|Research Article|

Effect of Aerobic Exercise on Hematological Parameters of Football Players at University Level

Muhammad Imran
Lecturer, Department of Sports Sciences and Physical Education, University of Science and Technology Bannu,imrankhan43658@gmail.com
Samreen Abid
P.hD Scholar, Department of Sports Science and Physical Education, University of Haripur Email: samreenwaseem07@gmail.com
Reema Aman
Lecturer, Department of Sports Science and Physical Education, University of Sargodha Email: reema.aman@uos.edu.pk
Haider Zaman
Assistant Professor, Department of Sports Science and Physical Education, Government Post Graduate College, Bannu Email: haiderzamanathlete@gmail.com
Taj Mali Khan
Assistant Professor, Department of Sports Science and Physical Education, Government Post Graduate College, Bannu Email: shazen3@gmail.com
Fakiha Wadiat
P.hD Scholar, Department of Sports Science and Physical Education, Gomal University, Dera Ismail Khan Email: Fakihasports94@gmail.com
Saman Gul
P.hD Scholar, Department of Sports Science and Physical Education, Gomal University, Dera Ismail Khan Email: Rohakhan379@gmail.com

Abstract

Physical activities play an active role in the hematological parameters of human body. These changes have been found to involve in enhancement of Red Blood Cells (RBCs), White Blood Cells (WBCs) and Platelets depending on nature of exercise. Duration of exercise and intensity of the exercise also fluctuate these parameters. This study's primary goal was to examine the influence of aerobic exercise (one mile run) on hematological parameters of the football players participated in intervarsity sports competition during the year of 2021-22 from the Gomal University Dera Ismail Khan (KPK), Pakistan. The voluntarily participating individuals were divided into two groups of similar size, the Experimental Group (EG, n=15), and the Control Group (CG, n=15). One mile run test was given to experimental group while control group untreated. Keeping in view the nature of research design pre-post experimental design the researcher get the hematological parameters before and after the completion of 8 week aerobic exercise program. Auto-analyzer was used to obtain the results of hematological parameters. The anthropometric measurement along with pulse rate, diastolic and systolic blood pressure of the participant was measured. For the purpose of statistical analysis The data were evaluated using the t-test. Additionally, after the completion of 8 week exercise program the Pulse rate, BMI, Diastolic BP, Systolic BP, WBCs, RBCs and Platelets of the EG was improved as compared to the CG.

Key words: Hematological Parameters, Aerobic Exercise,Pulse Rate.

Introduction

Blood is a major factor in regulating the thermostat of human body (Isaac et al., 2013). Blood plasm performs a major role in stabilizing the human body temperature (Dutton, 2012). RBC, WBC and platelets in plasma also regulatethermostat level. In plasma 7 g/dl protein content was found in which approximately 4 g/dl of albumin is present along with 3 g/dl of globulins (Berne et al., 2008). Football is dynamic sports which need strength and stamina for quick response, therefore, aerobic exercise play an important role in maintaining long run performance without undue fatigue (Reilly, 2006). One mile run have a characteristic to improve the cardiorespiratory level of elite athletes (Hoeger et al., 2008; Turpin, 2021).

It is observed that exercise have effect on physiological components of human body, where the amount of blood along with hemoglobin increased (Uzun, 2016). A well planned exercise program has a significant effect on hematological parameters (Törpel, Peter &Schega, 2020).One can regulate how the exercise affects the blood parameters by changing its type and intensity (Ceylan et al., 2014). The values of hematological parameters can change during and after exercise, depending on the duration and intensity of exercise (İbişet al., 2010). The parameters of hematological are depends on different factors such as age, gender, exercise environment (Cengiz&Çinar, 2014). Regular exercises found to be beneficial in the increment of hematological parameters of players (Kantyka et al., 2015; Duzova et al., 2016). Nature of exercise is also a key point in the improvement of hematological parameters. As a result of aerobic exercise found to be more significant as compared to the strength training program (Çiçek, 2018). Red blood cells play an important role in oxygen carrier from lungs to muscle tissues (Mairbäurl, 2013).This study's primary goal was to examine the influence of aerobic exercise (one mile run) on hematological parameters of the football players participated in intervarsity sports competition.

Method

Football players who were all in good health were split into two equal groups by randomly. One group was comprised of 15 participants. These groups was experimental group (EG, n=15 age

24.7±1.78) and control group (CG, n=15, age 24.2±2.11). The participants of the study was football players, who were got selected for intervarsity sports competition and remained in a camp for preparation of competition. After getting the prior permission from the Advance Study and Research Board (ASRB) of the university, an informed consent form was dully filled and signed by the participants.Although the participants were the football players but Physical Activity Readiness Questionnaire was filled to get the perfect participants for the study without having any chronic and heart disease history.

