IJBPAS, May, 2015, 4(5), Special Issue: 633-641

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

THE EFFECT OF AEROBIC TRAINING ON IL-6 AND CRP INDEXES AND FIREFIGHTERS LIFESTYLE QUALITY

FAHIMEH BENRASHID[1], FARZANEH TAGHIAN[2], MOHAMMAD FRAMARZI[3]

1,2,3. Department of Physical Education, Islamic Azad University, Science and Research Branch, Kerman, Iran

ABSTRACT

Goal of this research the effect of 12 week exercise aerobic training on cardiovascular disease. On serum IL-6 and CRP concentration and quality wife in firemen Statically sample is composed of 30 firefighter (average age 30-45) years and 10 years Activity with defect in the under part of the body, member of firefighting organization not having particular illnesses. Study cases were chosen purposefully and divided into 2 groups of practice (16 persons), and control (11 persons). They were able to do physical practices of this research. Taking written agree men and medical questionnaire, Body composition includes: high, weight, BMI, WHR, waist circumference, sub cutaneous fat, resting blood pressure and $Vo2_{max}$ of the subjects was measured and recorded. Then, at rest and after overnight fasting, blood samples (5cc) of the tribe were the subjects of the anterior brachial vein.After evaluation of body preparation and recording the experimental group participated in aerobic exercise program (12 week, 3 sessions par week, each session 1 hour). Aerobic exercises includes: (work out by step-sport wood-Elastic Band. Experimental start 60% MHR in 1 week and the finally program (12 week) it was 85% MHR. Then again at the end of 12 week and 24 hours after last practice session, all of the variables, like pre-test, were measured. In order to compare data whiting groups was used by dependent t-test and for comparison between groups was used Independent t-test. Data were analyzed by software spss 21 Edition $(P \le 0.05)$ .The finding of this study showed that 12 weeks of aerobic exercise, weight, body fat percentage, BMI and $Vo2_{max}$, IL-6 and CRP, LDL, stomach circumference, waist, between control and experimental groups had significant differences $(P \le 0.05)$. But the systolic and

diastolic blood pressure, fasting glucose, triglycerides, HDL-c, and insulin resistance variables was not significant $(P \leq 0.05)$.

Finally, results shows 12 weeks aerobic exercise can decreasing level IL-6 and CRP and increases aerobic endurance and quality wife is beneficial firemen.

