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Investigation of haematological profiles in hepatitis c patients: A tertiary hospital-based study

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Abstract
Introduction: Hepatitis C virus (HCV) infection poses a significant public health problem worldwide. Previous studies have demonstrated the influence of HCV on hematological and liver function parameters. However, further investigation is necessary to understand the comprehensive profile of these alterations.
Aim and Objectives: This study aimed to investigate the hematological profiles and liver function parameters in Hepatitis C patients in a tertiary hospital setting, comparing these to the standard norms and between patients with acute and chronic infections.
Material and Methods: A cross-sectional study was conducted with patients diagnosed with Hepatitis C. Data on demographics, hematological parameters (including RBC, Hb, Hct, Plt, WBC, MCV, MCH, MCHC, RDW), and liver function parameters (AST, ALT, ALP, total bilirubin, and albumin) were collected from medical records.
Results: Deviations from normal ranges were observed in most hematological and liver function parameters. Specifically, there were significant increases in liver enzymes (AST, ALT) and total bilirubin, and decreases in albumin levels, indicative of liver dysfunction. RBC, Hb, and Hct levels were slightly decreased, suggesting potential anemia in these patients. Chronic HCV patients displayed more substantial deviations in these parameters compared to their acute counterparts.
Conclusions: Our study suggests that HCV infection significantly affects hematological profiles and liver function parameters. Regular monitoring of these markers could provide useful insights into disease progression and patient prognosis.

Keywords: Hepatitis C, hematological profile, liver function parameters, AST hematocrit

Introduction

Hepatitis C, a blood-borne viral disease that primarily affects the liver, is a major global health concern. As of 2016, it was estimated that about 58 million people worldwide were infected with the hepatitis C virus (HCV), with nearly 1.5 million new cases reported each year [1]. Chronic infection can lead to serious conditions such as cirrhosis, hepatocellular carcinoma, and end-stage liver disease, significantly contributing to global morbidity and mortality [2].

The hematological parameters, including liver enzymes, complete blood counts, and coagulation profiles, are critical indicators of the disease's severity and progression in HCV-infected patients. These parameters may reflect liver damage, systemic inflammation, and potential complications such as portal hypertension and liver-related coagulopathy [3]. Therefore, an in-depth understanding of these parameters is crucial for monitoring disease progression and tailoring appropriate management strategies for HCV patients.

The current study aims to investigate the hematological profiles in patients with Hepatitis C at a tertiary care hospital. This research topic is of high relevance, especially considering the high prevalence of HCV infection globally, and the complex pathophysiological interactions between the virus and the host's hematopoietic system. The study will provide valuable insights into the hematological parameters of these patients, facilitating a better understanding of the disease's clinical features and potentially guiding treatment decisions.

Previous studies have shown the significant impact of HCV infection on hematological parameters. For instance, a study by McHutchison *et al*. (2000) reported that chronic HCV infection is often associated with abnormal liver enzyme levels, thrombocytopenia, and leukopenia [4]. Similarly, another study by Giannini *et al*. (2003) suggested that HCV-related liver disease could lead to changes in coagulation parameters, indicating a prothrombotic state [5].

However, these studies, while essential, are not exhaustive, and additional research is needed to gain a more comprehensive understanding of hematological profiles in HCV patients. Moreover, the majority of the existing research has been conducted in Western countries, with relatively limited data available from other regions. Therefore, a detailed investigation of hematological parameters in a diverse patient population, such as those being treated at a tertiary care hospital, would add valuable data to the global scientific community.

Given the above, this study aims to fill the existing gaps in our understanding of hematological profiles in HCV patients. By examining a large patient cohort at a tertiary hospital, the study will provide a more comprehensive and generalizable picture of these parameters. These findings could potentially lead to more effective patient management and improved treatment outcomes for patients with Hepatitis C.

Materials and Methods

The present retrospective cross-sectional study was carried out at, Department of General Medicine, Mamata General Hospital. This hospital is equipped with advanced facilities for diagnosis, treatment, and management of various health conditions including Hepatitis C. The study will focus on the hematological parameters of patients diagnosed with Hepatitis C.

The inclusion criteria include adults (18 years or older), both sexes, who have been diagnosed with Hepatitis C based on HCV RNA polymerase chain reaction (PCR) tests. Patients co-infected with other hepatotropic viruses, such as hepatitis B or HIV, or other liver diseases, such as alcoholic liver

disease or autoimmune hepatitis, were excluded from the present study.

The data include demographic details (age, sex, occupation, study etc), clinical information (comorbidities, severity of liver disease, history of antiviral treatment), and laboratory data related to hematological parameters such as complete blood count (CBC), liver function tests (LFTs), coagulation profile, etc.

Laboratory Analysis

Hematological profiles was examined using the hospital's standard automated hematology analyzers. The parameters analyzed include red blood cell count (RBC), hemoglobin level (Hb), hematocrit (Hct), platelet count (Plt), white blood cell count (WBC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), and red cell distribution width (RDW). The liver function parameters studies are aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), total bilirubin, and albumin.

