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ANALYSIS OF HEMATOLOGICAL VARIABLES AMONG COMPETITORS IN VARIOUS GAMES

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ABSTRACT

Hematological factors may be useful in determining the best physical performance of various game participants. It also indicates the athletes' health and physical condition. This study deals with the analysis of hematological variables-red blood cells, white blood cells (neutrophil, eosinophil, lymphocytes, monocytes), and platelet among university men basketball, volleyball, and cricket players. Fourteen (14) active players (basketball-5, volleyball-5, and cricket-4) were taken as samples and age range between 20 to 25 years. All players were actively competing at Inter-University levels in their respected sport and they voluntarily participated in this study. Blood samples were collected in the morning session with fasting. Red blood cells, white blood cells, platelet counts were criterion measures in this study. The obtained data were analyzed by one-way ANOVA with the help of SPSS software and the level of significance was set at $p<0.05$. As per the statistical analysis, insignificant differences were found among the three different game players. In summary, the study found that the red blood cells, white blood cells, and platelet counts are similar in the three groups.

Keywords: Hematology, Blood, Red Blood Cells, White Blood Cells, Platelets, Games, Players

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1. INTRODUCTION

Physical activity through regular exercise has been shown to improve physical, physiological, and other health effects. There is scientific evidence that the acute and chronic effects of regular exercise on several physiological systems have favorable effects Koç et al. (2018). Using auditory and visual information, this majority regular exercise is completed Rahman and Islam (2021) . Whereas, additionally, regular exercise helps to enhance body awareness while also reducing the risk of joint sprains, muscular strains, joint pain, muscular pain, and tension Rahman and Islam (2020). On the other hand, the function of physiological systems such as the cardiovascular, immunological, and endocrine systems are all evaluated using blood as an

indication Kenney et al. (2015). Regular physical activity and exercise are thought to be significant regulators of blood cells and their activities Ludlow et al. (2013), Büttner et al. (2007). Different findings have been reported concerning hematologic parameters in the peripheral blood during and after exercise and physical activity Pedersen (2000). As a result, there is a close link between regular exercise and hematology.

Plasma, red blood cells (RBC), white blood cells (WBC), and platelets are the most common components of blood Ghosh and Das (2013) and in sports physiology, it's especially essential because it transports oxygen, carbon dioxide, and other nutrients that tissues require AHMADIZAD and EL-SAYED (2003), Akar et al. (1992), Arslan et al. (1992). Hematology studies look at the blood, blood proteins, and blood-producing organs. The study of blood, especially how blood impacts general health and illness, is known as hematology. Infection, anemia, inflammation, hemophilia, blood-clotting problems, leukemia, and the body's response to chemotherapy regimens are all conditions that these tests can assess Gonzaba (2018).

Depending on the length of the competition and the intensity of the physical performance, hematological parameters may be impacted Alwaid (2021). Type, intensity, exercise duration, eating condition, and supplements can all affect hematological and biochemical parameters Çınar et al. (2016). The biochemical and hematological variables are significantly altered by varied environmental match practices Sureshkumar et al. (2011). Humans undergo a variety of hematological alterations as a result of both acute and chronic exercise Wardyn et al. (2008). Physical activity causes changes in the number of leucocytes and their subgroups in the circulating blood, according to researchers Robson et al. (1999). Due to hemoconcentration and platelet release from the liver, lungs, and, most crucially, the spleen, acute exercise induces a temporary rise in platelet count Chamberlain et al. (1990), Schmidt and Rasmussen (1984), Bakovic et al. (2013).

The analysis of hematology has proven that the impact of everyday exercise on hematology is different. It is said that those variations rely upon the severity, length, and frequency of exercising in addition to the bodily and physiological situations of subjects. Furthermore, the severity, length, and frequency of exercising must are well prepared to have a comparable wonderful effect on blood biochemistry Baltaci et al. (1998). In view of the fact that everyday exercise boosts the immune and metabolic systems Islam et al. (2020)and these sports activity may impact the blood count. Therefore, to the best of the authors' knowledge, there are just a few pieces of research on hematological variables in basketball, volleyball, and cricket players. With this in mind, the researcher decided to compare hematological variables among basketball, volleyball, and cricket players in the current study.

2. METHODOLOGY

Fourteen (14) university-level male players (five basketball players, five volleyball players, and four cricket players) were selected randomly from Visva-Bharati University, Santiniketan, West Bengal, India. Their age ranged from 20 to 25 years. All players participated in the university-level competition.

Table 1 **The characteristics of the players (Mean ± SD)**

Items	Basketball Players (n=05)	Volleyball Players (n=05)	Cricket Players (n=04)
Age (yr)	22.80 ± 2.17	22.40 ± 0.55	22.75 ±2.22
Weight (kg)	66.60 ± 4.67	64.00 ± 2.74	67.25±7.09
Height (m)	1.71 ± 0.08	1.68 ± 0.01	1.69 ±0.07
BMI (kg/m^2)	22.72 ±0.79	22.70 ± 1.02	23.50 ±0.81

In this study researcher wanted to measures six hematological parameters of the selected players.

Table 2 **Hematological parameters**

Blood Parameters	Methods
Red blood cell	In counts (million/c.mm)
Neutrophil	In counts /c.mm
Eosinophil	In counts /c.mm
Lymphocytes	In counts /c.mm
Monocytes	In counts /c.mm
Platelet	In counts (Lakhs/c.mm)

Blood samples were obtained in the indicated sterile container during the morning session with fasting. Blood samples were collected by trained medical technicians and forwarded to the pathological laboratory for analysis using precise scientific laboratory procedures. The results were compiled in a printed format with letterhead and seal. The data were analyzed using descriptive statistics; mean, standard deviation (SD), standard error of mean (SEM), minimum and maximum scores. One-way analysis of variance (ANOVA) was calculated by the SPSS software.

