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To Investigate the Fibrinogen and Some of Coagulation Factors in Anaerobic Exercise Training Women

[1]Parvaneh Nazar Ali and [2]Parichehr Hanachi

[1]Faculty of Physical Education and Sport Science, Alzahra University, Tehran Iran
[2] Department of Biology, Faculty of Basic Science, Biochemistry unite,
Alzahra University, Tehran-Iran

Abstract: Acute exercise causes a temporary short lasting activation of blood coagulation, platelet function, the extent of these alterations being significantly less pronounced in well trained athletes than in untrained persons. Therefore purpose of this study was to investigate the effect of anaerobic power exercise on coagulation factors in active women. The participants of this study were 30 healthy women assigned randomly to 2 groups of control (n=15) and test (n=15). The test group performance the RAST test (anaerobic power exercise), however, control group had no exercise training. Blood sample collected before and after training. Results showed mean fibrinogen and platelet increase after RAST test. We conclude that anaerobic power exercise may cause increase in platelet and fibrinogen levels in active women.

Key words: Anaerobic power · Coagulation factor · Active women

INTRODUCTION

Cardiovascular disease is the main cause of death in the world representing around 30% of all deaths [1]. The research showed that imbalance of blood coagulation system, increase of platelet concentration and disorder in platelet function is related with progress of cardiovascular disease [2].

Coagulation is consequence of biochemistry reaction, which creates with some protein of plasma. The Coagulative Cascade occur consequence harm to blood vessels, which result production of thrombin. Thrombin is the primary activator of platelets at the site of thrombus formation and a major driving force in thrombus growth [3]. Thus, thrombin inhibition is important in the treatment of acute coronary syndromes and during percutaneous coronary intervention [4].

High levels of Factor VIII activity have also been shown to be associated with atherothrombotic events in comparison with control levels [5, 6] and Factor VIII is a known acute-phase reactant [7]. There is evidence that physical activity may modify the inflammatory process. Available evidence suggests that exercise and physical training evoke multiple effects on blood hemostasis in normal healthy subjects and in patients. A single bout of exercise is usually associated with a transient increase in blood coagulation as evidenced by a shortening of activated partial thromboplastin time (APTT) and increased Factor VIII (FVIII).

Cross-sectional studies of physical activity and physical fitness have shown inverse associations with levels of fibrinogen [8-10]. Intervention studies have demonstrated reductions in fibrinogen when exercise groups are compared with controls. Fibrinogen is a coagulation factor and plasma protein, wrought in liver. Evidence show that reduced 1 g/l in fibrinogen concentration, 15% reduced in coronary disease. Fibrinogen and factor VII are independent risk factors for coronary artery disease and myocardial infarction [11, 12].

Strenuous exertion promotes a prothrombotic state1 and may trigger acute myocardial infarction [13]. Exercise may induce thrombocytosis and platelet activation in vivo and enhanced platelet reactivity in vitro [14]. Physical activity via reduced of inflammation, coagulation and obesity index, make reduced of mortality. Investigate report moderate intensity of physical activity reduced of fibrinogen and WBC. Moderate exercise has been reported to improve existent blood coagulation.

Corresponding Author: Parichehr Hanachi, Department of Biology, Faculty of Basic Science, Biochemistry unite, Alzahra University, Tehran-Iran, Tel: +982188049809 Fax: +982177498112
E-mail: hanachi_wrc@yahoo.com

Few studies exist on the relationship between the blood clotting times and exercise. The increase in clotting and fibrinolytic activity due to exercise has been widely documented in humans [15].

There are few studies on exercise on coagulation factors. Therefore, the aim of this study was to investigate the effect of anaerobic power exercise on coagulation factors in active women.

METHOD AND MATERIALS

Study Design: Thirty healthy women participated in this non-randomized study. The subjects were instructed to follow a normal lifestyle maintaining daily habits, to avoid any medications. Before the main trial, participants were taken to the weight room three times. All subjects were asked to complete a medical examination and a medical questionnaire to ensure that they were not taking any medication, were free of cardiac, respiratory, renal and metabolic diseases. The study protocol was approved by the Scientific Advisory Committee and Ethical Committee of University Alzahra University.

The participant were considering for participants in exercised group at least three times per weeks. They complete written informed consent to participate in this study. They were divide into two group, control (n=15, age= 24±1.05 yr, height= 158±6.35cm, weight= 55.3±4.47kg, BMI: 21.97±2.27kg/m^2) and test (n=15, age=22.2±1.54 yr, height= 163±6.24cm, weight= 57±6.11kg, BMI: 21.54±1.6 kg/m^2). The test group performed a RAST test (Running based anaerobic sprint test). This test is 6 stages running in 40yard with 10 second rest between stages (Table 1). The control group had no exercise training. Blood sample were collected before and after training.

Body Composition Analyzer: Height was measured in the upright position with stadiometer. Weight, body fat percentage, lean body mass, BMI and WHR measured with body composition analyzer (Inbody 3.0, Biospace Co, Ltd. KOREA).

Blood Collection: Blood samples were obtained from antecubital vein before and after training and collected in test tubes containing EDTA. Subjects were 12 h overnight fast in the any two trials. The Plasma was separated by centrifugation within 15 min of collection. The coagulation factors was determined using the system K-4500 automated hematology analyzer.

Statistical Analysis: All statistical analyses were performed with using SPSS 11.5 (Statistical Package for Social Science) and t-test was used to determine the association of each factor and to be significant was considered at p <0.05.

RESULT

The characteristic and anthropometric parameters of respondents show in table 1.

The result of Thromboplastin time and Prothromobin time of 2groups (control and test groups) were shown in table 1 and result of platelet and fibrinogen were in figure 1 and 2.