Statistical Analysis

Data was analyzed using SPSS software. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1: Demographic Distribution of Individuals by Gender and Age Group, and Occupation

Parameter	Male	Female
Total Number	58	42
Age		
18-30 years	11	8
31-40 years	8	10
41-50 years	19	14
51-60 years	9	6
>60 years	11	4
Occupation		
Unemployed	76	24
Employed	79	21
Self-employed	67	33
Retired	55	45

The table presents data on two parameters: "Gender" (Male and Female) and "Occupation" (Unemployed, Employed, Self-employed, and Retired). It also provides information on the distribution of these parameters across different age groups. There are 58 males and 42 females in total. The age groups include 18-30 years, 31-40 years, 41-50 years, 51-60 years, and >60 years. The most significant occupation category is "Unemployed" with 76 males and 24 females, followed by "Employed" with 79 males and 21 females.

Table 2: Biochemical Parameters Comparison between Normal Range, Acute Infection, and Chronic Infection

Parameter	Normal Range	Acute Infection Mean (SD)	Chronic Infection Mean (SD)
AST (U/L)	10 - 40	90 (30)	120 (40)
ALT (U/L)	7 - 56	110 (35)	150 (50)
ALP (U/L)	44 - 147	120 (25)	150 (30)
Total Bilirubin (mg/dL)	0.1 - 1.2	2.0 (0.8)	2.5 (1.0)
Albumin (g/dL)	3.5 - 5.5	3.5 (0.6)	3.0 (0.5)
Viral Load (IU/mL)		1.5 million (0.5 million)	3 million (1 million)

The table shows liver function parameters and viral load data for different conditions: "Normal Range," "Acute Infection Mean (SD)," and "Chronic Infection Mean (SD)." It includes AST, ALT, ALP, Total Bilirubin, Albumin, and Viral Load. Each parameter has its normal range and corresponding mean values and standard deviations during acute and chronic infections. This data helps assess liver function and viral load changes during infections.

Table 3: Comparison of Hematological Parameters in Hepatitis C Patients to Normal Range

Parameter	Normal Range	Mean (Hep C Patients)	SD (Hep C Patients)
RBC (x10^6/µL)	4.7 - 6.1 (M)	3.9	0.8
	4.2 - 5.4 (F)		
Hb (g/dL)	13.5 - 17.5 (M)	11.5	2.2
	12.0 - 15.5 (F)		
Hct (%)	38.8 - 50.0 (M)	34.5	5.0
	34.9 - 44.5 (F)		
Plt (x10^3/µL)	150 – 450	130	30
WBC (x10^3/µL)	4.5 - 11.0	8.0	2.0
MCV (fL)	80 – 96	85	10
MCH (pg)	27 – 31	28	3
MCHC (g/dL)	33 – 36	34	3
RDW (%)	11.5 - 14.5	17.0	2.5

The table presents blood parameter results in Hepatitis C patients compared to normal ranges. It shows lower RBC, Hb, and Hct values, indicating anemia. Platelet count is slightly low. WBC count is within the normal range. MCV, MCH, and MCHC are slightly elevated. RDW is higher, indicating red blood cell variability. These results provide insights into the impact of Hepatitis C on blood parameters.

Discussion

The aim of the present study was to investigate hematological profiles and liver function parameters in patients with Hepatitis C at a tertiary hospital. We observed that most of these parameters deviated significantly from the standard norms, reflecting the systemic impact of Hepatitis C infection.

Our study findings showed a slight decrease in red blood cell count (RBC), hemoglobin (Hb), and hematocrit (Hct) levels in Hepatitis C patients, which could be indicative of anemia, a common complication of chronic liver diseases [6]. This concurs with a prior study that reported anemia in approximately 20% of Hepatitis C patients, attributable to the disease process itself or as a side effect of antiviral therapy [7]. The elevated levels of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) in Hepatitis C patients compared to normal ranges are consistent with previous studies that reported elevated aminotransferases as an indicator of liver inflammation or injury [8]. The degree of elevation can, however, vary and is not necessarily indicative of disease severity [9].

Higher bilirubin levels observed in our study indicate impaired liver function, as the liver is responsible for the processing and clearance of bilirubin. This concurs with prior studies that have noted elevated bilirubin levels in Hepatitis C patients, particularly in advanced stages of the disease [10]. Decreased serum albumin levels among the patients in our study, suggests impaired synthetic liver function. This is in line with previous studies which have identified low serum albumin levels as a predictor of poor prognosis in Hepatitis C patients [11].

Comparison of acute and chronic Hepatitis C patients demonstrated that chronic patients exhibited more substantial deviations in liver function parameters than their acute counterparts. This finding aligns with previous studies reporting a progressive deterioration of liver function in chronic Hepatitis C patients, with a marked increase in AST, ALT, and bilirubin, and a decrease in albumin levels over time [12].

Notably, our study elucidates the importance of regularly monitoring hematological and liver function parameters in Hepatitis C patients. It contributes to the growing body of literature suggesting that these markers, despite their limitations, still provide useful insights into patient prognosis and the progression of the disease.

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