Medbiotech Journal

MBTJ, 3(2): 84-88, 2019

Research Paper

The Effect of Eight Sessions of Interval Training on Aerobic Power, Body Composition and Mood of Non-Athlete Students

Hossein Ansari Mahyari*

Master in Physical Education and Sport Sciences, Gorgan, Iran

Received: 04 April 2019 Accepted: 15 May 2019 Published: 01 June 2019

Abstract

The purpose of this study was to investigate the effect of the eight sessions of interval sessions on aerobic power, appetite, body composition and mood of non-athletic students. The study had a experimental design with pretest-posttest and control group. Thirty students of Payam Noor University, Iran were randomly assigned into experimental and control groups. The training protocol of the study was a period of interval aerobic exercise in two forms, which was performed for 8 weeks, and three sessions per week. Before and after the research, they were asked to complete the mood questionnaire and their body composition and aerobic power were measured. Covariance analysis was used to analyze the data. The findings showed that 8 sessions of interval training had a significant effect on aerobic power and body composition but had no significant effect on the mood of the participants. Regarding the results of this study, intensive exercise training can be proposed as a training method for increasing aerobic power and improving body composition.

Keywords: Interval Training; Weight Loss; Mood Profiling; Body Composition

How to cite the article:
H. Ansari Mahyari, The Effect of Eight Sessions of Interval Training on Aerobic Power, Body Composition and Mood of Non-Athlete Students, Medbiotech J. 2019; 3(2): 84-88, DOI: 10.22034/mbt.2019.88389

1. Introduction

The lifestyle of inactive people and on the other hand their lack of time to engage in physical activity, and also the athlete's needs have led the researchers to design new methods by combining different training models to improve cardiovascular system, aerobic and anaerobic performances in the least time possible. An effective exercise program requires a combination of types of exercises, intensity, duration, and number of sessions for overloading different body parts and adaptation. The researchers are trying to modify these essential factors in order to maximize the desired adaptations (Bayati, 2010). The efficiency of the exercises depend heavily on the intensity, volume, time, and frequency of the exercises and the ability of the athlete; therefore, many efforts have been made so that the balance between the workload and the athlete's tolerance can be reduced (Michel, 2009). The trainers are trying to modify these essential factors to maximize the optimal adaptation. On the other hand, athletes often require a training program to reach maximum readiness in a short period of time, especially after periods of low practice and no practice (Rodas, 2000). Effective exercise programs, such as intense periodic exercises, in addition to being able to save time, can improve physiological capabilities, such as aerobic power and body composition, and also result in improving other features, such as appetite and mood. For example, according to Bickham et al. (2004), the most important indicator of maximum aerobic power is the maximum amount of oxygen

* Corresponding Author Email: hosein_ansari_mahyari@yahoo.com

consumed by an individual during activity (Memillan et al., 2005). On the other hand, mood is one of the psychological variables that is sensitive to changes in volume and intensity of trainings (Morgan et al., 1987). Initial research on swimmers has shown that after intense training periods, negative emotional components such as tension, depression, anger, fatigue, and confusion increase and become more severe (Morgan et al., 1988). Even three days of sudden increase in exercise volume will enhance total mood disorders. In general, the review of information in this area shows that the mood response to changes in volume and intensity of training is not clear. Based on the research, sports and nutritional interventions have significant effects on the cellular energy equation, the secretion of AGRP neuropeptide, appetite adjustment, and ultimately weight management and control. However, little research has been done on the effects of intense periodic exercises. Therefore, the purpose of this study was to investigate the effect of the 8 sessions of interval training on aerobic power, body composition and mood of non-athletic students.

2. Methodology

The study had an experimental design with pretest-posttest and control group. The statistical population consisted of all students of Payam Noor University, Iran, who received general physical education in the first semester of the academic year of 2018-2019. Thirty subjects were randomly selected and randomly assigned to experimental and control groups. In the research implementation stage, more detailed descriptions of the stages of the research and the methods of implementing the training protocol were provided to the subjects of the study. If they were willing to participate in the research and after obtaining written consent, they were asked to complete the mood questionnaire and their body composition was measured.