Keywords: Aerobic trainin, Interleukine-6, C - reactive protein, Fire men

INTRODUCTION

Hoffman (2006) Atherosclerosis is the leading cause of premature death and disability in developed countries. It is estimated that by 2020 the atherosclerotic disease, the leading cause of premature death and disability in the world Bashdharysvn and sisil (2005). Free radicals consisting of reactive oxygen and nitrogen species (RONS), are chemical compounds produced naturally in human body (1). They can have both positive effects (e.g. their effect on the immune system and antioxidant defense) as well as negative ones (like the oxidation of DNA, proteins, and lipids of cells) (15, 27, 28). These compounds are highly reactive and able to destroy cells by aiming at different cell parts especially the cell membrane and the internal organelle (4, 16). To limit the negative effects of free radicals, the immune system uses antioxidant defense systems, including enzyme antioxidants (catalase, glutamine peroxidase, and superoxide dismutase) as well as non-enzyme ones (like vitamins A, C, and E) (26, 3). Catalase (CAT) is an iron dependent enzyme found mainly in organelles called peroxisomes. It changes H_2O_2 to H_2O and acts like SOD. It is most active in the liver and least active in skeletal muscles (11). In skeletal muscles its activity changes with the type of the fiber, with the most activity in type one fibers (I) and the least activity in type two fibers (IIa) (2, 11). In the case of an imbalance between the production of free radicals and the antioxidant capacity, oxidative stress occurs (12, 19). As a result of oxidation homeostasis cell revival is lost. This leads to cellular and muscular damage (13, 30). An increase in the oxygen uptake during exercise is accompanied by an increase in the production of free radicals. A decrease in the negative effects of these compounds depends on the antioxidant system (9, 20). Santo-silva et al (2001) stated that intense and competitive exercise with the imposition of high proteolytic and oxidative stress can increase the liability of future cardiovascular diseases (5). Some studies show that moderate-intensity exercise goes together with structural modifications in the cardiovascular system and also muscular system (18, 14), which can decrease diseases resulting from oxidative stress (17,7). In their research, Falone et al. (6,8) analyzed the effect of exercise on systematic antioxidant capacity and resting levels of lipid peroxidation serum and damages of oxidative proteins in amateur runners in comparison with untrained people. Findings showed that long-term and moderate aerobic exercise can improve the antioxidant defense system and decrease protein oxidative processes in times of rest. Regulation of lipid oxidative stress decreases in response to a period of intense exercise (21. 29). Soccer is an intense periodic sport (10, 22) in which players undergo high body pressure in a rather long period (two 45-minute halves with a 15-minute interval). During a soccer match more than %90 of needs are satisfied via the aerobic system (9) and players run about 10 kilometers at an intensity level close to the anaerobic threshold (23). Aguilo et al (25) did a research to prove the existence of oxidative stress during exhaustive exercise and to measure the antioxidative response. In this research 8 males did mountain biking for 171 km in 270±12 minutes. Blood samples were taken before the biking, immediately after the end, and in the morning the next day. Mountain biking significantly increased the activities of glutathione reductase and catalase, oxidative stress, GSSG, and serum uric acid concentration. Triglycerides and VLDL-cholesterol increased and remained high up to 3 hours after biking. Special use of alpha-tocopherol for oxidative stress was proved during the recovery. Much oxygen intake during a soccer match can be accompanied by an increase in the production of free radicals and the imposition of oxidative stress upon players (3, 30). Currently there is little known about the oxidative stress of a soccer match upon players. Therefore, the current research aims to determine the response of indices of oxidative stress of soccer players. An increase in the production of free radicals during intense exercise can cause serious damage and inflammation to athletes. The onset of the season of matches and intense exercise for the preparation of players as well as the lack of sufficient recovery during the exercises can lead to the weakening of the immune system in confronting the oxidants and their precursors, if not trauma. There are different causes to such a decline, one of them being the intensity of exercise in a session. If coaches and athletes are aware of the stress imposed on the body in a training session they can set the duration and the intensity of the training session and the recovery period. Soccer is among combined activities, defined to include aerobic and anaerobic metabolism

(15). Therefore, players undergo significant physiologic pressures during both preparation exercises and matches. Coaches' and players' awareness of the levels of these pressures can be an effective step in designing optimum exercises so that the performance of players improves (11).

What add to the necessity of this research are the biological duties and actions of glutathione reductase (GR) and catalase (CAT) which are necessary in many bodily physiological reactions to sustain life.Since studies have many different factors associated with heart disease, but few studies have examined the prognostic indicators of inflammation and cardiovascular disease in the whether the use of a combination of aerobic exercise on serum levels of IL-6 and CRP can affect firefighters?

Quasi- experimental research that has been done in the field. Also, due to the long time of research, the use of research and in terms of practical results .Since the researcher to manipulate the independent variable to determine its impact on subsequent changes in the dependent variable pay, a prospective study. The study used a pretest-posttest control group, the subjects were initially evaluated by a medical questionnaire and Groups were randomly replaced.

The population

The research to operational firefighters from 21 stations in the city for the age range 45-30Years and 10 years were working. The sample selection criteria

The sample included 30 males operational firefighter firefighters working in Isfahan ProvinceIn the 45-30 age category and has 10 years of operational history were constituted. As sampling (purposive) selection of the sample were selected. The questionnaire for demographic data and medical records were prepared and distributed among them.aerobic exercise group (n = 16) and control group (15 cases).were ready to start exercising.