One mile run was an exercise which is used to apply as an extra treatment on experimental group along with their routine training load. This aerobic exercise was started from 65% of maximum heart rate and increasingly finished at 80%.10 minute warmup and cool down exercise was mandatory for the participants of experimental group throughout the 8 week (3 days in a week). The height of the participants was measured through stadiometer by standing them bear footed with the wall. Weight was measured in kilogram (kg), pulse rate, diastolic and systolic blood pressure was measured by digital sphygmomanometer OMRON 907 (OMRON, Hoofddorp, Netherlands). Using sterile syringe venous blood sample of five millimeters (5ml) was collected from the players of both groups into EDTA bottle before and after the completion of 8 week aerobic exercise program.Hematological parameters were measured before the start and after the completion of 8 week duration of aerobic exercise.At 9:00 am a laboratory worker took a blood sample from them while they were fasting.Platelets, RBC, and WBC, which are part of hematological characteristics, were measured using an automated cell analyzer (Beckman Coulter, USA).

Statistical analysis

Descriptive statistics including mean and standard deviation were calculated using the statistical program for social science (SPSS) version 26. The t-test was used to measure the difference of aerobic exercise on anthropometric measures and hematological parameters of football players. In this study $p<0.05$ was considered as the level of significance. The Kolmogorov-Smirnov test was performed to determine whether the data were normal ($p>0.05$).

Results

Table 1 Anthropometric measurement of experimental and control group

(Mean and Standard deviation).

Variable	EG (M± Sd)	CG (M± Sd)
Age (Years)	24.7±1.78	24.2±2.11

Table 1 shows the age group of the participants. Experimental group (n=15, age=24.7±1.78), while the control group was (n=15, age=24.2±2.11).

Table 1.1

Variable	EG (M± Sd)		CG (M± Sd)	
	Before	After	Before	After
Height (cm)	180.88±1.3	180.88±1.3	183.28±2.4	183.28±2.4
Weight (kg)	66.46±1.57	65.18±1.29	67.88±3.21	68.18±2.21
BMI (kg/m^2)	20.30±1.57	19.9±4.70	20.20±1.23	20.30±2.11

Table 1.1shows the anthropometric measurements of the participants. Mean difference was observed in weight and BMI in experimental group as compared to control group after the completion of 8 week aerobic program.

Table 2 Hematological Parameters (Pre and post test data)

Variable	EG (M± Sd)		CG (M± Sd)	
	Before	After	Before	After
Pulse Rate (Beat per minute)	68.54±3.21	66.66±2.11	69.39±1.21	71.22±3.14
Diastolic BP (mm Hg)	74.65±2.11	77.33±1.17	77.68±2.21	77.21±4.34
Systolic BP (mm Hg)	119.23±2.21	121.15±3.30	118.22±2.15	118.65±3.23
RBC (10^{12}/L)	5.27±1.21	6.12±2.21	5.17±2.21	5.74±0.67
WBC (10^9/L)	5.71±2.31	7.01±3.17	5.67±3.76	5.68±2.11
Platelets (10^9/L)	231.22±0.23	239.14±1.19	229.14±3.11	230.26±4.22

Table 2 shows the hematological parameters of the players along with cardiorespiratory parameters.

Table 2.1 Hematological Parameters (Pre and post test data)

Variable	EG (M± Sd)		Sig.	CG (M± Sd)		Sig.
	Before	After		Before	After	
Pulse Rate (bpm)	68.54±3.21	66.66±2.11	.057	69.39±1.21	71.22±3.14	.989

Diastolic BP (mm Hg)	74.65±2.11	77.33±1.17	.049	77.68±2.21	77.21±4.34	.667
Systolic BP (mm Hg)	119.23±2.21	121.15±3.30	.033	118.22±2.15	118.65±3.23	.711
RBC (10^{12}/L)	5.27±1.21	6.12±2.21	.030	5.17±2.21	5.74±0.67	.221
WBC (10^{9}/L)	5.71±2.31	7.01±3.17	.004	5.67±3.76	5.68±2.11	.232
Platelets (10^{9}/L)	231.22±0.23	239.14±1.19	.010	229.14±3.11	230.26±4.22	.141

P=0.05

Table 2.1 shows a significant change in cardiorespiratory indices along with the hematological parameters of football players. All variables of hematological parameters like RBC, WBC and Platelets values found significant (<.05) in experimental group while there is no significant change observe in control group.

