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COMPARATIVE ANALYSIS OF HEMATOLOGICAL CHANGES IN DENGUE POSITIVE PATIENTS: A RETROSPECTIVE OBSERVATIONAL STUDY FROM SOUTH GUJARAT

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ABSTRACT

Dengue, a major arboviral infection, continues to pose significant public health concerns globally. This retrospective comparative study was conducted to analyze hematological parameters across 150 confirmed dengue cases admitted to a tertiary care center in South Gujarat. Serial monitoring of hematological indices, including hemoglobin, white blood cells (WBC), differential counts, and platelet counts, was done on days 1, 3, and 7. Results highlighted significant trends, particularly leukopenia, thrombocytopenia, and monocytosis during the acute phase. Comparative evaluation with previously published data reinforces these patterns and suggests their potential as clinical markers for dengue diagnosis and prognostication. The study also explores the immunological underpinnings of hematological changes with reference to viral-host interactions. Findings support integrating hematologic monitoring in dengue case management algorithms.

INTRODUCTION:

Dengue fever, caused by the dengue virus (DENV), is transmitted primarily by Aedes aegypti and represents one of the most prevalent vector-borne diseases in tropical and subtropical regions [1,2]. Clinically, it presents in a spectrum ranging from mild febrile illness to life-threatening dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) [3]. In recent years, there has been growing interest in understanding the dynamic hematological changes during the course of dengue illness, including the role of leukocytes, platelets, and immune cells as indicators of disease progression [4–6]. These hematologic patterns are essential for early diagnosis and risk stratification, especially in resource-limited settings where serological confirmation may be delayed.

METHODS:

This retrospective observational study included 150 patients diagnosed with dengue using NS1 antigen, IgM ELISA, or PCR-based confirmation between July 2022 and December 2023 at a tertiary care hospital in South Gujarat. Demographic data, clinical symptoms, and laboratory values were obtained from patient records. Hematologic parameters analyzed included hemoglobin (Hb), total leukocyte count (TLC), platelet count, hematocrit (HCT), and differentials including eosinophils, neutrophils, lymphocytes, and monocytes. These were compared across three time points (Day 1, Day 3, and Day 7). Statistical analysis employed ANOVA and t-tests to evaluate temporal changes, with $p<0.05$ considered significat

RESULTS:

Demographics & Clinical Features

- Majority of patients were in the 21–30 age group (38%), followed by <20 years (26%).
- Predominant symptoms: fever (100%), myalgia (82.7%), arthralgia (80%), and rash (68%).

Table 1 Gender Wise Comparison Of Mean Haemoglobin, WBC & Platlets On Different Days

		Haemoglobin			WBC			Platelet		
Gender		**Day 1**	**Day 3**	**Day 7**	**Day 1**	**Day 3**	**Day 7**	**Day 1**	**Day 3**	**Day 7**
F	Mean	12.19	11.96	12.22	4490	2850	3410	76333.3	38366.7	124833
	SD	1.6	1.7	1.65	2327.1	1967.45	1571.59	33535.7	22194.3	36476.8
M	Mean	12.84	12.55	12.82	4794.17	2733.33	3380.83	74325	41258.3	122283
	SD	1.7	1.69	1.66	1954.41	1286.93	1163.25	36643.4	23521.2	36556.4
Total	Mean	12.71	12.43	12.7	4733.33	2756.67	3386.67	74726.7	40680	122793
	SD	1.69	1.71	1.67	2029.67	1441.63	1249.63	35954.8	23210.8	36432.4
T value		3.596	2.977	3.123	0.53	0.15	0.01	0.07	0.37	0.117
P value		0.06	0.087	0.079	0.47	0.69	0.91	0.78	0.54	0.733

Gender wise there was no difference of mean Hemoglobin level among study participants. In Female mean haemoglobin at day 1 was 12.19, at Day 3 11.96 and 12.22 at Day 7 while in male mean HB at day 1 was 12.71, at day 3 12.55 and 12.82 at day 7 was and SD were 1.7, 1.69 and 1.66 respectively..

In Female mean WBC at day 1 was 4490, at Day 3 2850 and 3410 at Day 7 while in male mean WBC at day 1 was 4794.1, at day 3 2733 and 3380 at day 7 was and SD were 1954.41, 1286.93 and 1163.25 respectively.

In Female mean Platelets at day 1 were 76333.3, at Day 3 38366.7 and 124833 at Day 7 while in male mean Platlets at day 1 was 74325, at day 3 41258.3and 122283 at day 7 was and SD were 35954.8, 23210.8 and 36432.4 respectively.

Study showed maximum patients were presented with fever, arthralgia , headache and myalgia. And least present with splenomegaly and subconjunctival hemorrhage.

Among all dengue patients, 62 (41.3%) were had atypical lymphocyte.

Table 2: Comparison Of Difference In Eosinophil Level At Day 1 , 3 And At Day 7.

Group	Day	Average	Variance	F value	p value
Eosinophil	1	2.21	0.61		
	3	2.22	0.39		
	7	2.18	0.26	0.14	0.86
Monocyte	1	2.09	0.11		
	3	2.11	0.23		
	7	2.27	0.64	4.26	0.015*
Neutrophil	1	54.39	33.49		
	3	36.9	50.17		
	7	38.82	48.47	313.2	0.015*
Lympho	1	41.52	33.79		

cyte	3	57.17	48.3		
	7	59.07	50.03	315.9	0.015

Table 3 Comparison Of Difference In Hematocrit At Day 1, 3 And At Day 7.

Groups	Average	Variance	F value	p value
Hematocrit Day 1	33.81	48.09	4.38	0.015*
Hematocrit Day 3	34.43	36.35		
Hematocrit Day 7	35.90	34.33		

Study showed hematocrit from day 1 to day 7 with p value 0.015 which was statically significant.

DISCUSSION:

This study confirms previously documented hematologic features of dengue, especially during its critical and recovery phases [7–10]. Leukopenia observed around day 3 reflects bone marrow suppression, while thrombocytopenia corresponds with immune-mediated platelet destruction and peripheral sequestration [11,12]. The spike in lymphocytes and monocytes supports the role of cellular immune activation and cytokine release [13,14].

Comparative analysis with Indian and Southeast Asian cohorts [15–18] reveals similar hematologic signatures but with earlier nadir in leukocyte and platelet counts in this study. Regional vector density, viral serotypes, and host immunity likely explain these differences [19,20].

The study's retrospective nature and absence of dengue serotyping limit interpretation, yet its strength lies in the consistent serial monitoring and alignment with broader epidemiological trends. Incorporation of WBC and platelet monitoring into clinical scoring tools could enhance early identification of severe dengue.

CONCLUSION:

Serial hematologic evaluation in dengue-positive patients reveals dynamic trends that may aid in early disease detection and severity stratification. Monitoring WBC, platelet count, and differentials—especially monocytosis—provides vital insights into disease progression and recovery. Further large-scale prospective studies integrating virologic and immunologic profiling are recommended.

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