The training protocol of the study was a period of interval aerobic exercise in two forms, which was performed for 8 weeks, and three sessions per week. The intensity of the beginning of exercise in the first week was 50% of the sub-maximal heart rate, which progressively increased. The intensity of the work in the final session reached 75% HRmax. The time of the exercise started from 10 minutes and the total time in the last session was 24 minutes. The subjects also performed stretching exercises, for 5 minutes, to warm up the body before running, and after completing the work, they also performed stretching exercises, for 5 minutes, to cool down the body. There was no specific intervention in the control group, and they were advised not to do any physical activity. Using a height gauge and a weighing scale, the standing height of the subjects was measured in cm and their weight with minimum dress and no shoe was measured in kilograms. To measure the waist to hip ratio, the measurement of the smallest circumference of the waste was divided by the circumference of the hips. Body mass analyzer (inbody 720: South Korea) was used to measure body mass index and fat percentage. Bruce test was also used to determine the maximum oxygen consumption.

Maximum oxygen consumption (VO_{2max}) was measured with the help of treadmill and respiratory gas devices (Cortex Metalyzer and Cortex Metamax). The procedure was as follows: the subjects warmed up by using the treadmill for 5 minutes at a speed of 5 km / h and then Bruce test was used to determine VO2max. After finishing the Bruce test, the subjects walked at a speed of 4 km / h for 3 minutes in order to cool down, and performed 5-10 stretching exercises. The conditions for finishing the test were as follows: The patient's heart rate reached more than 90%, the maximum heart rate of subjects was more than 90% of maximum heart rate, the ratio of respiratory was up to 1.15 and the plateau of oxygen intake was achieved, despite the increase in exercise intensity. It is worth noting that reaching two of the three criteria mentioned was enough to stop the protocol (Kraus, 2004).

To measure the mood states profile of the subjects, the 65-item questionnaire of mood profile of McNeir et al. (1971) was used. After completing the training sessions, participants were asked to complete the mood questionnaire and their physical composition and aerobic power were measured. Covariance analysis was used to analyze the data. The significance level was considered 0.05.

3. Results

The descriptive information of the subjects is presented in Table 1.

Table 1. Descriptive information of subjects in the research

	Age	Weight	Height
Participants	20.8 ± 1.72	78.28 ± 3.47	175.52 ±2.88

The results of Kolmogorov-Smirnov test (K-S Z) indicated that the distribution of variables was normal. One-way analysis of covariance was used to investigate the effect of eight sessions of interval training on aerobic power, body composition and mood. In Table 2, the results of one-way analysis of covariance were reported to examine the differences between the experimental and control groups in the pre-test with the posttest.

According to table 3 of F value, aerobic power in posttest was significant at the level of 0.001. This shows that there is a significant difference between the two groups in the amount of aerobic power. The F value of the pretest of aerobic power was significant at the level of 0.001. This indicates that the pretest has a significant effect on the posttest scores. Regarding this finding, it can be said that intense interval training increase the aerobic power of the participants.

The F value of mood in the posttest is not significant at the level of 0.001, which shows that there is no significant difference between the moods of the two groups. Regarding this finding, it can be said that intense interval training does not affect the mood of the participants.

Table 2. one-way analysis of covariance (ANCOVA) results to examine the differences between the experimental and control groups

Variable	Source of change	Sum of squares	df	Mean squares	F	Sig.
Aerobic power	Pretest	2.345	1	2.345	11.278	0.001
	Group membership	11.773	1	11.773	38.244	0.001
	Error	9.788	27	0.34		
Body composition	Pretest	18.816	1	89.816	26.228	0.001
	Group membership	58.566	1	58.566	84.22	0.001
	Error	17.65	27	0.628		
Mood	Pretest	5.412	1	5.412	27.228	0.068
	Group membership	9.254	1	9.254	27.06	1.07
	Error	17.65	27	0.34		

