

# Hematological Abnormalities in Patients with Decompensated Chronic Liver Disease: A Cross-Sectional Analysis

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**Abstract:** *This study aims to evaluate hematological abnormalities in patients with decompensated chronic liver disease. A cross-sectional analysis of 100 patients was conducted, focusing on the prevalence of anemia, leukocyte anomalies, thrombocytopenia, and pancytopenia. Results indicated a high prevalence of anemia and thrombocytopenia among the studied patients, with significant associations found between hematological abnormalities and disease complications. Early identification and management of these abnormalities could reduce morbidity and mortality in affected patients.*

**Keywords:** anemia, thrombocytopenia, chronic liver disease, hematological abnormalities, decompensated liver disease

## 1. Introduction

- Liver is the largest organ in the body (1,2).
- Liver plays an important role in homeostasis. Any disease affecting the functions of liver will cause a breach in whole body homeostasis.
- The liver plays a major role in carbohydrate, lipid, and protein metabolism; inactivation of various kinds of toxins, metabolism of drugs & hormones, synthesis of plasma proteins & maintenance of immunity (kupffer cells). It's role in endocrine and hematological manifestations is important.
- From being a primary site of hematopoiesis to maintaining hematological parameters in postnatal life, the liver plays an extremely important role in the maintenance of blood homeostasis. Liver plays a major role in maintaining the hematological parameters normal and maintaining hemostasis.
- The liver is the storage site for iron, B12 and folic acid which are necessary for normal hematopoiesis.
- Liver also secretes the clotting factors and the inhibitors and keeps the hemostasis in equilibrium. Loss of Liver function can manifest as subtle metabolic abnormalities and derangements in hematological parameters which can ultimately culminate in grave complications.
- Hepatocellular failure, portal hypertension and jaundice may affect the blood picture. Chronic Liver disease is usually accompanied by hypersplenism. Diminished erythrocyte survival is frequent.
- In addition, both parenchymal hepatic disease and cholestatic jaundice may produce blood coagulation defects. Dietary deficiencies, alcoholism, bleeding and

difficulties in hepatic synthesis of proteins used in blood formation or coagulation add to the complexity of the problem (3).

- According to the latest WHO data published in 2017, liver disease deaths in India reached 259,749 or 2.95% of total deaths, accounting for one-fifth (18.3%) of all cirrhosis deaths globally(4). This study was undertaken to describe the hematological abnormalities in decompensated chronic liver disease so that 1 measure could be taken to correct them and reduce morbidity & mortality. This could also extend help in increasing longevity in transplant awaiting patients.

### Aim & Objectives of the Study

This study aims to evaluate hematological abnormalities in patients with decompensated chronic liver disease. A cross sectional analysis of 100 patients was conducted, focusing on the prevalence of anemia, leukocyte anomalies, thrombocytopenia, and pancytopenia. Results indicated a high prevalence of anemia and thrombocytopenia among the studied patients, with significant associations found between hematological abnormalities and disease complications. Early identification and management of these abnormalities could reduce morbidity and mortality in affected patients.

## 2. Materials and Methods

Patients presenting with signs and symptoms of decompensated chronic liver disease were selected through analytical cross-sectional method for the study from department of Medicine – M K Shah Medical College & SMS Hospital Chandkheda. The exclusion criteria included -

patients with primary hepatocellular carcinoma or GI malignancies, primary coagulation disorders or primary abnormalities in hemostatic function, pre-existing anemia of other causes, acute hepatic failure, end-stage medical diseases like CKD, Coronary artery disease, Cardiac failure, COPD were excluded. 100 subjects (82 male and 18 female) were selected for the study and evaluated in terms of clinical examination and lab investigations.

### 3. Result & Discussion

**Anemia:** The study analyzed the prevalence and characteristics of anemia among the patients. Out of 100 patients, 92 patients had anemia and only 8 patients had normal hemoglobin above 12 g/dL (Females) & 13g/dL (Males). 10 patients had Hb <6 g/dL, 28 patients had Hb between 6-8 g/dL, 42 patients had Hb between 8-10 g/dL and 12 patients had Hb between 10-12 g/dL.

**Table 3:** Severity of anemia

Hb (g/dL)	Cases	Percentage
≤6	10	10%
6.1-8	28	28%
8.1-10	42	42%
10.1-12	12	12%
>12	8	8%

This result is comparable to a study done by Joeimon J L where anemia was present in 90% cases, Suresh Moothazhathu Kesavadas et al. where anemia was present in 88% and G. Anbazhagan et al. where anemia was observed in 80% of the patients with DCLD.

**Table 4:** GI bleeding vs Hemoglobin

GI bleeding	Number of patients	Average hemoglobin(g/dL)
Present	36	7.06
Absent	64	9.15

P value <0.001: Statistically significant

Average hemoglobin of 36 patients having GI bleeding was 7.06 g/dL compared to 9.15 g/dL of 64 patients not having GI bleeding which suggests GI bleeding is a significant contributing factor for anemia in decompensated chronic liver disease (P < 0.001).

