Blood blueprint of cricket players: exploring variations in hematological parameters based on playing roles

El patrón sanguíneo de los jugadores de críquet: exploración de las variaciones en los parámetros hematológicos en función de los roles de juego

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Abstract

Background: Cricket is an outdoor sport where players, including batsmen, bowlers, and all-rounders, encounter various physical challenges and demands. Complete Blood Count (CBC) is an essential test for understanding hematological parameters, playing a crucial role in monitoring overall health detecting deficiencies like iron deficiency or anemia, assessing recovery, and optimizing athletic performance.
Objectives: This study aims to examine the variations in hematological parameters among cricket players in different roles.
Methods: The sample included 30 randomly selected male cricketers aged 14-19 years, with a mean age of 16. Participants comprised 6 batsmen, 15 bowlers, and 9 all-rounders. CBC tests were conducted using Beckman Coulter's DxH 500 Series Hematology Analyzer on intravenous blood samples.
Results: The results indicated no significant difference in hematological parameters across batters, bowlers, and all-rounders, but minor differences were witnessed within each playing role, despite all values remaining almost within normal limits. Cricketers' overall mean values for the CBC tests were as follows: Hemoglobin (Hb) 14.97 mg/dl, White Blood Cell (WBC) 8474/cmm, Eosinophil Total Cell Evaluation (TCE) 367/cmm, Neutrophils 52%, Lymphocytes 35%, Monocytes 9%; Eosinophil Count 3%, Platelet Count (PLT) 216367/cmm, Mean Platelet Volume (MPV) 9.57 fL, Red blood cells (RBC) Count 5.3 million/cmm, Hematocrit (HCT) Measure 44.02%, Mean Cell or Corpuscular Volume (MCV) 83.9 fL, Mean Cell Hemoglobin (MCH) 28.8 pg, Mean Cell Hemoglobin Concentration (MCHC) 34 g/dL, and Red Cell Distribution Width - Standard Deviation (RDW-SD) 44 fL.
Conclusion: The batter, bowler, and all-rounder roles in cricket do not greatly change the results of hematological parameters, though small differences exist within the normal ranges. Given the similarity in hematological values across roles, coaches should implement balanced training loads in intensity and volume for all players, while incorporating specific drills to meet each role 's distinct performance demands.

Keywords

All-rounder; blood profile; batter; bowler; complete cell count.

Resumen

Introducción: El cricket es un deporte al aire libre en el que los jugadores, incluidos los bateadores, los lanzadores y los todoterrenos, se enfrentan a diversos desafíos y exigencias físicas. El hemograma completo (CSC) es una prueba esencial para comprender los parámetros hematológicos, que desempeña un papel crucial en el control de la salud general, la detección de deficiencias como la deficiencia de hierro o la anemia, la evaluación de la recuperación y la optimización del rendimiento deportivo.
Objetivos: Este estudio tiene como objetivo examinar las variaciones de los parámetros hematológicos entre los jugadores de cricket en diferentes roles.
Métodos: La muestra incluyó 30 jugadores de cricket masculinos seleccionados al azar de entre 14 y 19 años, con una edad media de 16. Los participantes comprendían 6 bateadores, 15 lanzadores y 9 todoterrenos. Las pruebas de CSC se realizaron utilizando el analizador hematológico de la serie DxH 500 de Beckman Coulter en muestras de sangre intravenosa.
Resultados: los resultados no indicaron diferencias significativas en los parámetros hematológicos entre los bateadores, los lanzadores y los todoterrenos, pero se observaron diferencias menores dentro de cada rol de juego, a pesar de que todos los valores se mantuvieron casi dentro de los límites normales. Los valores medios generales de los jugadores de críquet para las pruebas de hemograma completo fueron los siguientes: hemoglobina (Hb) 14,97 mg/dl, glóbulos blancos (WBC) 8474/cmm, evaluación de células totales de eosinófilos (TCE) 367/cmm, neutrófilos 52 %, linfocitos 35 %, monocitos 9 %; Recuento de eosinófilos 3%, recuento de plaquetas (PLT) 216367/cmm, volumen plaquetario medio (MPV) 9,57 fL, recuento de glóbulos rojos (RBC) 5,3 millones/cmm, medición del hematocrito (HCT) 44,02%, volumen corpuscular medio (MCV) 83,9 fL, hemoglobina celular media (MCH) 28,8 pg, concentración de hemoglobina celular media (MCHC) 34 g/dL y ancho de distribución de glóbulos rojos - desviación estándar (RDW-SD) 44 fL.
Conclusiones: los roles de bateador, lanzador y todoterreno en el cricket no cambian en gran medida los resultados de los parámetros hematológicos, aunque existen pequeñas diferencias dentro de los rangos normales. Dada la similitud de los valores hematológicos en todos los roles, los entrenadores deben implementar cargas de entrenamiento equilibradas en intensidad y volumen para todos los jugadores, al tiempo que incorporan ejercicios específicos para satisfacer las distintas demandas de rendimiento de cada rol.

