

Studies on Platelet Count, Platelet Indices, and Aspartate Aminotransferase in Patients Diagnosed with Infectious Mononucleosis in Imo State, Nigeria

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Abstract:

Background: Infectious mononucleosis (IM), caused primarily by the Epstein Barr virus (EBV), is a common viral illness associated with both hematological and hepatic abnormalities. Alterations in platelet count and platelet indices, alongside elevated liver enzymes such as aspartate aminotransferase (AST), have been reported in IM; however, data from sub-Saharan Africa are limited.

Objective

This study evaluated platelet count, platelet indices (mean platelet volume [MPV], platelet distribution width [PDW], and plateletcrit [PCT]), and AST levels in patients diagnosed with infectious mononucleosis in Imo State, Nigeria.

Methods

A case-control study was conducted involving 20 patients diagnosed with IM and 20 apparently healthy controls. Five milliliters of venous blood samples were collected and analyzed for platelet count, platelet indices and AST determination using standard laboratory techniques. Statistical analysis was performed using SPSS version 20. Results were expressed as mean $\pm$ standard deviation. Independent t-tests and analysis of variance (ANOVA) were used for comparisons, with $p < 0.05$ considered statistically significant.

Results

IM patients showed significantly reduced platelet count and PCT compared with controls ($p < 0.0001$). MPV, PDW, and AST levels were significantly elevated among IM patients ($p < 0.0001$). Younger patients (18–29 years) had higher platelet counts than older patients (30–39 years) ($p = 0.034$). No significant sex-based differences were observed in most parameters.

Conclusion

Infectious mononucleosis is associated with thrombocytopenia, increased platelet activation indices, and elevated AST levels. Platelet indices may serve as simple and inexpensive biomarkers for monitoring disease activity in IM.

Key words: infectious mononucleosis; epstein barr virus; platelet indices; aspartate aminotransferase; thrombocytopenia

1.Introduction

Infectious mononucleosis (IM) is an acute clinical syndrome most commonly caused by Epstein Barr virus (EBV), a ubiquitous human herpesvirus with worldwide distribution [1]. The infection is particularly common among adolescents and young adults and is characterized

clinically by fever, pharyngitis, lymphadenopathy, and fatigue [2]. Although IM is generally self-limiting, it may present with hematological and hepatic abnormalities that complicate clinical management [3]. EBV primarily infects B lymphocytes and epithelial cells, triggering a robust immune response dominated by cytotoxic T lymphocytes [4]. This

immune activation contributes to several laboratory abnormalities, including atypical lymphocytosis, thrombocytopenia, and elevated liver enzymes [5]. While mild thrombocytopenia is frequently observed, severe platelet reduction can increase the risk of bleeding [6]. Platelets are now recognized as important mediators of inflammation and immune responses, in addition to their role in hemostasis [7]. Platelet indices such as mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT) provide insights into platelet production, activation, and turnover. These indices are routinely available from automated hematology analyzers and have been explored as biomarkers in infectious and inflammatory diseases [8,9]. Hepatic involvement in IM is common and usually presents as mild, transient elevation of liver enzymes, particularly AST and alanine aminotransferase (ALT) [10]. Although jaundice is uncommon, biochemical evidence of hepatocellular injury occurs in a significant proportion of patients [11]. The mechanisms underlying EBV-induced liver injury are thought to involve immune-mediated hepatocyte damage rather than direct viral cytotoxicity [12]. Despite the high prevalence of EBV infection, there is limited local data on platelet indices and AST levels in IM patients in Nigeria. Understanding these laboratory patterns may improve diagnosis and monitoring in resource-limited settings. This study therefore assessed platelet count, platelet indices, and AST levels in patients diagnosed with infectious mononucleosis in Imo State, Nigeria.

2.0 Materials and Methods

2.1 Study Area

The study was conducted at Imo State University Teaching Hospital Imo State, Nigeria.

2.2 Study Design

This was a hospital-based case-control study.

2.3 Study Population

A total of 40 participants were recruited, comprising 20 patients clinically and serologically diagnosed with infectious mononucleosis and 20 apparently healthy controls matched for age and sex.

2.4 Selection Criteria

2.4.1 Inclusion Criteria

- Patients aged 18–39 years
- Confirmed diagnosis of infectious mononucleosis
- Consent to participate in the study

2.4.2 Exclusion Criteria

- History of chronic liver disease
- Co-infection with hepatitis viruses or HIV
- Use of drugs known to affect platelet count or liver enzymes

2.5 Ethical Approval

Ethical approval was obtained from the Institutional Ethics Committee of Imo State University Teaching Hospital. Written informed consent was obtained from all participants.

2.6 Sample Collection

Five milliliters of venous blood were collected aseptically from each participant. Two milliliters were dispensed into EDTA tubes for hematological analysis, while three milliliters were placed in plain tubes for serum AST analysis.

2.7 Laboratory Analysis

Platelet Count and Platelet Indices

Platelet count, MPV, PDW, and PCT were analyzed using an automated hematology analyzer based on the Coulter principle.

Aspartate Aminotransferase (AST)

AST was determined using a semi-automated chemistry analyzer based on the kinetic method, following standard laboratory protocols.