4. Discussion and Conclusion

The purpose of this study was to investigate the effect of the eight sessions of interval training on aerobic power, appetite, body composition and mood of non-athletic students. The findings showed that eight sessions of interval training had a significant effect on aerobic power and body composition but had no significant effect on the mood of the participants. The findings indicated that interval training has a significant effect on aerobic power. The findings of this study are not consistent with the results of the research by Chamari et al. (2005), Laursen et al. (2002). Chamari et al. (2005), using the Huff practice protocol and playing in the small field, showed that the eight weeks of training did not have a significant effect on the aerobic power of the players. Laursen et al. (2004) reported that 8 intense training sessions over a four-week period did not significantly change cyclists' exhaustion times. Findings of this research are consistent with the results of researches by Morshedloo Kherad Olia and Attarzadeh Hosseini (2015), Seddiqian Rad and et al. (2013), Siahkouhian and Khodadadi (2013), Bayati et al. (2011), Bailey et al. (2009), Rakobowchuk et al. (2008), Impellizzeri et al. (2006). However, Bayati et al. (2011) investigated the effect of a periodic intensive exercise program on the aerobic and anaerobic exercise, in which it was concluded that a periodic intensive exercise, despite the very low volume with an average of two minutes each session, can improve aerobic and anaerobic performance.

In explaining these findings, many studies have reported increased activity of oxidative enzymes, indicating an increase in aerobic power (Linossier, 1993). It can be argued that lactic acid accumulation is one of the most important factors in increasing fatigue during maximum exercise activity. One of the major theories in this topic is that if the maximum oxygen consumed following the lactate accumulation is achieved at the time of activity, the athlete will be able to maintain the VO_{2max} for a longer period, thereby increasing the time until exhaustion and delayed fatigue (Gaeini, 2008). Demarle et al. (2003) showed that any increase in lactate increases the time of exhaustion (Demarle 2003). Weston et al. (1997) also observed a significant increase in buffering capacity of skeletal muscle after only 3 weeks of intense periodic exercises. They also found that the relation there is a significant relationship between running 40 kilometers of time trail and the skeletal muscle buffering capacity of heavily trained in cyclists. These findings suggest that improving aerobic exercise following intense periodic exercises may be due to increased ability to buffer the Hydrogen ion (Laursen, 2002). An increase in VO_{2max} may also be due to improved oxygen delivery to skeletal muscles by increasing the volume of impulse as well as increasing capillary and mitochondrial density, thereby increasing the oxygen uptake by active muscle (Laursen, 2002). It has also been shown that, in the short-term periods of activity with maximum intensity, metabolism, high energy phosphagen, glycolysis and oxidative metabolism, all participate in the ATP regeneration cycle (Burgomaster, 2005). It has been shown that the increased activity of the key regulatory enzymes of these energy systems contributes to the improvement of aerobic performance; hence, both the speed and frequency of exercises appear to be effective in enzymatic performance and adaptation (Ross, 2001). Billaut et al. (2009) reported that the share of energy production in a 30-second of speed exercise consists of 18% ATP, 2% phosphagen, 25% anaerobic glycolysis, and 55% oxidation (Billaut, 2009). Nevertheless, some short-term periodic stages with maximum power and short resting times between the stages increase the share of relative participation of aerobic metabolism, which is possibly due to the increased oxygen dynamics (Billaut, 2009). Probabilistic mechanisms responsible for increasing anaerobic power after training protocol can be attributed to increased muscle phosphocreatine concentration (Gaeini, 2008), anaerobic enzymes (phosphofructokinase, aldolase, lactate dehydrogenase), and changes in the profile of muscle fibers. Also, other mechanisms for improving anaerobic power in the experimental group may include neuromuscular adaptations. This type of adaptation involves increasing the motor units, the frequency and coincidence of motor units, which ultimately leads to increased power, efficiency, and coordination of muscle (Gaeini, 2008). Improving the efficiency of nerve adaptation delays fatigue and enables athletes to tolerate higher levels of lactate production. Linossier et al. (1993) reported an increase in the maximum activity of phosphofructokinase (20%) and lactate dehydrogenase (19%) after 7 weeks of intense periodic training (Linossier, 1993). Hellsten et al. (1996) showed that six weeks of intense periodic exercise significantly increased the activity of phosphofructokinase and muscle creatine-kinase enzymes, which indicates an increased anaerobic power of trained muscles (Hellsten, 1996). MacDougall et al. (1998) also found that 7 weeks of intense periodic exercise led to a significant increase in the activity of hexokinase and phosphofructokinase enzymes after the exercise (quoted by Bayati et al., 2011), which discussed that probably a part of anaerobic improvement in this study is associated with increased anaerobic enzymes. Therefore, the above-mentioned mechanisms can justify the findings of the research to improve the anaerobic performance.