Palabras clave

Todo terreno; perfil sanguíneo; bateador; jugador de bolos; recuento celular completo.

Introduction

Cricket is an outdoor sport that requires players to have different skills where batters, bowlers, and all-rounders encounter distinct physical challenges and workloads (Jacobs et al., 2024). The sport also demands a unique combination of athleticism, strategy, and precision, with physical fitness being crucial for achieving peak performance (Boby et al., 2024).

Assessing an athlete's health should include evaluating blood parameters such as hemoglobin and cell counts as they play a critical role in oxygen transport, endurance, recovery from injury, immune function, energy metabolism, and the body's response to training (Lee et al., 2017; San-Millán, 2019; Sim et al., 2019).

Hematological parameters are generally more optimized in scientifically trained individuals compared to untrained individuals, and they tend to reach baseline ranges in elite endurance athletes (Astolfi et al., 2021; Martínez et al., 2022; Singh et al., 2024; Sitkowski et al., 2023, 2024; Spodaryk, 1993). However, prolonged exhaustive training, can compromise the immune system and increase susceptibility to upper respiratory infections (Cicchella et al., 2021). This profile can vary depending on athlete 's specialization, as observed in elite track and field athletes (Robinson et al., 2019). Aerobic exercise has been shown to results in a marked increase in red blood cell (RBC) count, hemoglobin levels, packed cell volume (PCV), and lymphocyte percentage (Ghosh & Das, 2013). Additionally, variations in hematological profiles are often linked to specific training regimens and the performance level of top endurance athletes (Malcovati et al., 2003; Robinson et al., 2019). Conversely, significant reduction in hemoglobin have been reported following anaerobic exercises (Ghosh, 2013). Comparatively, cricket players exhibit no remarkable differences in RBC, white blood cell (WBC) and platelet counts, compared to athletes from other sports, reflecting similar hematological profiles (Rahaman, 2021).

Hemoglobin and hematocrit which are vital for oxygen transport, tend to be higher in bowlers due to their increased aerobic demands; in addition, abnormal blood profiles can indicate potential issue such as blood doping (Schütz & Zollinger, 2018). The WBC count, an indicator of immune response, may rise in response to stress or infection (Chaudhary et al., 2022). Regular monitoring of hematological profiles is essential to optimize training and recovery for enhanced competitive performance (Thannoun & Mahmoud, 2010). It is well-recognized that batsmen, bowlers, and all-rounders in cricket face distinct physical demands and workloads (Bartlett, 2003; Boby, et al., 2024; Boby & Shara, 2024; Noakes & Durandt, 2000). Activity type directly affects hematological profiles, with endurance athletes displaying notably higher values for red blood cells, hemoglobin, hematocrit, and mean cell volume than athletes in strength disciplines (Çiçek, 2018; Díaz Martínez et al., 2022; Mancera-Soto et al., 2022; Martínez et al., 2022; Morgado et al., 2017).