2.8 Statistical Analysis

Data were analyzed using SPSS version 20 (IBM Corp., Chicago, USA). Results were expressed as mean $\pm$ standard deviation. Independent t-tests were used to compare IM patients and controls, while ANOVA assessed subgroup differences. Statistical significance was set at $p < 0.05$.

3.0 Results

Parameter	IM Patients (n = 20) Mean $\pm$ SD	Controls (n = 20) Mean $\pm$ SD	t-value	p-value
Platelet Count ($\times 10^9/L$)	149.83 $\pm$ 29.37	260.47 $\pm$ 35.17	-13.23	<0.0001*
Mean Platelet Volume (fL)	10.88 $\pm$ 0.83	9.60 $\pm$ 1.57	3.94	<0.0001*
Platelet Distribution Width (fL)	15.17 $\pm$ 0.91	13.47 $\pm$ 1.36	5.67	<0.0001*
Plateletcrit (%)	0.068 $\pm$ 0.021	0.241 $\pm$ 0.035	-23.09	<0.0001*
Aspartate Aminotransferase (U/L)	62.00 $\pm$ 29.87	25.70 $\pm$ 6.68	6.50	<0.0001*

Table 3.1: Comparison of Platelet Parameters and AST Between Infectious Mononucleosis Patients and Controls.

Key:

* - Significant p value

IM patients had significantly lower platelet count and PCT compared to controls ($p < 0.0001$), while MPV, PDW, and AST levels were significantly higher ($p < 0.0001$).

Parameter	18–29 years (n = 20) Mean $\pm$ SD	30–39 years (n = 10) Mean $\pm$ SD	t-value	p-value
Platelet Count ($\times 10^9/L$)	157.75 $\pm$ 27.06	134.00 $\pm$ 28.55	2.23	0.034*
Mean Platelet Volume (fL)	10.87 $\pm$ 0.88	10.89 $\pm$ 0.75	-0.06	0.95
Platelet Distribution Width (fL)	15.17 $\pm$ 0.92	15.17 $\pm$ 0.93	0.00	1.00
Plateletcrit (%)	0.0726 $\pm$ 0.0225	0.0595 $\pm$ 0.0136	1.63	0.11
Aspartate Aminotransferase (U/L)	61.90 $\pm$ 26.20	62.20 $\pm$ 35.10	-0.03	0.98

Table 3.2: Platelet Parameters and AST in Infectious Mononucleosis Patients Based on Age.

Patients aged 18–29 years had significantly higher platelet counts than those aged 30–39 years ($p = 0.034$). No significant age-related differences were observed for MPV, PDW, PCT, or AST.

Parameter	Male (n = 15) Mean $\pm$ SD	Female (n = 15) Mean $\pm$ SD	t-value	p-value
Platelet Count ($\times 10^9/L$)	148.60 $\pm$ 31.20	151.07 $\pm$ 27.90	-0.23	0.82
Mean Platelet Volume (fL)	10.92 $\pm$ 0.81	10.84 $\pm$ 0.86	0.26	0.80
Platelet Distribution Width (fL)	15.21 $\pm$ 0.94	15.13 $\pm$ 0.89	0.25	0.81
Plateletcrit (%)	0.067 $\pm$ 0.020	0.069 $\pm$ 0.022	-0.29	0.77
Aspartate Aminotransferase (U/L)	63.40 $\pm$ 31.10	60.60 $\pm$ 28.80	0.26	0.80

Table 3.3: Platelet Parameters and AST in Infectious Mononucleosis Patients Based on Sex.

No sex-based difference was observed in platelet indices and AST levels IM patients.

4.0 Discussion

This study demonstrated significant alterations in platelet count, platelet indices, and AST levels among patients with infectious mononucleosis. The observed thrombocytopenia in IM patients aligns with previous reports describing mild to moderate platelet reduction during acute EBV infection [6,13]. Proposed mechanisms include immune-mediated platelet destruction, splenic sequestration, and transient bone marrow suppression [14].

The elevated MPV and PDW suggest increased platelet activation and turnover, reflecting a response to peripheral platelet destruction [15]. This finding supports the use of platelet indices as markers of inflammatory activity, as previously reported in viral infections [8,16].

AST levels were significantly elevated, confirming hepatic involvement in IM. This elevation is usually mild and self-limiting, consistent with immune-mediated hepatocyte injury rather than direct viral damage [12]. This suggests that hepatic and hematologic changes may occur independently during EBV infection.

Younger patients had higher platelet counts, possibly due to better bone marrow reserve and regenerative capacity [17]. The lack of sex-based differences may be related to the small sample size¹⁸. Overall, the findings highlight the clinical utility of routine hematological parameters in the assessment of IM, particularly in resource-limited settings.

5.0 Study Limitations

This study had some limitations. The sample size was relatively small, which may limit the generalizability of the findings. In addition, the cross-sectional design did not allow assessment of changes in platelet indices and AST over time. Larger, longitudinal studies are recommended to confirm these findings.

6.0 Conclusion

Infectious mononucleosis is associated with significant thrombocytopenia, elevated platelet activation indices, and increased AST levels. Platelet indices such as MPV and PDW may serve as useful, affordable biomarkers for disease monitoring in IM patients. Incorporating these parameters into routine evaluation may enhance clinical assessment and follow-up.

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