How to collect information

Sampling

Selected individuals aged 30-45 years old and 10 years' experience operating Were on fire. Were evaluated. Data on age, marital status, smoking and drug use, daily physical activity, and family history of certain diseases in the questionnaire, the respondents were using. Individuals selected to complete a consent form, and the form of semi-randomly into 2 groups (n = 16) and control (n = 11) were divided.

Data collection

After initial coordination with the relevant authorities, fire department, planning research work was carried out. Subjects were asked to measure the initial anthropometric indices such as height, weight, waist circumference, fat, and blood pressure measurements in the laboratory study of these indicators Shvnd.bd participants were present in the hall Vzshyantecubital vein by specialist laboratories, blood was taken. The blood samples were centrifuged and the separated serum samples Shd.andaz·h levels of fasting glucose, triglycerides, HDL, LDL, and insulin resistance and serum samples were taken on the same day in order to measure insulin and IL-6 and the remainder at CPR It was -70 ° C freezer.

After the initial data collection, training the next day for 12 weeks (3 months) in the Sports Hall of Fire Department Station 6 in St. Kaveh began.

The measured and calculated variables

Height and weight Waist circumference Using non-elastic tape with a precision of 1 cm, in the navel and the abdominal muscles are not contracting was measured.

Body mass index (BMI) After measuring height and weight to calculate BMI BMI is calculated using the following formula:

BMI = "weight in kilograms" / "(height in meters) 2" Gaytvn Vhal (2006) maximal oxygen uptake (Vo2max).

3 / 1- (D)] 0268/0 [= (ml kg per minute) Vo2max D = distance in meters Ayrlh and Bachl (2004) Blood pressure Blood pressure was considered as final.

Insulin (mU ml) Insulin ELISA method using kits made in Germany DRG were measured in fasting state.

Method of measuring insulin resistance Measurement of biochemical variables 5 ml of venous sitting left anterior group of subjects was performed. In both subjects' blood for 12 hours (8 pm to 8 Syh) were fasting. All the blood in the gym dedicated fire by province and technicians specialized laboratories was Aria.

Data collection

After initial coordination with the relevant authorities, fire department, planning research work was carried out. Subjects were asked to measure the initial anthropometric indices such as height, weight, waist circumference, fat, and blood pressure measurements in the laboratory study of these indicators Shvnd.bd participants were present in the hall Vzshyantecubital vein by specialist laboratories, blood was taken. It was -70 ° C freezer.

After the initial data collection, training the next day for 12 weeks (3 months) in the Sports Hall of Fire Department Station 6 in St. Kaveh began.

Statistical Analysis

The data collected in this study using the software 21SPSS Tvsyfyv inferential statistics were reviewed and analyzed. Descriptive statistics, mean and standard deviation to describe the data and inferential statistical tests to analyze the data . In the Kolmogorov-Smirnov normal distribution of the variables used to determine Grdyd.hmchnyn to compare data before and after each test. of the t-test and independent t-test was used for comparison between groups in the analysis of significance (05/0 = P) was considered.

Descriptive Statistics

Physical characteristics of the subjects Table (1), mean (SD) age, height, weight, BMI, subjects were presented. Subjects were randomly assigned 27 male firefighters who participated in this study.

Table (1) Physical characteristics of subjects

Group	BMI (kg m)		Weight (kg)		Height (mm)		Age(year)		Count
	standard deviation	mean	standard deviation	mean	standard deviation	mean	standard deviation	mean	
Experimental	4/57	27	17/50	87/23	8/46	179/06	5/38	37/75	16
Control	2/84	26/45	9/54	86/61	3/414	180/64	5/65	40/18	11
Total	3/90	26/77	14/56	86/98	6/81	179/70	5/52	38/74	27

CONCLUSION

The effects of aerobic exercise on cardiovascular disease risk factors (CRP) and also on cardio respiratory fitness was much more meaningful.CRP level and the important thing is that they all have noted that the effect of aerobic exercise on these factors have been more helpful. In conclusion, the present study is consistent with some of the research findings contradict others. The reason may be lack of control, none of research methods, the use of patterns and different ways, using different subjects, not all sex and age of the respondents knew. Notable are the results of this study are consistent with this hypothesis with the results of previous studies of aerobic exercise on inflammatory factors. Despite popular misconception, the firefighters who have high fitness, in this study it was observed that high Ndshatnd not only fitness but also to encourage regular physical activity daily and do the exercise in addition to the enthusiasm of exercise, positive psychological effects such as increased morale and happiness to arouse in them. The more important point is that aerobic exercise in operational firefighters and rescue operations, are useful in a variety of other sports.