Based on the present study, the body composition decreased significantly in the training group. Lowering fat mass and increasing lean body mass is one of the beneficial effects of the exercise program that helps increasing physical fitness and health. Physical activity results in special adaptations based on the type, severity and duration of the activity. Intensive interval training helped improving body composition by reducing the body fat. Exercise volume is one of the key factors in changing body composition. In their study, Jafari and Ramezani (2012) measured the effect of 8 weeks of simultaneous periodic endurance training on body composition and lipid profiles, and stated that individuals who regularly have aerobic activity often have a more balanced fat and a more favorable body composition. Regarding the results of this study, intensive interval training can be proposed as a training method for increasing aerobic power and improving body composition.

Reference

Bailey, S.J., Wilkerson, D.P., Dimenna, F.J., & Jones, A.M. (2009). Influence of repeated sprint training on pulmonary O2 uptake and muscle deoxygenation kinetics in humans. J Appl Physiol,106 (6):1875- 1887

Bayati, M., Qara Khanlou, R., Agha Ali Nejad, H., & Farzad, B. (2011). The effect of the intense periodic exercise program on the aerobic and anaerobic exercise of untrained men. Research in Sport Sciences, 9: pp. 25-40

Billaut, F., & Bishop, D. (2009). Muscle fatigue in males and females during multiplesprint exercise. Sports Med, 39(4):257-278.

Burgomaster, K.A., Hughes, S C., Heigenhauser, G.J.F., Bradwell, S.N., & Gibala, M.J. (2005). Six sessions of sprint interval training increases muscle oxidative potential and cycle endurance capacity in humans. Journal of Applied Physiology 98: 1985–1990

Chamari, K., Hachana, Y., Kaouech, F., Jeddi, R., Moussa – Chamari. I., & Wistoff, U. (2005). Endurance training and testing with the ball of young elite soccer players. Br J Sports Med. 39:24-28.

Demarle, P.A., Heugas, A.M., Slawinski, J.J., Tricot, V.M., Koralsztein, P.J., & Billat, L.V. (2003). Whichever the initial training status, any increase invelocity at lactate threshold appears as a major factor in improved time to exhaustion at the same severe velocity after training. Archives of Physiology and Biochemistry; 111 (2): 167- 176.

Gaeini, A.A., Rahnama, N., Kordi, M.R., & Khaledi, N. (2008). The relationship between vLTP and vVO2max during an incremental test to exhaustion in professional endurance runners. Sport Sciences for Health; 3 (3): 53- 56.

Hellsten, Y., Apple, F.S., & Sjödin, B. (1996). Effect of sprint cycle training on activities of antioxidant enzymes in human skeletal muscle. Journal of Applied Physiology; 81 (4): 1484- 1487.

Impellizzeri, F.M., Marcora, S.M., Castagna, C., Reilly, T., Sassi, A., Iaia, FM., & Rampinini, M. (2006). Physiological and performance effects of generic versus specific aerobic training in soccer players. Int Journal of Sports Med. 27(6): 483-92…

Jafari, A., & Ramezani, A.R. (2012). The effect of eight weeks of simultaneous periodic endurance, resistance and continuous endurance and strength exercises on strength, body composition and lipid