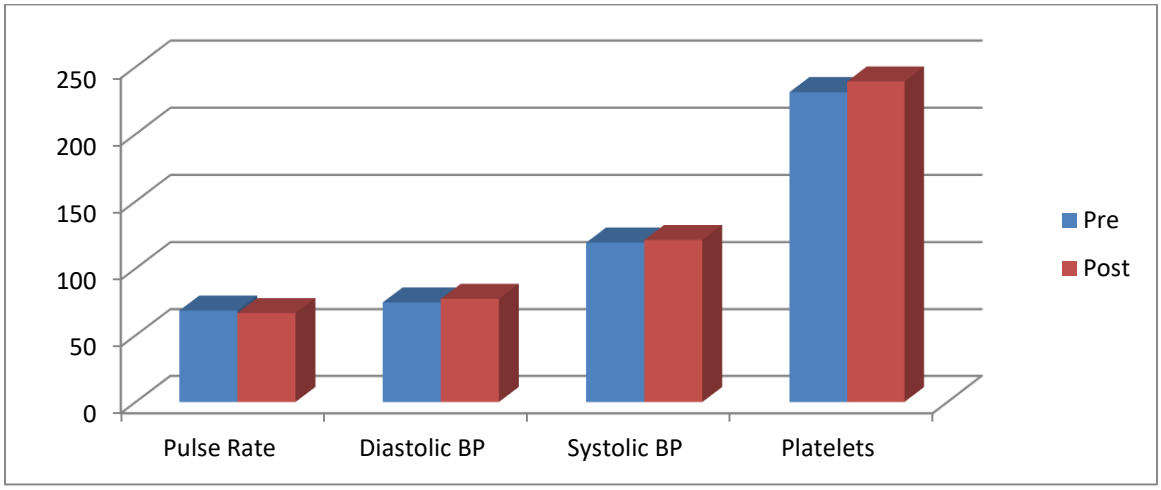

Chart 1 Mean comparison

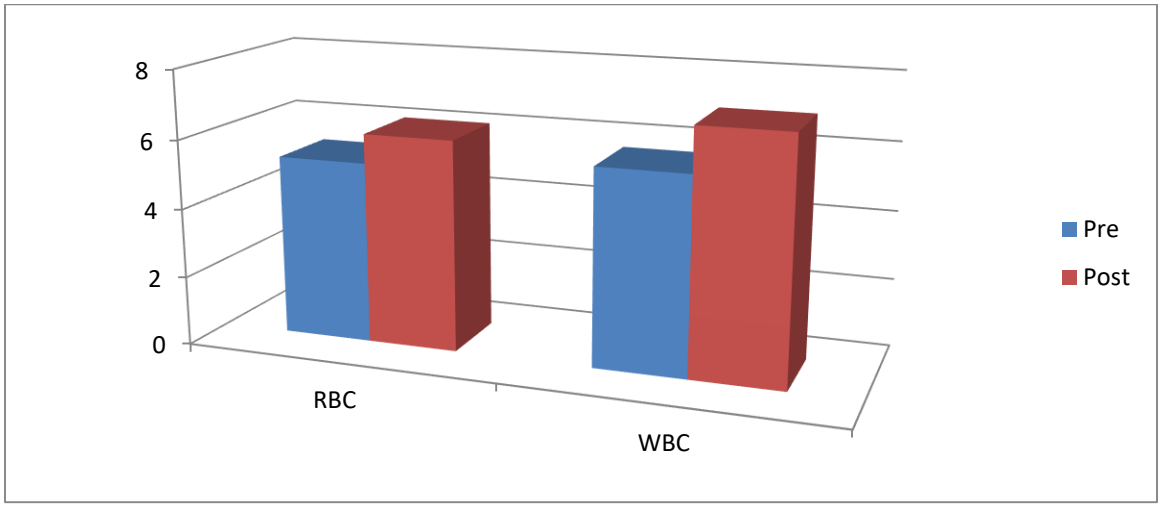

Chart 2 Mean comparison

Chart 2 shows a mean difference of improvement in RBC and WBC before and after exercise program.

Discussion

After completion of 8 week aerobic exercise program a significant increase was observed in RBC, WBC, and Platelets of football players. Exercise and sports have been shown to have an impact on hemoglobin concentration (Fujitsuka et al., 2005). Similarly, a research was done on hematological parameters to check the effect of aerobic morning exercise, which shows a significant increase in red blood cells (Sazvar et al., 2013). Conversely, a study found that red blood cells of inactive athletes did not significantly alter after a two-week workout program. (Ümit et al., 2004).Study has proved that eight week of bicycle ergometer exercise program elevate the level of RBC, WBC and platelets of the participants in experimental group (Lamina & Okoye, 2009).A 16 week aerobic exercise group shows a significant level at the end of the duration in platelets and red blood cells of the athletes of experimental group (Çiçek, 2018).