Other variables, such as systolic and diastolic blood pressure, triglycerides, HDL, glucose, and insulin resistance, although the 12-week aerobic training showed no significant difference between control and experimental groups, but due to the reduction of the Group experimental, perhaps by increasing the number of repetitions of exercise on weekdays and appropriate to achieve the desired results. The reduction of CRP, IL-6 and 12-week aerobic training had an impact on firefighters.

REFERENCES

1. Mehrabani J, The effect of interaction of vitamin E supplements and aerobic exercise on LDH, CK, and blood lactate of non-athlete males after exhaustive exercise, Olympic Quarterly 2007; 38, pp. 17-28.
2. Namani F, Kashef M, Lari A, The effect of warm up on the relationship between CK and LDH in female athletes' recovery, Olympic 2004; 28, pp. 97-107.
3. Pirani H, Ravasi A, Kordi M, Aminian P, Rasa'i J, Kiani A, Moradi K, A comparison of effects of three kinds of strength, sprint, and endurance training on blood glutathione levels, Research in Sport sciences 2011; 9, pp. 13-24.
4. Shemshaki A, Ghanbari-Niaraki A, Rajab H, Hedayati M, Salami F, The effect of intense alpine skiing on the antioxidant status of male skiers, Iranian Journal of Endocrine glands and metabolism 2007; 9(3), pp. 291-297.

A. Eglish references

5. Aguilo A, Tauler P, Faentespina E, Tur J.A, Cordova A, Pons A, antioxidants response to oxidative stress induced by exhaustive exercise, Physiology & behavior 2005; 84, -7
6. Akkus H, Effects of acute exercise and aerobic exercise training on oxidative stress in young men and women, African Journal of Pharmacy and Pharmacology 2011; vol, 5 (16), pp. 1925-1931.
7. Andersen HR, Nielsen J, Nielsen F, Grandjean P .Antioxidative enzyme activities in human erythrocytes .J Clin Chemistry; 1997. 43: 562-68.
8. Bangsbo J. The physiology of soccer - with special reference to intense intermittent exercise. Acta Physiol Scand Suppl 1994;151:1—155.
9. Bendiksen M, Bischoff R, Randers MB, Mohr M, Rollo I, Suetta C, Bagsbo J, Krustrup P. The Copenhagen Soccer Test: physiological response and fatigue development. Med Sci Sport Exerc 44(8): 1595-603, 2012.
10. Bloomer R.J, Goldfarb A.H, wideman L, Mckenzie M.J, and Consitt L.A, Effects of acute aerobic and anaerobic exercise on blood markers of oxidative stress. Journal of Strength and Conditioning Research, 2005; 19 (2): 276-285.