Table 1. Mean values of Tromboblastin time and prothromobin , before and after training in two groups (control and test group). *- Statistical significance was accepted at P=0.05.

The results were not significant different in thromboplastin time (p=0/126) and prothrombin time (p=0/56) between before and after the RAST test (Table 2).

The results of this study indicated that the level of platelet (10^5/µl) and fibrinogen (g/l) in test group increase after anaerobic power exercise by 2.963±2517 to 3.576±5176 and 221.70±13.87 to 245.70±18.73, respectively (Figure 1,2). The results showed that significant different were in platelet (p=0/001) and fibrinogen (p= 0/000) before compared with after RAST test.

Table 1: Physical characteristics in thirty healthy women participated (n=30).

Groups(n=30)	n	Age (year)	Height (cm)	BMI (kg/m^2)
C	15	24±1.05	158±6.35cm	21.97±2.27
T	15	22.2±1.54	163±6.24cm	21.54±1.6

*Significant level was set at *P*< 0.05. Data are expressed as mean± SEM. (C) control,(T) training group.

Table 2: missing

n= 30		Thromboplastin time(sec)	Prothromobin time(sec)
Test	Before	32.50±./84	13.16±./33
n=15	After	32.20±1.13	13.80±1.13
Control	Before	32.70±./94	13.22±./96
n=15	After	32.70±./82	13.54±1.8

*Significant level was set at *P*< 0.05. Data are expressed as mean± SEM. (C) control,(T) training group.

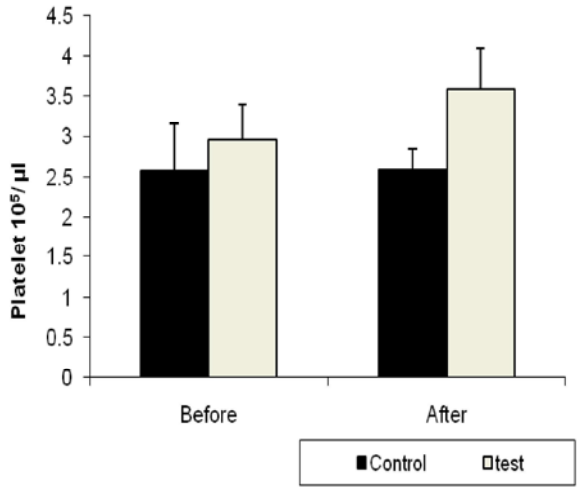

Fig. 1: Platelet count (10^5/µl) before and after the training in control and test groups. Data were mean ± S.E.M. *Statistical significance was accepted at P=0.05.

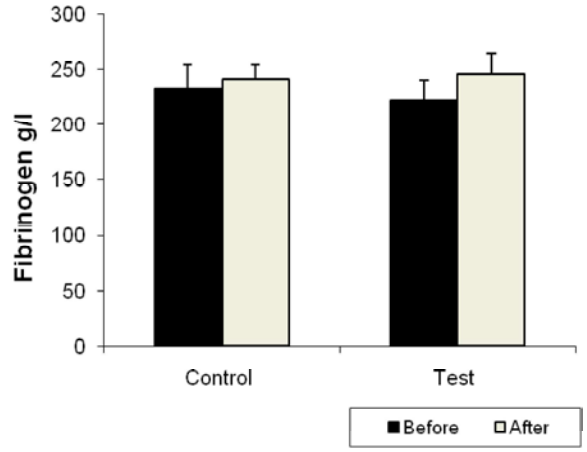

Fig. 2: Fibrinogen (g/l) value before and after training in control and test groups. Data were mean ± S.E.M. *Statistical significance was accepted at P=0.05.

DISCUSSION

Many of investigation reported beneficial effect of physical activity on prevention of cardiovascular disease. Previous studies have found that acute physical exertion may trigger an acute coronary syndrome. One of the possible explanations for this is that acute physical exertion may acutely change the haemostatic milieu in favor of increased coagulation. Increased levels of fibrinogen were shown to be associated with increased cardiovascular risk [15, 16]. The result of present study show that fibrinogen increased after RAST test. The results were in agreement with those of Cerneca and Bartesh [17, 18] and in disagreement with those of Paniccia [19]. Differences in exercise protocols, training status of the study subjects and the haemostatic markers used for the assessment of the coagulative and fibrinolytic system may lead to inconsistent results in studies evaluating the effect of exercise on haemostatic markers.

Previous study, found acute physical exercise caused increases in both fibrinolytic and coagulative parameters at peak exercise [20, 21]. However, exercise also activates fibrinolysis and a disturbed fibrinolytic response to exercise seems to have prognostic implications. The thrombotic risk during exercise will depend on the balance between platelet activity, fibrin formation and fibrinolysis. The association of physical activity with lower levels of inflammation may provide another cardio protective mechanism, although this topic has received little prior investigation. The previous studies demonstrated similar associations between physical activity and fibrinogen levels, but they focused on the procoagulant activity of fibrinogen rather than its role in inflammation.

Noradrenalin and adrenaline are likely mediators in exercise-induced platelet activation, because the plasma levels of both catecholamines are elevated and they are known to enhance platelet activity in vivo and in vitro at these levels [22]. Furthermore, exercise induced increases in blood pressure and blood flow may enhance platelet activation due to increased shear stress [23].

CONCLUSION

The present data demonstrate that anaerobic power exercise accelerates blood coagulation and activates blood fibrinolytic activity; however physical conditioning appears not to influence the haemostatic and fibrinolytic systems at rest or in response to maximal exercise. Also thromboplastin and prothromobin time did not significantly increase after exercise. This data suggested that the coagulation factors and fibrinogen were associated to intensity of training. Therefore prospective studies will be required for moderate exercise to complete these findings.

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