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Immediate Effect of Aerobic Exercise on Hematological Parameters

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Abstract :

Introduction: In this research, the examination of the immediate effect of aerobic exercise on hematological parameters of male Interuniversity players has been aimed.

Methods: Six male cricket players with an average age of 22.16±1.85 years participated in this study on voluntary basis. Hematological parameters of the players were analyzed before running (BR) and after the running (AR) 1000m course.
In order to determine hematological levels, blood samples with 5 ml EDTA were taken from the forearm ante-cubical area before and after running, and erythrocyte, leucocytes and blood platelet parameters were analyzed in laboratory with using auto-analyzers.

Result: Measurement results were presented as average and standard deviation. Student T-test for dependent samples was used in order to make a comparison between BR and AR values. $P<0.01$ value was considered to be significant. The result of the study revealed that, the increase in AR than BR values for RBC, Hemoglobin, PCV, Lymphocyte% were found significant and no significant differences were found in case of MCH, MCHC, Platelet, WBC, Neutrophil% and Eosonophil %.

Conclusion: Conclusively RBC, Hemoglobin, PCV, Lymphocyte% displayed significant incensement in relation to acute aerobic exercises.

***Key words*:** Hematology, PCV, MCV, MCHC, erythrocyte, leukocyte, platelet.

Introduction: Body fluids are divided into different parts, one of which flows throughout the vascular system. In sports physiology, blood is particularly important as it carries oxygen, carbon dioxide, and other substances required by tissues]1-4]. Blood is generally composed of plasma, red blood cells (RBC), white blood cells (WBC) and platelets. Hemoglobin and water are the major constituents of red blood cells. Sanguine factors, mainly red blood cells and hemoglobin, are responsible for transferring nutrients and oxygen to active tissues, as well as carrying excretory substances and carbon dioxide from tissues for expulsion from the lungs. On the their hand, it has

been demonstrated that physical exercises aimed at improving aerobic capacity and body endurance depend on numerous factors. One particularly essential factor is oxygen carrying capacity of the blood. In addition, RBC count, hemoglobin level and hematocrit greatly influence the capacity of carrying oxygen to tissues and excretion of carbon dioxide. All studies express that long-term regular exercises make positive contributions into human organism. Researchers have reported positive contribution of exercise in physical, physiological, psychological and motor features [6-11]. The analysis of hematology shown that, the effect of regular exercise on hematology is different. It is stated that these differences depend on the severity, duration and frequency of exercise as well as physical and physiological conditions of subjects. Furthermore, the severity, duration and frequency of exercise should be well- organized to have similar positive influence on blood biochemistry [12].

There is not a full consensus as to how exercise makes an effect on hematology. Studies in this field contain different findings concerning blood biochemistry depending on the relevant exercise. Despite the studies showing a decreasing [13] and increasing [12] change in blood biochemistry due to acute and chronic exercises, there are also studies which report that hematological values do not change with exercise [14]. Investigating the trends of hematological variations resulting from conventional physical training in experienced athletes may provide an appropriate ground for development of efficient combined exercises. In other words, discovering the hematological outcomes of these particular exercises will help trainers and athletes to pay extra attention to the useful or harmful results of their training programs. With this view in mind the researcher conducted the present study to investigate the effects of immediate effect of 1000m run on hematological parameters.

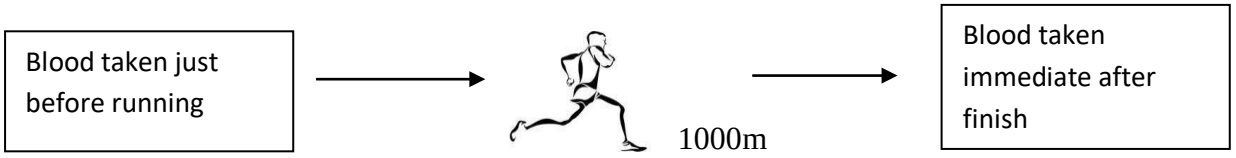
Materials &Method:

Participants:

Six male cricket players with an average age of 22.16±1.85 years who played in Inter-University competitions participated in this study on voluntary basis. These subjects were healthy, nonsmokers, without history of hematological disease and free of infection.

Study design:

After the permit of the ethical board required for the study was granted, players were informed about the tests. Before running (BR) and after the 1000m running (AR) measurements were made.



Data collection: Blood samples were taken in the morning from 7:00 to 8:00 am. Blood samples with 5 ml EDTA (Ethylenediaminetetraacetic acid) were taken from players in the forearm ante cubical area, in line with hygiene rules before and immediate after the running. Hematological levels including Red Blood Cells (RBC), Hemoglobin (HBG), Pack cell volume (PCV), Mean Red Cell Volume (MCV), Mean Cell Hemoglobin (MCH), Mean Cell Hemoglobin Concentration (MCHC), White Blood Cells (WBC;), Lymphocyte Percentage (LYM%), Neutrophil Percentage (NE%), Eosinophil Percentage (Eos%), Blood Platelets (PLT), were analyzed by the expert pathologist at standard laboratory.