Another study found that three months of running had a significant effect on the haematological markers that were assessed, including RBC, WBC, and platelets (Jafari, 2019). In a study it is found that platelets increased after the completion of twelve week aerobic training program (Sharma et al., 2018). In general eight week aerobic program is improvedRBC, WBC and platelets that may lead to improve the cardiovascular functions. Platelets found to be safe guard against diseases while excessive amount of red blood cells carries more amount of oxygen, this may also lead to improve the physiological functions.

References

Berne, R. M., Levy, M. N., Koeppen, B. M., & Stanton, B. A. (2008). Physiology, TürkFizyolojikBilimlerDerneği (Fizyoloji). 5. BaskıÖncüBasımeviYayınevi: mosby. 267.

Uzun, M. (2016).KardiyovaskülerSistemveEgzersiz. Journal of Cardiovascular Nursing, 7(Sup 2), 48-53.

Cengiz, Ş. Ş., &Çinar, V. (2014).The Effect of 8-Week Core Exercises on Some Hematological Parameters in Sedentary Females. Turkish Journal of Scientific Research, 1(1), 1-5.

Ceylan, H. İ., Babayiğit, İ. G., &Saygın, Ö. (2014).Examining of the effects of aerobic dance and step dance exercises on some hematological parameters and blood lipids. International Journal of Human Sciences, 11(2), 980-991.

Çiçek, G. (2018). The Effects of Different Exercise Types on Hematological Parameters in Sedentary Women. Journal of Education and Training Studies, 6(8), 96-101.

Dutton, R. P. (2012). Resuscitative strategies to maintain homeostasis during damage control surgery. Journal of British Surgery, 99(Supplement_1), 21-28.

Duzova, H., Karakoc, Y., Gullu, E., Gullu, A., Koksal, B., &Esen, B. (2016). The acute effects of single football match on whole blood viscosity and hematological variables in female soccer players. Biomedical Research, 27(4), 1423-1425.

Fujitsuka, S., Koike, Y., Isozaki, A., & Nomura, Y. (2005).Effect of 12 weeks of strenuous physical training on hematological changes.Military medicine, 170(7), 590-594.

İbiş, S., Hazar, S., &Gökdemir, K. (2010).Aerobikveanaerobikegzersizlerinhematolojikparametrelereakutetkisi.UluslararasıİnsanBilimleriDergisi, 7(1), 71-81.

Isaac, L. J., Abah, G., Akpan, B., &Ekaette, I. U. (2013).Haematological properties of different breeds and sexes of rabbits. Proceedings of the 18th Annual Conference of Animal Science Association of Nigeria.24-27.

Jafari, M. (2019).Effect of running training on white blood cells and platelets count and red blood cells distribution width in untrained middle-aged men.International Journal of Sport Studies for Health, 2(1).

Kantyka, J., Herman, D., Roczniok, R., &Kuba, L. (2015). Effects of aqua aerobics on body composition, body mass, lipid profile, and blood count in middle-aged sedentary women. Human Movement, 16(1), 9-14.

Lamina, S., & Okoye, C. G. (2009). Effects of continuous exercise training on white blood cell count in men with essential hypertension. Journal of the Nigeria society of physiotherapy, 17(1), 11-20.

Mairbäurl, H. (2013). Red blood cells in sports: effects of exercise and training on oxygen supply by red blood cells. Frontiers in physiology, 4, 332.

Reilly, T. (2006). The science of training–soccer: A scientific approach to developing strength, speed and endurance. Routledge.

Sazvar, A., Mohammadi, M., Nazem, F., &Farahpour, N. (2013).The effect of morning aerobic exercise on some hematological parameters in young, active males.Iranian Journal of Health and Physical activity, 4(1), 23-28.

Sharma M, Aara S, Mir FA. Variations in platelet count with physical activity. Int J Sci Res. 2018;7(3).

Törpel, A., Peter, B., &Schega, L. (2020).Effect of resistance training under normobaric hypoxia on physical performance, hematological parameters, and body composition in young and older people.Frontiers in Physiology, 11, 335.

Turpin, A. (2021). Effects of a Run-Walk-Run Training Program on One Mile Time Trial Performance.

Ümit, K. S., Yalçın, O., Gündüz, F., Kuru, O., Herbert, J. M., &Baskurt, O. K. (2004). Effect of antioxidant vitamin treatment on the time course of hematological and

hemorheological alterations after an exhausting exercise episode in human subjects, Appl. Physiol., 98, 1272–1279.