The CBC test is the primary method for establishing a hematological profile (El Brihi & Pathak, 2024), offering a detailed insights into various blood components. The RBC Count measures the number of healthy red blood cells (RBCs), essential for proper oxygen transport throughout the body and helps identify conditions like anemia or dehydration (Hess & D'Alessandro, 2022). Hemoglobin (Hb) levels are assessed to determine the oxygen-carrying capacity of the blood, while hematocrit or packed cell volume (HCT or PCV) measures the proportion of blood composed of RBCs, assisting in the diagnosis of anemia and related disorders. (Billett, 1990).

The mean cell volume or corpuscular Volume (MCV) provides information on the average size of RBCs, aiding in the classification of different anemia types (Banfi et al., 2011; Roy et al., 2022; Tomschi et al., 2018; Yamamoto et al., 2022). Similarly, mean cell hemoglobin (MCH), evaluates the average hemoglobin content per RBC, and mean cell hemoglobin concentration (MCHC) indicates the average concentration of hemoglobin within RBCs, both of which are crucial for diagnosing and categorizing anemia (Kocakulak et al., 2020; Bukvić et al., 2024; Dhakar & Rai, 2023). Red cell distribution width (RDW) reflects size variability in RBCs, while RDW-SD further identifies variations of RBC size, supporting the detection of anemia and blood disorders (Aychiluhim & Abay, 2019; Kai et al., 2021).

The total white blood cell (WBC), count is essential for assessing the body 's immune response and identifying immune-related conditions (Eimonte et al., 2021). Platelet count (PLT) and mean platelet volume (MPV), measure blood clotting abilities, helping diagnose bleeding, clotting disorders, and potential

bone marrow issues (Ahmadizad et al., 2020; Sadeghi et al., 2020). The total leukocyte count (TLC) assesses WBC levels, aiding in the detection of infections and immune-related conditions (Lim et al., 2023), while the differential leukocyte count (DLC) identifies the proportions of various WBC types, valuable for diagnosing infections, allergies, and immune disorders (Akaishi et al., 2022). Total Cell Evaluation (TCE) offers a comprehensive analysis of RBCs, WBCs, and platelets, helping detect conditions such as infections anemia and clotting disorders.

Specific components like neutrophils indicate the body's primary defense against bacterial infections, signaling the immune system's response to infection or inflammation (Gleeson, 2007).

Lymphocytes are crucial for immune response, particularly in combating viral infection and identifying immune system abnormalities (Abbas et al., 2023). Monocytes play a role in fighting infections, regulation immune response, and removing pathogens and dead cells (Austermann et al., 2022).

The eosinophil count, reflects the body's reaction to allergies, asthma, and parasitic infections, while basophils measure the response to allergic reactions and inflammation by releasing histamine and other chemicals during immune responses (Siracusa et al., 2013).

Extensive research indicate that current studies lack comprehensive insights into athletes' blood profiles and the effects of exercise these profiles, particularly in terms of how these parameters differ among cricket players in specific roles, such as batsmen, bowlers, and all-rounders.

It remains unclear how hematological parameters vary among cricket players according their playing roles. This research aims to address this gap by investigating the variations in hematological parameters among cricket players in the roles of batsmen, bowlers, and all-rounders, providing a clearer understanding of how distinct physical demand and workloads impact their blood profile. The findings of this study are intended to support cricket coaches and players in making more informed decisions regarding health monitoring, recovery strategies, and performance optimization.

Method

Participants

This study included 30 male adolescent cricket players randomly selected from the Bangladesh Institute of Sports known as 'Bangladesh Krira Shikkha Protishtan (BKSP)' in Dhaka. BKSP servers as the premier sports training institution for nurturing young talent in Bangladesh. The participants age ranged from 14-19 years, with a mean age (M) of 16 and standard deviation (SD) of ±1.76. Based on their playing roles, the sample included 6 batsmen (M = 16 years, SD = ±1.96), 15 bowlers (M = 16 years, SD = ±1.71), and 9 all-rounders (M = 16 years, SD = ±1.81).