#### WBC abnormalities:

The analysis of WBCs was done with the total count and the differential count. The total count of WBCs ranges from 1200/mm<sup>3</sup> to 22,500/mm<sup>3</sup>. Among the 100 patients, 15 patients had leucocytosis (WBC >11,000/mm<sup>3</sup>) which was observed mostly in patients with fever due to secondary infection of ascites due to repeated paracentesis and due to spontaneous bacterial peritonitis. Leucopenia (WBC <4000/mm<sup>3</sup>) was present in 34% of patients. 51% of patients had normal WBC counts (4000-11,000)

**Table 5:** WBC counts

WBC counts (/mm <sup>3</sup> )	Number of cases	Percentage
≤ 4000	34	34%
4001-11,000	51	51%
>11,000	15	15%

In a study done by Joeimon J L, 26% of patients had leucopenia with counts less than 4000/mm<sup>3</sup>, 58% had

normal WBC counts & 16% of patients had Leucocytosis. In a study done by Suresh Moothazhathu Kesavadas Et al., leucopenia was observed in 26.7% of patients, leucocytosis was observed in 18.7% of patients and the rest had normal WBC count.

#### Platelet counts:

Platelet counts: Thrombocytopenia was observed in 83% of the 100 patients studied. Severe thrombocytopenia of <50,000 cells/mm<sup>3</sup> was found to be in 25% of patients and only 17% of patients had normal platelet count of >1,50,000/mm<sup>3</sup>.

**Table 6:** Platelet count

Platelet count(/mm <sup>3</sup> )	Number of cases	Percentage
50,001-1,00,000	36	36%
1,00,001-1,50,000	22	22%
1,50,001-2,00,000	9	9%
>2,00,000	8	8%

This finding is comparable to study done by Suresh Moothazhathu Kesavadas Et al., in which thrombocytopenia was observed in 88% cases and the study done by Joeimon J L which showed platelet count <1,50,000/mm<sup>3</sup> in 74% of patients.

**Table 7:** Splenomegaly vs thrombocytopenia

Splenomegaly	Number of patients	Average platelet count (per mm <sup>3</sup> )
Mild	32	1,23,843
Moderate	36	66,574
Severe	18	39,596

P value <0.0001: Statistically significant

Platelet count was compared with splenomegaly. Average platelet count of patients having mild splenomegaly was 1,23,843/mm<sup>3</sup>, for moderate splenomegaly it was 66,574/mm<sup>3</sup> and patients having severe splenomegaly had average platelet count of 39,596/mm<sup>3</sup>. It shows the significant role of splenomegaly in producing thrombocytopenia in patients with decompensated chronic liver disease (P value < 0.0001).

A study by Richard H Aster showed that as spleen size increases pooling of platelets in spleen increases. Normally, one third of platelets are concentrated in the spleen, in splenomegaly, this pooling increases to 50 to 90%.

A similar previous study by Joeimon J L showed a statistically significant correlation between spleen size and thrombocytopenia (p value – 0.03).

**Table 8:** GI bleeding vs thrombocytopenia

GI bleed	Number of patients	Average platelet count (per mm <sup>3</sup> )
Present	36	67,652
Absent	64	1,19,418

P value = 0.00004: Statistically Significant

Platelet counts were compared among patients with GI bleed and those who did not have GI bleed. Average platelet count in patients with GI bleed was 67,652 /mm<sup>3</sup> and it was 1,19,418/mm<sup>3</sup> in those who did not have GI bleed. It shows

that thrombocytopenia is a significant factor contributing to GI bleed (P value = 0.00004).

This result is similar to the result obtained from a study done by Po-Han Lo Et al where the incidences of gastrointestinal hemorrhage for people with and without thrombocytopenia were 14.5 and 5.07 per 1000 person-years, respectively (P<0.0001) and the conclusion was derived that patients with thrombocytopenia showed higher risks of gastrointestinal hemorrhage.

### Pancytopenia

Out of total 100 patients, 34 patients had pancytopenia. Among 34 patients having pancytopenia, 31 were having alcoholic liver disease, so pancytopenia is more common in alcoholic liver disease than other forms of decompensated chronic liver disease. (P value = 0.0014)

**Table 9:** Pancytopenia among the study population

Pancytopenia	Number of patients	Percentage
Present	34	34%
Absent	66	66%

**Table 10:** Pancytopenia in alcoholic vs non-alcoholic cases

Alcoholic liver disease	Pancytopenia present	Pancytopenia absent
Yes	31	40
No	3	29

P value: 0.0014: Statistically significant

A study done by Suryareshmi B S et al showed that the most common cause of pancytopenia was chronic liver disease secondary to alcoholic cirrhosis.

## 4. Conclusion

- This study found that hematological abnormalities such as anemia and thrombocytopenia are prevalent in patients with decompensated chronic liver disease. Normocytic anemia and anemia of chronic disease were the most common forms observed. The findings underscore the importance of early detection and management of these abnormalities to reduce the risk of complications and improve patient outcomes. Further research should explore targeted interventions to mitigate these hematological risks in liver disease patients
- The study significance lies in highlighting the critical need for early detection and management of hematological abnormalities in patients with decompensated chronic liver disease, which can significantly impact patient prognosis and reduce associated complications

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