interval versus continuous aerobic exercise on weight reduction in addition to some selected components of serum blood including CRP and Fibrinogen of female subjects. For this purpose, a total of 45 volunteer subjects were randomly assigned into three groups of interval, continuous and control groups. The subjects in the exercising condition participated in 12 weeks of exercise program while the control groups did not participate in any regular physical activity. One day prior to the start of the exercise protocol, the subjects attended a lab where blood sample was collected. After the termination of the exercise program, similar procedure was used to collect blood sample. The exercise program was performed three times per week. The interval condition included 4 distances of 200 meters interspaced by periods of 1 to 3 minutes of active rest, whereas the continuous group ran the same distance continuously. The exercise intensity was set to 65 to 75 percent of maximum heart rate. The running distance was increased by 200 meter per week. SPSS: PC version 14 was employed to analyze the data by using one-way analysis of variance test. The results of analysis showed that despite the changes in the levels of both CRP and fibrinogen, the differences were not significant. However, there was a significant decrease in body weight of the exercising group compared to the control group. It was concluded that 12 weeks of exercise program regardless of interval or continuous activity is not sufficient o decrease the level of CRP and fibrinogen in young female subjects.

Keywords: Fibrinogen, CRP, interval, continuous, exercise

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INTRODUCTION

Inactivity is one of the major factors that lead to many health problems including obesity and cardiovascular diseases. Change in life style and the expansion of urban life styles has forced the inhabitant of such places to use various types of motor vehicles to go to work and conduct their daily affairs. Living this type of life has led to the increase of risk factors that in long run results in diseases known as the hypokinetic diseases with high incidences of life threatening diseases such as the cardiovascular, diabetes and high blood pressure [1, 2]. One of the consequences of sedentary life style is the development of atherosclerosis condition that is assumed to be a major cause of coronary heart disease [3]. For many years the major risk factors were assumed to be the undesirable changes in lipid profiles, however new evidence are pointing to other causes of disease such as the general inflammation condition and many investigations have been designed to examined the risk factors such as CRP and Fibrinogen [5-10]. Research evidence shows that increase in CRP level is associated with 2 to 5 times increase in the danger of incidence of heart problems. In regard to the types of life style and physical activity, American Heart association has warned that sedentary life style is associated with increase in the likelihood of facing heart problems [7]. There are reports that show high level of physical activity is associated with low level of fibrinogen which is to be blamed as a coagulatory factory in the incidence of heart attack [11]. Bermudez and associates (2002) showed that there is a significant association between the level of serum CRP and traditional inflammatory markers in healthy women [12]. Yarnel and associates (2004) showed that there is positive association between the fibrinogen and CRP with body mass index which is a well-known index of physical activity in both gender [13].

Gefken and associates in their study demonstrated that the level of CRP, fibrinogen and BMI of active subjects were significantly lower than the sedentary subjects [14]. Dabidi (2005) conducted a research in which two groups of wistar rats were employed to perform 12 weeks of interval versus continuous aerobic running for 5 sessions per week compared to a control group [9]. The results showed that there was a significant decrease between the exercising groups compared to the control group in regard to the in CRP level [9]. It seems like the both CRP and fibrinogen level of blood in addition to the state of body mass index are all indicators of healthy cardiovascular system [15, 16] and the types of aerobic activity may have different effect on these variables [9 , 6]. This research was designed to examine the effects of two types of aerobic exercise programs on the new inflammatory marker including fibrinogen and CRP plus body mass index of sedentary overweight girl students .