The players Body Mass Index (BMI) was calculated by fasted weight (weight in Kg/Height in cm2) measured in the morning in a fasted state after bowel movements. The overall mean BMI for all participants was 19.60 (SD = ±1.69), with specific group means and SDs of 20.16 (SD = ±1.50) for batsmen, 19.43 (SD = ±1.84) for bowlers, and 19.52 (SD = ±1.03) for all-rounders. All participants had competed in at least the Dhaka 2nd Division Cricket League, with some representing national age-group teams. None of the participants were chain smokers or alcohol consumers. In the six months preceding data collection, no player had suffered from major injuries or illnesses, nor had they taken any medications that could influence hematological parameters. Additionally, all players followed a standardized diet and a similar daily routine, as they resided in the institution's hostel.

Study Design

To test CBC to prepare a hematological profile for cricket players according to the playing role following tests were opted for: Hb, Total WBC Count, Eosinophil TCE, Differential WBC Counts (Neutrophils, Lymphocytes, Monocytes, Eosinophil, and Basophils), PLT, MPV, Total RBC Count, HCT/PCV, MCV, MCH, MCHC, and RWD-SD. During data collection, the players were in the preparatory-2 phase of their training. Volunteers as the players of BKSP underwent regular fitness and cricket training throughout the year. In a week they received 9 training sessions, totaling 31.5 hours including morning and afternoon sessions. Morning and afternoon sessions consisted of 1.5 and 2.00 hours respectively. Players of the different playing roles received different training as playing techniques and responsibilities are unique.

They did not take part in any hard physical activity before the day of data collection. Data was collected once in the morning before doing any physical activity. The Ethical Review Committee of the Jashore University of Science and Technology, Bangladesh approved the study Ref: ERC/FBST/JUST 2024-193 Dated: 09.03.2024. All the players were briefed thoroughly before signing the Informed Consent Form.

Instrument Setting and Recording

A CBC Test was conducted by the DxH 500 Series Hematology Analyzer an automated machine manufactured by the United States-based company Beckman Coulter. The distinct advantage of using this machine is that it requires a small sample volume and provides advanced cellular analysis with quite accurate results. Blood samples were collected by a certified and skilled medical technologist. These samples were preserved following international standards and transported safely to the research center. For this purpose, the blood sample was collected in a lavender (Purple) top tube, which contains EDTA (Anticoagulant) prevents the blood from clotting, and confirms correct cell count. The samples were transported to the laboratory within 2 hours after collection maintaining the standard temperature of 22-25^0 C. For safe transportation and to minimize shaking in the transportation, collected samples were kept in a biohazard-labeled cushioned container. The medical wastes were disposed of following biohazard waste management protocols. This test was conducted in a research laboratory based in Dhaka by qualified and authorized medical professionals.

Data Collection and Extraction

Lavender top tubes containing blood samples placed into the analyzer following a close vial sampling method reduce contact with biohazards and decrease contamination risk, where the tubes remain sealed and the analyzer pierces the cap with a needle to aspirate the required amount of blood. This analyzer uses cutting-edge technologies such as flow cytometry, impedance, and spectrophotometry to calculate and differentiate blood cells. Upon completion of the analysis, the results were automatically generated and displayed which were digitally extracted for evaluation and further interpretation.

Statistical Analysis

Descriptive statistics were used to summarize key measures, including the mean and standard deviation. For inferential statistics, a one-way analysis of variance (ANOVA), two-tailed, was conducted with a significance level of $\alpha = .05$, considering results statistically significant at $p \leq .05$. Prior to performing inferential analyses, the data were tested for normality and homogeneity. The Shapiro-Wilk test was used to assess normality, with all data found to be approximately normally distributed ($p > .05$), and skewness and kurtosis values fell within acceptable ranges ($Z = \pm 1.96$). Homogeneity of variances was also confirmed, meeting assumptions necessary for ANOVA.