profiles in overweight non-athlete boys of 14 to 17 years old. biology, 15; 5-22.
Kraus, R.M., et al., (2004). Circulating plasma VEGF response to exercise in sedentary and endurance trained men .Journal of Applied Physiology. 96(4): p. 1445-1450.
Laursen, P. B., Shing, C. M., Peake, J. M., Coombes, J. S., & Jenkins, D. G. (2002). Interval training program optimization in highly trained endurance cyclists Med Sci. sports Exerc. 34, 11: 1801-1807.
Laursen, P.B., & Jenkins, D.G. (2002). The scientific basis for high intensity interval training: optimising training programmes and maximizing performance in highly trained endurance athletes. Sports Medicine; 32 (1): 53- .37
Linossier, M.T., Denis, C., Dormois, D., Geyssant, A., & Lacour, J.R. (1993). Ergometric and metabolic adaptation to a 5-s sprint training programme. Eur J Appl Physiol Occup Physiol, 67(5):408-.414
Memillan, K., Helgerud, J., Macdonald, R. & Hoff. J. (2005). Physiological adaptations to soccer specific endurance training in professional youth soccer players. Br J sports Med. 39:273-277
Morgan, W.P., Brown, D.R., Raglin, J.S., O'Connor, P.J., & Ellickson, K.A. (1987). Psychological monitoring of overtraining and staleness. Br J Sports Med. Sep;21(3):107–114.
Morgan, W.P., Costill, D.L., Flynn, M.G., Raglin, J.S., & O'Connor, P.J. (1988). Mood disturbance following increased training in swimmers. Med Sci Sports Exerc. Aug;20(4):408-14.
Morshedloo Kherad Olia, S., & Attarzadeh Hosseini, S.R. (2015). Comparison of the effect of high and moderate intensity training on an inclined plane on maximum oxygen consumption and running performance of athlete girls. The first national conference on the new achievements of physical education and sport, Chabahar, Iran.
Rakobowchuk, M., Tanguay, S., Burgomaster, K. A., Howarth, K. R., Gibala, M. J., & MacDonald, M. J. (2008). Sprint interval and traditional endurance training induce similar improvements in peripheral arterial stiffness and flow-mediated dilation in healthy humans. Am Journal of Physiol Regul Integr Comp Physiol, 295(1): R236-242.
Rodas, G., Ventura, J.L., Cadefau, J.A., Cusso, R., & Parra, J., (2000). A short training program for the rapid improvement of both aerobic and nanerobic metabolism. Eur Journal of Appl Physiol, 82: 480-486.
Ross, A. et al. (2001). Long-term metabolic and skeletal muscle adaptations to shortsprint training: implications for sprint training and tapering. Sports Med, 31(15):1063-1082.
Seddiqian Rad, M., Piri, M., and Azarbayejani, M.A. (2013). The effect of short-term HIIT periodic exercises on the aerobic power of the elite Futsal ID players. Quarterly journal of research in sports biology, third year, 10: 90 - 101
Siahkouhian, M., & Khodadadi, d. (2013). The effect of intense periodic exercises and moderate continuous training on aerobic and anaerobic indices in athlete boys. Sports Physiology Magazine, 18: 39-52.
Weston, A.R., My burg, K.H., Lindsay, F.H., Noakes, T.D., & Hawley, J.A.(1997).Skeletal muscle buffering capacity and endurance performance after high – intensity interval training by well-trained cyclist. Eur Journal of Appl Physiol, Vol 75; PP:7-.31

Al Tariq, Z. (2018). Clinical, Biochemical and Immunological Profiles of HIV Patients Developing Immune Reconstitution Inflammatory Syndrome (IRIS). MedBioTech Journal, 02(01), 21-28. doi:10.22034/MBT.2018.61528
Barbosa, F. (2018). Emergency Health Care System and its Role in National Disasters. Journal of Humanities Insights, 02(01), 14-20. doi:10.22034/JHI.2018.61425
Farzadnia, E., Hosseini, Z., & Riahi, A. (2017). Study of Hospital Quality Management and Improvement Rates in the Hospitals. Journal of Humanities Insights, 01(01), 7-11. doi:10.22034/JHI.2017.59549
Hakiminya, B., & Parnian, L. (2018). Examining the Relation between Life Style and General Mental Health. Journal of Humanities Insights, 02(02), 60-66. doi:10.22034/JHI.2018.62710
Mehrabifar, A., Mansouri, A., Gholami, K., Ghaeli, P., & Javadi, M. (2017). Investigation of Medication Errors in a Teaching Psychiatric Hospital using Chart Reviews. MedBioTech Journal, 01(02), 60-64. doi:10.22034/MBT.2017.60369