Original Research Article

Estimation of hematological parameters in patients with Hepatitis B and C

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Abstract

Background: Hepatitis B and Hepatitis C are the blood-borne diseases with high morbidity and mortality. These are responsible for liver diseases, cirrhosis and hepatocellular carcinoma so determination of hematological parameters is essential in these patients. The aim of the present study was to compare the change in the hematological parameters in patients with hepatitis B and C than those of healthy individuals.

Material and methods: A case-control study was carried out by the routine screening of the hepatitis B and C patients by using rapid immunoassay test. The study group comprised of 15 cases of Hepatitis B positive, 15 cases of Hepatitis C positive and 15 cases of healthy individuals. Blood samples were collected from the patients with seropositive hepatitis B and C as well as healthy individuals to determine the variation in the hematological parameters.

Results: Variation in the hematological parameters has been observed in patients with seropositive Hepatitis B and C virus as compared to healthy individuals.

Conclusion: This study determines the need for routine hematological investigations in seropositive hepatitis B and C patients. Follow up of patients even after recovery from Hepatitis B and C virus infection should create an essential part of these patients' management.

Key words

Hepatitis B, Hepatitis C, Viral hepatitis, Hematological parameters.

Introduction

Various infectious diseases affecting human beings are triggered by viruses whereas some viral diseases are lethal to them like viral hepatitis [1]. Several viral agents are responsible in the etiology of viral hepatitis and these agents may vary from hepatotrophic viruses which

include hepatitis A, B, C, D, E and G to systemic viral infections like Epstein Barr and Herpes Simplex viruses [2]. Hepatitis B and Hepatitis C are the blood-borne diseases with high morbidity and mortality. The hepatitis B and C viruses belong to the family of Hepadnaviridae and Flaviviridae [3, 4]. Hepatitis B virus infections are a most important health problem and have a greater incidence among injection drug users (IDUs). The various risk factors associated with hepatitis B virus were age, gender, sexual behavior, shared syringe use, duration of addiction, imprisonment, tattooing, past history of surgery, dental procedures, blood transfusion, jaundice, type of illicit drug use and level of education [5]. Hepatitis B virus infects the liver of hominoidea including humans and cause an inflammation called hepatitis, originally called as serum hepatitis. They cause liver diseases that vary in severity from person to person [6, 7]. Hepatitis C virus affects the liver and asymptomatic infection occur initially but chronic hepatitis may developed later which are generally due to either decreased liver function or increased pressure in the liver circulation [8]. Hepatitis C viruses infect only human and chimpanzees [9]. Hepatitis C virus transmission occurred by cross-contamination from reused syringes, needle, multiple-use medication vials and infusion bags [10]. In addition to hepatic pathology caused by hepatitis B & C virus, extra-hepatic abnormalities are not uncommon [11]. One of the most commonly recognized extra-hepatic abnormalities determined at the time of diagnosis is the hematological abnormality [12]. Hepatitis B and C viruses are responsible for liver diseases, cirrhosis and hepatocellular carcinoma so determination of hematological parameters is essential in these patients. The aim of the present study was to compare the variation in the hematological parameters in patients with hepatitis B and C than those of healthy individuals.

Materials and methods

A case-control study was carried out by the routine screening of the hepatitis B and C patients reported in the Department of Oral Pathology, Govt. Dental College and Hospital, Srinagar by using rapid immunoassay test. The study group comprised of 15 cases of Hepatitis B positive, 15 cases of Hepatitis C positive and 15 cases of healthy individuals. Individuals with a known history of jaundice, blood/ blood component transfusions or major surgery in the previous six months were excluded from the study. The tourniquet was released after collection of 4 millimeters of blood from the patients with seropositive hepatitis B and C as well as healthy individuals and the patient was asked to open his or her fist. The needle was removed and the punctured site was immediately covered with a piece of dry cotton wool. The needle was removed from the syringe and the blood was delivered into a commercially prepared concentration of Ethylene diamine tetra acetic acid (EDTA) tube to determine the hematological parameters in patients with hepatitis B and C than those of healthy individuals. The data was analyzed by using statistical software (SPSS version 19.0). Mean and standard deviation were calculated for each individual group. A probability value (p) of ≤ 0.05 was considered to be statistically significance.

Results

The mean hemoglobin concentration in Hepatitis B positive patients and healthy subjects were 11.2±1.2g/dl and 13.6±1.8g/dl respectively with a statistically significant difference (p=0.035). The mean RBC count in Hepatitis B positive patients were lower ($4.28\pm1.2\times10^6/mm^3$) as compared to control subjects ($5.85\pm1.8\times10^6/mm^3$). There was a statistically significant difference (p=0.002) in the RBC count. The mean WBC count in control individuals were higher ($6.4\pm1.8\times10^9/l$) than Hepatitis B positive individuals ($5.8\pm3.7\times10^9/l$). The mean platelet count in Hepatitis B positive patients and healthy subjects were $165.5\pm4.16\times10^9/l$ and $225.5\pm5.18\times10^9/l$ respectively. There was a statistically significant difference in the platelet count but non-

significant correlation in the WBC count. The neutrophil count in Hepatitis B positive patients and healthy subjects were 51.8±10.2% and 48.3±10.3% respectively. The lymphocyte count in Hepatitis B positive patients were higher (45.3±10.6%) as compared to control subjects (44.4±10.3%). A statistically non-significant correlation was found in the neutrophil and lymphocyte count. The eosinophil count in Hepatitis B positive patients and control individuals were 2.4±1.6% and 2.8 ±2.1% with a statistically significant difference (p=0.036). The basophil count in Hepatitis B positive patients were higher (1.7±1.8%) as compared to healthy individuals (1.5±1.9%). The monocyte count in Hepatitis B positive patients and healthy individuals were 2.0±1.4% and 1.2±1.8% respectively. There was a statistically significant difference in the monocyte count but non-significant correlation in the basophil count (**Table - 1**).