Results

Table 1. Descriptive Statistics of CBC Tes

Parameter	Category	Mean	Std. Deviation	Reference Range
Hb	Batter	15.18	1.29	Male: 15.0 ± 2 mg/dl (milligrams per deciliter)
	Bowler	14.93	1.06	
	All-rounder	14.90	1.18	
	Altogether	14.97	1.11	
WBC	Batter	8258	1828	Adult: 4,000-11,000 /cmm (cells per cubic millimeter)
	Bowler	8623	1408	
	All-rounder	8368	2111	
	Altogether	8474	1669	
Eosinophil TCE	Batter	213	180	0 - 400 /cmm
	Bowler	378	193	
	All-rounder	452	283	
	Altogether	367	230	
Neutrophils	Batter	53	10	Adult: 40 – 75 %
	Bowler	52	7	
	All-rounder	51	7	
	Altogether	52	7	
Lymphocytes	Batter	35	8	Adult: 20 – 40 %
	Bowler	36	7	
	All-rounder	35	6	
	Altogether	35	7	

Monocytes	Batter	9	3	02 – 10 %
	Bowler	8	2	
	All-rounder	9	2	
	Altogether	9	2	
Eosinophil	Batter	3	2	02 – 06 %
	Bowler	4	2	
	All-rounder	5	3	
	Altogether	4	2	
PLT	Batter	212500	50789	1,50,000 - 4,50,000 /cmm
	Bowler	213533	52107	
	All-rounder	223667	44883	
	Altogether	216367	48322	
MPV	Batter	9.86	1.03	8 - 9.5 fL (femtoliters)
	Bowler	9.67	1.17	
	Altogether	9.22	.82	
	All Together	9.57	1.04	
RBC	Batter	5.3	.37	Male: 5.0 ± 0.5 million/cmm
	Bowler	5.3	.49	
	All-rounder	5.2	.45	
	Altogether	5.3	.45	
HCT/PCV	Batter	44.72	4.09	36.0 - 51.0 %
	Bowler	43.85	3.13	
	All-rounder	43.83	3.39	
	Altogether	44.02	3.30	
MCV	Batter	84.4	7.1	76-94 fL
	Bowler	83.6	5.4	
	All-rounder	84.1	2.9	
	Altogether	83.9	5.0	
MCH	Batter	29.7	2.7	29.52 ± 2.50 pg (picogram)
	Bowler	28.5	2.1	
	All-rounder	28.7	1.3	
	Altogether	28.8	2.0	
MCHC	Batter	33.8	.70	29-34 g/dL
	Bowler	34.0	.48	
	All-rounder	34.0	.58	
	Altogether	34.0	.55	
RDW-SD	Batter	43.5	2.81	30-57 fL
	Bowler	43.2	2.35	
	All-rounder	44.0	2.13	
	Altogether	44.0	2.32	

N.B.: Age- and sex-specific normal reference range.

Table 2. ANOVA Test of CBC parameters across Batter, Bowler, and All-rounder in Cricket

		df	F	Sig.
Hb	Between Groups	2	.131	.88
	Within Groups	27		
WBC	Between Groups	2	.121	.89
	Within Groups	27		
Eosinophil TCE	Between Groups	2	2.135	.14
	Within Groups	27		
Neutrophils	Between Groups	2	.166	.85
	Within Groups	27		
Lymphocytes	Between Groups	2	.099	.91
	Within Groups	27		
Monocytes	Between Groups	2	.515	.60
	Within Groups	27		
Eosinophil	Between Groups	2	2.636	.09
	Within Groups	27		
PLT	Between Groups	2	.139	.87
	Within Groups	27		
MPV	Between Groups	2	.812	.46
	Within Groups	27		
RBC	Between Groups	2	.183	.83
	Within Groups	27		
HCT/PCV	Between Groups	2	.157	.86
	Within Groups	27		
MCV	Between Groups	2	.067	.94
	Within Groups	27		
MCH	Between Groups	2	.827	.45
	Within Groups	27		
MCHC	Between Groups	2	.692	.51
	Within Groups	27		
RDW-SD	Between Groups	2	.329	.72
	Within Groups	27		

In this study, the CBC test Results according to different playing roles in cricketers are observed in Tables 1 & 2. The test results of different parameters exhibit the following: Hb test mean and standard deviation scores for cricketers altogether, batters, bowlers, and all-rounders were 14.97 mg/dl ±1.29, 15.18 mg/dl ±1.06, 14.93 mg/dl ±1.18, 14.90 mg/dl ±1.11 respectively; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .131, p = .88.