MATERIALS AND METHODS

In this quasi-experimental research, 45 apparently healthy volunteer subjects with bmi over 29 took part. They were randomly assigned into three groups (n=15). The procedures for the subjects were explained and they signed human consent forms before starting the exercise program. The first group severed as the interval exercise group and participated in 3 sessions of aerobic exercise that started with a distance of 800 meters ran at 4 intervals of 200 meters in the first week. The second group served as the continuous exercising group and ran 800 meters without any rest interval in between in the first week. The subjects were required to increase the running distance by 400 meter every week. The

interval group performed the task with rest interval between every 200 meter, whereas the continuous group ran the entire distance without rest interval. The work intensity was set to 65 to 75 percent of maximum heart rate and polar watch was employed to monitor the heart rate during the activity program. The experimental groups received complete instruction for participation in the exercise protocol. Prior to the start of the running program and at the end of every session, both group performed warm-up and cool- down exercises for 5 minutes including stretching and flexibility exercises. The control group did not participate in any regular physical activity during the research protocol. All the groups attended a lab 24 hour before the start of the protocol and at the end of the research protocol to give fasting venous blood sample. The data collected were analyzed by SPSS:PC software version 12.

RESULTS

Following the collection of data, Kolmogorov-smirnov test was used to check the normality of data and the results indicated the data showed normal distribution, therefore, one-way analysis of variance (ANOVA) and t-tests was employed to compare the groups at alpha level set to 0.05 and LSD post hoc test was used to locate the differences. The results of analysis for weight indicated that there was a significant weight reduction between the groups (p=0.009). LSD test revealed that the differences was between the weight of interval and continuous group compared to the control group (p=0,006, p=0,009). No significant differences was found between the weight of continuous and interval group (p=0. 18). These results are presented in figure 1.

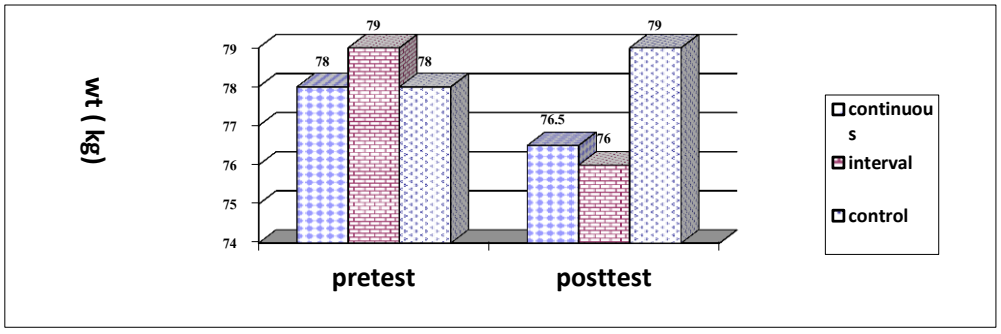

Figure 1: Weight changes in three groups in pre and post test

Similar procedure was used to examine the changes in CRP level. The results of analysis indicated that the level of CRP in both exercise groups decreased, but this change was not statistically significant. These results are presented in figure 2.

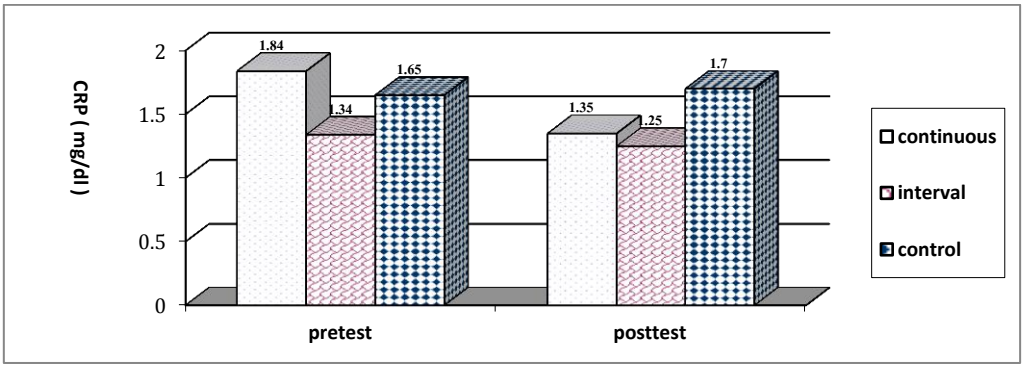

Figure 2: CRP level changes in three groups according to the testing time

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Finally, the same procedure was used to examine the changes in fibrinogen levels. The results of analysis indicated that the level of fibrinogen in both exercise groups decreased, but the changes was not statistically significant (p=0.06). These results are presented in figure 3.