Statistics analysis: Measurement results were presented as average and standard deviation. Student T-test for dependant samples was used in order to make a comparison between BR and AR values. *P<0.01* value was considered to be significant.

Result: The findings of the study indicate that among the hematological variables studied, Hemoglobin, PCV, RBC and Lymphocyte% were significantly increase after running. But no significant differences were found at before running and after running for MCV, MCHC, MCH, Platelet, White Blood Cell count, Neutrophil % and Eosinophil Percentage.

Mean Standard deviation and P value of participants' characteristics.

Variables	***Before running***	***After running***	***P Value***
RBC (Million)	5.05 ± 0.192	5.57 ± 0.136	0.0002*
HBG	15.1 ± 0.586	16.7 ± 0.409	0.0002*
PVC	45 ± 1.78	50.33 ± 1.86	0.0004*
MCV	88.94 ± 0.263	89.79 ± 0.856	0.042
MCH	29.88 ± 0.095	29.95 ± 0.023	0.128
MCHC	33.6 ± 0.209	33.35 ± 0.325	0.154
PLT (lac)	2.96 ± 0.201	3.05 ± 0.062	0.356
WBC (Thousand)	8.36 ± 0.831	9.50 ± 0.709	0.029
NEU%	63 ± 5.58	55.66 ± 3.38	0.020
LYM%	34 ± 3.89	39.66 ± 2.73	0.015*
ESO%	4.33 ± 1.36	4 ± 0.894	0.627

Red Blood Cells (RBC), Hemoglobin (HBG), Pack cell volume (PCV), Mean Red Cell Volume (MCV), Mean Cell Hemoglobin (MCH), Mean Cell Hemoglobin Concentration (MCHC), White Blood Cells (WBC;), Lymphocyte Percentage (LYM%), Neutrophil Percentage (NE%), Eosinophil Percentage (Eos%), Blood Platelets (PLT).

P<0.01

Discussion: This study was conducted in order to determine the influence of 1000m running on hematological parameters of University level cricket players; it was observed that there were changes in terms of increase in Hemoglobin, PCV, RBC and Lymphocyte% before and after running. The changes in Hemoglobin, PCV, RBC and Lymphocyte% levels after the running were significant whereas the changes in MCV, MCHC, MCH, Platelet, White Blood Cell count Neutrophil % and Eosinophil% were not significant. When a comparison was made between these changes and those found in other studies carried out on hematological levels, both similarities and differences were observed.

In this study it was seen that, immediate after 1000m running RBC, Hemoglobin and PVC parameters were increase significantly which supported the study of [12] examined blood biochemistry at the end of an acute maximal exercise and found that hematological parameters increased depending on severity and duration of an exercise. Unal (1998) also found that there was a significant increase in hemoglobin values of subjects after 8-week aerobic exercises [15]. But the chronic effects of exercise and found out a decrease in red blood cell parameters. Ricci et al. (1988) found that hematological parameters decreased after chronic exercise. Whereas [14] Spiropoulos and Trakada (2003) expressed in their study on marathon runners that, there was no significant difference in hematological parameters before and after the marathon competitions. In the present study, changes in MCV, MCHC and MCH were not found significant.

In a study on taek wondoers that there was not a significant difference in white blood cell, red blood cell, blood platelet and Hematocrit parameters in blood samples taken before and after the cam. Sub-maximal exercise did not result in any statistically significant increase in Hematocrit value and red blood cell numbers whereas he reported an increase in the white cell number and not a significant change in blood platelet numbers. Short-term exercises at maximal severity do not have any impact on red blood cell levels, but it had an influence on white blood cell and blood platelet parameters. Sub-maximal exercise had a significant impact on WBC, RBC, HGB, HCT and PLT levels whereas its impact on MCV, MCH and MCHC levels was insignificant. In this study, it was also seen that there was no significant change in number of WBC and Platelet after the running which was implemented. There is a rapid decrease in the number of lymphocytes after the exercise. The decrease in lymphocytes is attributed to the lymphopenic effect of the increased cortisol. Exercise does not have long or short term effects on neutrophil functions. The increase of eosinophilic cationic proteins in blood after the maximal exercise shows that eosinophils increase with exercise. However, it is yet to be well determined how it varies according to different exercise types and what function it fulfills during the exercise. In this study researcher found significant increase in Lymphocyte% and no significant change in Neutrophil % and Eosinophil%.

Conclusions:

Aerobic exercise like 1000m running can have immediate effect on some hematological parameters of University level sports person in term of increasing. Though there is some controversy with the other studies, researcher thought that experiment with more number of subjects may thorn more light on this problem.

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