In Total WBC Count slight deviations were observed in the cricketers due to their playing positions in batters (M = 8258/cmm, SD = ±1828), bowlers (M = 8623/cmm, SD = ±1408), all-rounders (M= 8368/cmm, SD = ±2111) and collective analysis shows cricketers altogether M= 8474/cmm, & SD = ±1669; found statistically no significant difference among batters, bowlers, and all-rounders as F .05 (2, 27) = .121, p = .89.

Eosinophil TCE test yielded mean and standard deviation scores: cricketers' altogether 367/cmm, ±230, batters 213/cmm ±180, bowlers 378/cmm ±193, and all-rounders 452/cmm, ±283; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = 2.135, p = .14.

Neutrophils test mean and standard deviation scores for Cricketers altogether, batters, bowlers, and all-rounders were 52% ±7, 51% ±7, 52% ±7, and 53% ±10 respectively; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .166, p = .85.

Lymphocytes Count discovered slight deviations in the cricketers due to their playing positions in batters (M= 35%, SD = ±8), bowlers (M= 36%, SD = ±7), all-rounders (M= 35%, SD = ±6) and collective analysis shows cricketers altogether M= 35, & SD = ±7; found statistically no significant difference among batters, bowlers, and all-rounders as F .05 (2, 27) = .099, p = .91.

Monocytes Count produced mean and standard deviation scores: cricketers altogether 9%, ±2, batters 9%, ±3, bowlers 8%, ±2 and all-rounders 9%, ±2; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .515, p = .60.

Eosinophil count mean and standard deviation scores for cricketers altogether, batters, bowlers, and all-rounders were 3% ±2, 3% ±2, 4 ±2, and 5 ±3 respectively; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = 2.636, p = .09.

In PLT count slight deviations were observed in the cricketers due to their playing positions in batters (M= 212500/cmm, SD = ±50789), bowlers (M= 213533/cmm, SD = ±52107), all-rounders (M= 223667/cmm, SD = ±44883) and collective analysis shows cricketers altogether M= 216367/cmm, & SD = ±48322; found statistically no significant difference among batters, bowlers, and all-rounders as F .05 (2, 27) = .139, p = .87.

The MPV test yielded mean and standard deviation scores: cricketers altogether 9.57 fL, ±1.04, batters 9.86 fL, ±1.03, bowlers 9.67 fL, ±1.17 and all-rounders 9.22 fL, ±.82; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .812, p = .46.

The RBC test mean and standard deviation scores for cricketers altogether, batters, bowlers, and all-rounders were 5.3 million/cmm ±.45, 5.3 million/cmm ±.37, 5.3 million/cmm ±.49, and 5.2 million/cmm ±.45 respectively; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .183, p = .83.

In HCT or PCV test slight deviations were observed in the cricketers due to their playing positions in batters (M = 44.72%, SD = ±4.09), bowlers (M = 43.85%, SD = ±3.13), all-rounders (M = 43.83, SD = ±3.39) and collective analysis shows cricketers altogether M= 44.02, & SD = ±3.30; found statistically no significant difference among batters, bowlers, and all-rounders as F .05 (2, 27) = .157, p = .86.

The MCV test yielded mean and standard deviation scores: cricketers altogether 83.9 fL, ±5.0, batters 84.4 fL, ±7.1, bowlers 83.6 fL, ±5.4 and all-rounders 84.1 fL, ±2.9; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .067, p = .94.

The MCH test mean and standard deviation scores for cricketers altogether, batters, bowlers, and all-rounders were 28.8 pg ±2.0, 29.7 pg ±2.7, 28.5 pg ±2.1, and 28.7 pg ±1.3 respectively; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .827, p = .45.

The MCHC test discovered mean and standard deviation scores: cricketers altogether 34 g/dL, ±.55, batters 33.8 g/dL, ±.70, bowlers 34 g/dL, ±.48 and all-rounders 34 g/dL, ±.58; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .812, p = .46.