11. Fallon K.E, Sivyer G, Siver k, and Dave A, The biochemical of runners in a 1600 km ultramarathon. Br J Sport Med 1999; 33: 264-269.
12. Falone S,Mirabilio A, Pennelli A, Cacchio M, Di Baldassarre A, Gallina S, Passerini A, Amicarelli F, Differential impact of acute bout of exercise on redox-and oxidative damage-related profiles between untrained subjects and amateur runners, Physiol. Res. 2010; 59: 953-961.
13. Feairheller D.L, Diaz K.M, Sturgeon K.M, Williamson S.T, Brown M.D, Racial differences in the time-course oxidative stress responses to acute exercise. JEP online 2011; 14 (1): 49-59.
14. Finaud J , G. Lac and E. Filaire, “Oxidative Stress: Relationship with Exercise and Training,” Sports Medicine, Vol. 36, No. 4, 2006, pp. 327-358.
15. Frei B, Reactive oxygen species and antioxidant vitamins: mechanisms of action, Am j Med 1994; 97:55-135.
16. Gavin .TP, Drew. JL, Kubik . CJ, Pofahl . WE and Hickner . RC ,(2007). Acute resistance exercise increases skeletal muscle angiogenic growth factor expression , Acta Physiol, 191, 139–146 .
17. Hagen S, Hudlicka O, Brown MD, Walter H, Weiss JB, and Bate A. In the human fetus, (2005). vascular endothelial growth factor is expressed in epithelial cells and myocytes, but not vascular endothelium: implications for mode of action. J Clin Endocrinol Metab 79: 316-322.
18. Klausen T, Mohr U, Ghisler and O. J. Nielsen, (2004). Maximal oxygen uptand erythropoietic responses after training at moderate altitude. 62: 376-379.
19. Laukkanen J.A, Rauramaa R, Makikallio Th, Toriola A.T, Kurl S, Intensity of leisure-time physical activity and cancer mortality in men. Br J Sports Med 2009 (doi:.1136/bjsm.2008.056713)
20. Miyazaki H, Oh-ishi Sh, Ookawara T, Kizaki T, Toshinai K, Shukoh Haga S.H, Ji l, Ohno H, Strenuous endurance training in humans reduces oxidative stress following exhausting exercise, Eur J Appl Physiol, 2001; 84: 1-6.
21. Olfert IM, Breen EC, Mathieu-Costello O, and Wagner PD,(2005). Skeletal muscle capillarity and

angiogenic mRNA levels after exercise training in normoxia and chronic hypoxia. J Appl Physiol 91: 1176–1184.

22. Packer L. Oxidants, antioxidants, nutrients and the athlete. J. Sports Sci. 1997; 15: 353-363
23. Pavlicek V,Marti S, Grad J. S. R,Gibbs C, Kol R, Wenger H,(2004), Effects of hypobaric hypoxia on vascular endothelial growth factor and the acute phase response in subjects who are susceptible to high-altitude pulmonary oedema . 81 : 497-503.
24. Pedlar CR, Whyte GP, Godfrey RJ,(2008). Pre-acclimation to exercise in normobaric hypoxia. J Appl Physiol 8:15-21.
25. Powers SK, Ji LL, Leeuwenburgh C. Exercise training-induced alterations in skeletal muscle antioxidant capacity: a brief review Med. Sci. Sports Exerc. 1999; 31(7): 987-997.
26. Radak Z, Chung H.Y, Koltai E, Taylor A.W, Goto S, Exercise oxidative stress and hormesis, Ageing Res. Rev. 2007; doi: 10.10161j.arr.2007.04.004.
27. Raymond M . Kraus , Howard W. Stallings III , Robert C. Yeager , and Timothy P. Gavin ,(2004) Circulating plasma VEGF response to exercise in sedentary and endurance-trained men, J Appl Physiol 96: 1445–1450.
28. Reilly, T., Bangsbo, J. and Franks, A. (2000) Anthropometric and physiological predispositions for elite soccer. Journal of Sports Sciences 18, 669-683.
29. Rowlans D.S, Pearce E, Abound A, Gillen J.B, Gibala M.J, Donato S, Waddington J.M, Green J.G, Tarnopolsky M.A, Oxidative stress, inflammation, and muscle soreness in an 894-km relay trail run, Eur J Appl Physiol, 2011; DOI 10.1007/s00421-011-2163-1.
30. Santo-Silva A, Rebelo M.I, Castro E.M, Belo L, Guerra A, Rego C, Quintanilha A, Leukocyte activation, erythrocyte damage, lipid profile and oxidative stress imposed by high competition physical exercise in adolescents. Clin Chim Acta 2001; 306:119-126.