3. RESULTS

Table 3 **Descriptive statistics of three different games players on hematological variables**

Variables	Players	N	Mean	SD	SE	Minimum	Maximum
Red blood cell	Basketball	5	4.70	0.34	0.15	4.40	5.20
	Volleyball	5	4.86	0.26	0.12	4.50	5.10

Continued on next page

Table 3 continued

	Cricket	4	4.60	0.36	0.18	4.10	4.90
Neutrophil	Basketball	5	5343.40	418.90	187.34	4992.00	5904.00
	Volleyball	5	4983.20	708.78	316.97	4071.00	5670.00
	Cricket	4	5307.00	368.42	184.21	4950.00	5670.00
Eosinophil	Basketball	5	206.00	44.18	19.76	154.00	246.00
	Volleyball	5	197.40	33.50	14.98	162.00	231.00
	Cricket	4	213.75	36.11	18.06	162.00	246.00
Lymphocytes	Basketball	5	2291.40	223.36	99.89	1968.00	2496.00
	Volleyball	5	2402.80	225.98	101.06	2187.00	2700.00
	Cricket	4	2201.25	97.06	48.53	2072.00	2296.00
Monocytes	Basketball	5	79.20	2.17	0.97	77.00	82.00
	Volleyball	5	76.60	4.98	2.23	69.00	81.00
	Cricket	4	78.00	4.08	2.04	74.00	82.00
Platelet	Basketball	5	3.70	0.29	0.13	3.30	4.10
	Volleyball	5	3.32	0.30	0.14	3.10	3.70
	Cricket	4	3.35	0.21	0.10	3.10	3.60

Table 3 shows that hematological parameters of basketball, volleyball and cricket players mean and SD of RBC 4.70±0.34, 4.86±0.26, 4.60±0.36; Neutrophil 5343.40±418.90, 4983.20±708.78, 5307.00±368.42; Eosinophil 206.00±44.18, 197.40±33.50, 213.75±36.11; Lymphocytes 2291.40±223.36, 2402.80±225.98, 2201.25±97.06; Monocytes 79.20±2.17, 76.60±4.98, 78.00±4.08; Platelet 3.70±0.29, 3.32±0.30, 3.35±0.21 respectively.

Table 4 One-way ANOVA of three different games on hematological variables

Variables	Variation	Sum of Squares	df	Mean Square	F-value	p-value
Red blood cell	Between Groups	0.16	2	0.08	0.77	0.485
	Within Groups	1.11	11	0.10		
Neutrophil	Between Groups	383359.21	2	191679.61	0.68	0.529
	Within Groups	3118566.00	11	283506.00		
Eosinophil	Between Groups	599.76	2	299.88	0.20	0.819
	Within Groups	16209.95	11	1473.63		
Lymphocytes	Between Groups	91802.68	2	45901.34	1.17	0.347
	Within Groups	432094.75	11	39281.34		
Monocytes	Between Groups	16.93	2	8.46	0.55	0.590
	Within Groups	168.00	11	15.27		
Platelet	Between Groups	0.43	2	0.22	2.85	0.101
	Within Groups	0.84	11	0.08		

*Significant at 0.05 level; F 0.05 (2, 11) = 3.982

Table 4 provides hematological parameters data on the relation between red blood cell, neutrophil, eosinophil, lymphocyte, monocyte, and platelet of basketball, volleyball and cricket players. The red blood cell comparison is p = 0.485 (F = 0.77), neutrophil p = 0.529 (F = 0.68), eosinophil p = 0.819 (F = 0.20), lymphocytes p = 0.347 (F = 1.17), monocytes p = 0.590 (F = 0.55), and platelet p = 0.101 (F = 2.85). As the obtained F-value were lower than the table F-value. So no significantly differences were found among the three different games players (p>0.05).

4. DISCUSSIONS

The purpose of the study was to compare hematological parameters in various sports disciplines. This study will provide about some hematological parameters and also understand that the how much different each of others games players. According to Parmar (2013) suggested that the rate of red blood cells in football players is higher than the basketball and volleyball players. Endurance sports activities for a longer length of time diminish hemoglobin and red blood cell count in athletes, which increases their athletic performance as compared to non-athletes Sujatha and Andrew (2016). Performing combination training is beneficial to physiological and hematological changes as well as the performance of elite basketball players Talaee et al. (2017). The blood counts of monocytes and platelets were greater in basketball players than in yoga practitioners, while the blood counts of red blood cells, neutrophils, eosinophils, basophils, and lymphocytes were similar between groups Rahaman (2021) . The decrease of blood parameters in a certain sport exhibits a similar pattern in both sexes, and the specific variations in red blood cell variables are also connected to the kind of activity, such as soccer, swimming, rowing, wrestling, athletics, and so on Schobersberger et al. (1990). The red blood cell count was reduced as a result of the high-intensity endurance training Bandyopadhyay et al. (2008).

5. CONCLUSIONS

Finally, results show that no significant differences were found among the three different game players. The present study concluded that red blood cells, neutrophil, eosinophil, lymphocyte, monocyte, and platelet blood counts are similar in basketball, volleyball, and cricket players.

6. LIMITATION

In this study, the sample sizes were too small.

7. ACKNOWLEDGEMENT

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8. CONFLICTS OF INTEREST

The author declares that there is no conflict of interest regarding the publication of this paper.

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