The RDW-SD test mean and standard deviation scores for cricketers altogether, batters, bowlers, and all-rounders were 44 fL ±2.32, 43.5 fL ±2.81, 43.2 fL ±2.35, and 44 fL ±2.13 respectively; no significant statistical difference was found among batters, bowlers, and all-rounders as F .05 (2, 27) = .329, p = .72.

Discussion

The CBC test parameters, including hemoglobin (Hb), total white blood cell (WBC) count, eosinophil total cell evaluation (TCE), differential WBC counts (neutrophils, lymphocytes, monocytes, eosinophils, and basophils), platelet count (PLT), mean platelet volume (MPV), total red blood cell (RBC) count, hematocrit/packed cell volume (HCT/PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), and red blood cell distribution width-standard deviation (RDW-SD), were analyzed for male cricketers, including batters, bowlers, and all-rounders. The test results revealed minimal variations across different playing roles, but no statistically significant differences were observed. Furthermore, all parameters remained within the reference range, except for eosinophil TCE and MPV, which showed slight deviations.

Given the limited research on this topic, it is important to note that CBC test results typically remain within normal ranges for young, fit individuals (Lee et al., 2019). Additionally, regular physical exercise, combined with proper recovery, supports the maintenance of normal hematological levels (Tayebi et al., 2011).

Bangladesh Krira Shikkha Protishtan (BKSP), only physically fit cricketers are selected through a rigorous screening process, and annual evaluations ensure the retention of high-performing athletes. The participants in this study, aged 14 to 19 years, were within a developmental age range where fitness plays a crucial role in hematological stability. Nevertheless, prior research suggests that CBC abnormalities can occur in fit individuals, as seen in studies on leukocyte variations in young adults (Santos et al., 2015).

Although no statistically significant differences were found in the eosinophil TCE test among the different playing roles, the mean value for all-rounders was slightly elevated, exceeding the reference threshold. Elevated eosinophil TCE values may result from allergic reactions, parasitic infections, autoimmune diseases, skin disorders, or certain cancers (Eng & DeFelice, 2016; Obumnaeme & Nnodim, 2021). The elevation observed in all-rounders (452/cmm) was only marginally above the normal limit (400/cmm) and well below the mild abnormality threshold (500–1500/cmm) (Park et al., 2018). While this does not necessarily indicate a serious health concern, continued monitoring of eosinophil levels is advisable to ensure they return to the normal range.

Similarly, although there were no statistically significant differences in MPV among the cricketers, slightly elevated mean scores were observed in the overall sample, as well as in batters and bowlers. However, these small decimal increases were insufficient to affect the interpretation of the test results. Nonetheless, regular health checkups are recommended to track MPV values until they normalize. Elevated MPV may indicate bone marrow disorders, inflammation, infections, vitamin D deficiency, cardiovascular disease, or recovery from thrombocytopenia (Gasparyan et al., 2019; Karnad & Poskitt, 1985).

Overall, the observed normal CBC test results in cricketers suggest that their hematological profiles remain stable regardless of playing role. Additionally, minor arithmetic variations in hematological parameters within the normal range do not appear to be influenced by specific playing positions. Further studies with larger sample sizes are recommended to validate these findings and explore potential long-term physiological adaptations among cricketers based on their playing roles.

Conclusions

This study analyzed Complete Blood Count (CBC) results for cricketers in different playing roles, including batters, bowlers, and all-rounders. Findings indicated no statistically significant differences among these groups across parameters such as hemoglobin, white blood cell count, eosinophil total cell evaluation, neutrophil count, lymphocyte count, monocyte count, platelet count, eosinophil count, mean platelet volume, red blood cell count, hematocrit, mean cell volume, mean cell hemoglobin, mean cell hemoglobin concentration, and red cell distribution width. Although playing roles (batters, bowlers, and all-rounders) did not significantly impact hematological parameters, minor differences were observed within normal ranges. It is recommended that cricket coaches and players conduct regular blood profile assessments, considering these role-based variations to optimize training, recovery, and performance outcome

Limitations

The small sample size was the only limitation of the study.

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