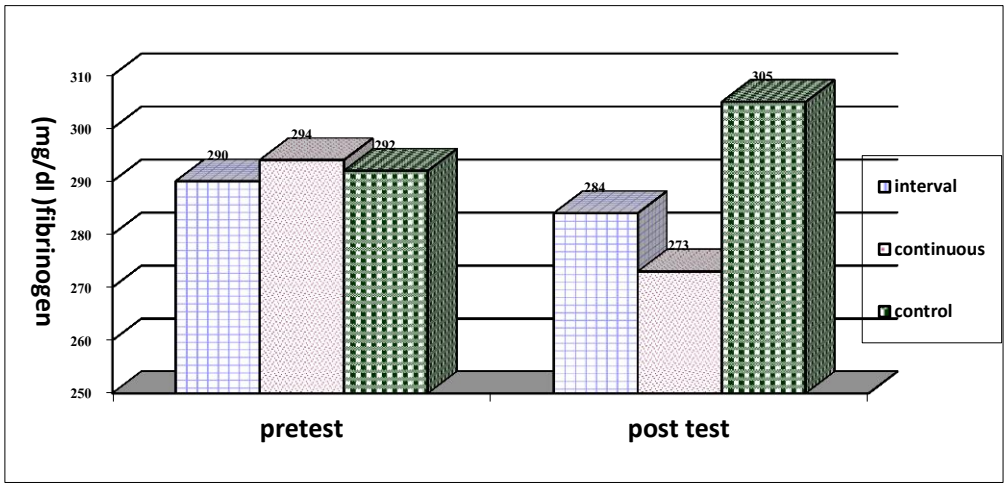

Figure 3: Fibrinogen level changes in three groups in pre and post test

DISCUSSION AND CONCLUSION

The results of this study indicated that 12 weeks of aerobic training regardless of being performed intervally or continuously had a significant reducing effect on total body weight of the sedentary overweight female subjects. These results are in agreement with the findings of other investigators who reported that aerobic exercise results in weight reduction [5, 17, 18].

Participation in exercise and physical activity is a mean by which weight reduction becomes feasible. A number of researchers claim that when calorie intake is restricted, physical activity have less effect on weight reduction [19]. Several researchers have indicated that in people with normal weight, the increase in calorie expenditure is associated with increase in food consumption [20]. On the contrary, the obese individuals do not increase their food intake or even lower it in response to exercise [21].

The results of this research showed that 12 weeks of interval or continuous aerobic exercise results in decrease of serum CRP and fibrinogen level of obese sedentary female subjects, however these changes are no statistically significant. Such condition may be attributed to factors such as the sample size, exercise intensity or the duration in which the exercise programs lasted. However, the statistical significance may not matter when the practical significance is the determining factor for facing life threatening condition such as heart attack or stroke. The results of this research were similar to the findings of other investigators who did not report any significant effect of aerobic exercise on CRP and fibrinogen level [9, 22, and 23]. It has been shown that CRP and fibrinogen level do decrease significantly in response to longer period and higher work intensities as was demonstrated by Taylor and associates (2002) and Fontaine and associates (2003) previously (24, 25).

Finally, it was concluded that participation in regular interval or continuous aerobic exercise is an effective mean of lowering the new risk factors that are associated with cardiovascular disease. Further research are needed to examine the effects of longer period of aerobic exercise performed at higher intensity with larger sample sizes to make firm conclusions in regard to prescribing more effective exercise regime for the overweight individuals. In addition, both types of exercise are effective in reducing the weight in overweight female individuals.

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