Table - 1: Hematological parameters in Hepatitis B positive patients and healthy individuals.

Parameters	Hepatitis B (n=15)	Control (n=15)	T-value	P-value
Hemoglobin (g/dl)	11.2±1.2	13.6±1.8	-2.014	0.035*
RBC count (10^6/mm^3)	4.28±1.2	5.85±1.8	0.328	0.002*
WBC count (10^9/L)	5.8±3.7	6.4±1.8	1.460	0.236
Platelet count (10^9/L)	165.5±4.16	225.5±5.18	2.46	0.002*
Neutrophils %	51.8±10.2	48.3±10.3	0.945	0.327
Lymphocytes %	45.3±10.6	44.4±10.3	0.245	0.825
Eosinophils %	2.4±1.6	2.8±2.1	-2.108	0.036*
Basophils %	1.7±1.8	1.5±1.9	0.426	0.527
Monocytes %	2.0±1.4	1.2±1.8	2.48	0.012*

Table - 2: Hematological parameters in Hepatitis C positive patients and healthy individuals.

Parameters	Hepatitis C (n=15)	Control (n=15)	T-value	P-value
Hemoglobin (g/dl)	11.7±1.4	13.6±1.8	-2.016	0.025*
RBC count (10^6/mm^3)	4.36±1.6	5.85±1.8	0.218	0.003*
WBC count (10^9/L)	5.2±2.2	6.4±1.8	1.260	0.004*
Platelet count (10^9/L)	140.5±3.14	225.5±5.18	2.104	0.003*
Neutrophils %	42.8±9.15	48.3±10.3	0.645	0.245
Lymphocytes %	46.3±8.60	44.4±10.3	0.232	0.633
Eosinophils %	2.7±1.3	2.8±2.1	-2.032	0.026*
Basophils %	1.4±1.2	1.5±1.9	0.482	0.435
Monocytes %	1.8±2.0	1.2±1.8	2.460	0.002*

The mean hemoglobin concentration in Hepatitis C positive patients and healthy subjects were 11.7±1.4g/dl and 13.6±1.8g/dl respectively with a statistically significant difference (p=0.025). The mean RBC count in Hepatitis C positive patients were lower ($4.36±1.6×10^6$/mm^3) as compared to control subjects ($5.85 ±1.8×10^6$/mm^3). There was a statistically significant difference (p=0.003) in the RBC count. The mean WBC count in control individuals were higher ($6.4±1.8×10^9$/l) than Hepatitis C positive individuals ($5.2±2.2×10^9$/l). The mean platelet count in Hepatitis C positive patients and healthy subjects were $140.5±3.14×10^9$/l and $225.5±5.18×10^9$/l respectively. There was a statistically significant difference in the platelet count and WBC count. The neutrophil count in Hepatitis C positive patients and healthy subjects were 42.8±9.15% and 48.3±10.3% respectively. The lymphocyte count in Hepatitis C positive patients were higher (46.3±8.60%) as compared to control subjects

(44.4±10.3%). A statistically non-significant correlation was found in the neutrophil and lymphocyte count. The eosinophil count in Hepatitis C positive patients and control individuals were 2.7±1.3% and 2.8 ±2.1% with a statistically significant difference (p=0.026). The basophil count in Hepatitis C positive patients were higher (1.4±1.2%) as compared to healthy individuals (1.5±1.9%). The monocyte count in Hepatitis C positive patients and healthy individuals were 1.8±2% and 1.2±1.8% respectively. There was a statistically significant difference in the monocyte count but non-significant correlation in the basophil count (**Table - 2**).

Discussion

Liver has great influence on various organs in the body including the hematopoietic system. Apart from its role as an extravascular hematopoietic organ in early foetal life and bone marrow infiltrative diseases, the liver plays a major role in the formation and storage of various elements as well as proteins necessary in blood formation. It also plays an important role in hemostasis [12].

Hepatitis is an inflammatory disease of the liver that has a negative impact on the health in both developed and developing nations. The most common form of viral hepatitis is the hepatitis B followed by hepatitis C. Viral hepatitis is a pan tropic disease with hematological manifestations. Variation in the hematological parameters may determine that patient have hematological complication even after recovery from acute viral hepatitis. Like viral hepatitis, malaria and typhoid fever show features of hepatic involvement [13, 14]. Hematological analysis of the HBV and HCV seropositive subjects showed a decrease in the hemoglobin level, total erythrocyte count, total leucocyte count and platelet count were seen as compared to healthy individuals. These results are similar to study done by Abdullah, et al. in 2018 [15]. This decrease may be inversely proportional to degree of hepatic damage that determines the involvement of the liver [16, 17]. The lymphocyte and monocyte count were higher in patients with seropositive Hepatitis B and C as compared to healthy individuals. These results are in agreement with the study carried out by Yang, et al. in 2014 [18] who found that monocytes are very plastic and diversified, and altered their physical appearance and functional responding to the environmental stimulus as well as considered as indicator of inflammatory disease. Lymphocytes are the central cells of the immune system which responsible for adaptive immunity. The hemopoietic stem cells produce lymphocyte during viral infection to neutralize the virus by antibody production.

Conclusion

In the present study, variation in the hematological parameters has been observed in patient with seropositive Hepatitis B and C virus. This determines the need for routine hematological investigations in acute viral hepatitis patients. Follow up of patients even after recovery from Hepatitis B and C virus infection should create an essential part of these patients' management. The study, though, has a limitation that it lacked a follow-up of seropositive individuals for additional monitoring.

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