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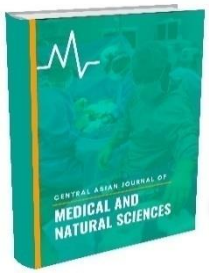

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Assessment of some biochemical and hematological parameters Children with hepatitis B and C

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Abstract: The study showed that there is a noticeable difference in the average values of hemoglobin (Hb), packed cell volume (PCV), and white blood cells (WBCs) among children infected with hepatitis C compared to the control group. This distinction is statistically significant, with a p value of less than 0.01. However, when children with hepatitis B are compared with the control group, no significant difference is observed".

"Specifically, the results indicate that children with hepatitis C show a significant reduction in platelet count (PLT), with a p value of less than 0.01, while children with hepatitis B do not show a significant reduction in platelet count compared to controls. group. This suggests that hepatitis C has a direct effect on the PLT count, leading to a significant reduction, while hepatitis B does not"."The importance of these findings lies in the potential clinical implications for the diagnosis and monitoring of hepatitis C in children. The marked reduction in Hb counts, PCV, WBCs, and PLT in children with hepatitis C infection suggests that these parameters can serve as valuable indicators of disease progression and response to treatment. By monitoring these blood indicators, healthcare professionals can gain valuable insights into the effectiveness of interventions and adjust treatment plans accordingly".It is worth noting that the lack of a significant difference observed in children with hepatitis B compared to the control group does not mean that hepatitis B is less severe or less important. Each type of hepatitis presents unique challenges and potential complications, and further investigation is

necessary to fully understand the impact of hepatitis B on blood markers and overall disease progression". In conclusion, the data in Figure 1 show a significant difference in the mean Hb, PCV, and WBC values of children with hepatitis C infection compared to the control group. In addition, a significant decrease in the number of PLT was observed in children with hepatitis C. In contrast, no significant difference was observed in children with hepatitis B compared to the control group". These findings underscore the importance of taking the specific type of hepatitis into account when analyzing blood parameters and highlight potential clinical implications for the diagnosis and monitoring of hepatitis C in children. Further research is warranted to fully understand the mechanisms and implications behind patient management.The results presented indicate a significant increase ($P < 0.01$) in the mean values of GPT, GOT, ALP, total bilirubin, direct bilirubin, and indirect bilirubin among female patients diagnosed with hepatitis B and hepatitis C when compared to Control group. These results indicate that liver function is significantly affected in female patients with these conditions.

Key words: hemoglobin (Hb), packed cell volume (PCV), and white blood cells (WBCs)

Introduction

Hepatitis refers to inflammation of the liver. There are many causes of hepatitis, such as viruses, toxicity, metabolism, Drug or immune attack on the liver . Viral hepatitis is one of the It is a major global public health problem and a major source of Public health issues. Global morbidity and mortality (1). Several different viruses cause viral hepatitis, Namely A, B, C, D, E, F and G. Hepatitis B and C are divided into Like similar types of liver infections, they occur primarily through Blood and blood products (2,3). Infection with hepatitis B virus (BV).is a global public health problem with acute and chronic causes Human hepatitis . (4). Hepatitis B virus infection can leading to a series of clinical illnesses characterized by fever and nausea Abdominal pain, loss of appetite, and yellowing of the skin. Acute Hepatitis can be serious, with symptoms lasting several weeks or months. It occurs less frequently - life-threatening or explosive - where

The liver is so damaged that it can no longer do this perform their duties (5). All people with chronic hepatitis B Infections increase the risk of complications, including Development of cirrhosis and liver cancer (6). Hepatitis C virus (HCV) infection has become a major public health problem About 170 million people are considered infected Worldwide, the disease progresses slowly and chronic infections emerge This occurs in 85% of cases. For patients with chronic diseases Hepatitis, 20% to 30% will develop into cirrhosis. Once it occurs, Poor prognosis, higher risk of liver disease Cancer (7). The structural analysis of the hepatitis C virus (HCV) genome reveals that it contains a positive-strand RNA virus belonging to the Flaviviridae family. Hepatitis C viruses are primarily transmitted through direct contact with infected blood, making them highly efficient in their transmission .

The possibility of chronic infection is high in cases of acute HCV infection. However, diagnosing HCV infection in the chronic phase is more common due to the difficulty of infecting normal human hepatocytes with naturally occurring HCV virus obtained from infected patients . Symptoms of acute HCV infection include decreased appetite, fatigue, abdominal pain, jaundice, itching, and flu-like symptoms . Approximately 15-40% of individuals clear the virus during the acute phase through normalization of liver function tests and clearance of HCV-RNA in plasma . The remaining 60-85% become chronically infected with hepatitis C. This study aims to understand the physiology of liver function, examine blood tests, and investigate the role of neutrophils using Nitro blue tetrazolium dye in the formation of hepatitis B and C viruses .

Material and Methods

The study included a group of patients with hepatitis B and C at various medical facilities . Samples were taken from 50 patients in total, with 30 individuals infected with hepatitis B. Among the infected patients, aged between 10-12 years. Additionally, a control group of 20 individuals who did not have hepatitis C or any other chronic diseases was included. Blood samples were collected from all participants, and their medical histories, including name, age, gender, and type of hepatitis, were recorded. The control group was selected based on their overall health and absence of specific conditions such as kidney disease, liver disease, lipid disorders, diabetes , high blood pressure, etc.

Blood samples

Blood samples were collected from both control subjects and patients with hepatitis B&C. A total of eight milliliters of venous blood was drawn using a disposable 10 ml syringe, with one milliliter added to EDTA for blood testing purposes. This includes the determination of important blood parameters such as hemoglobin (Hb), packed cell volume (PCV), white blood cell count (WBCs), and platelet count (PLT). An additional milliliter was reserved for N.B.T. analysis .

The remaining six milliliters of the blood samples were carefully placed in flat tubes and left at room temperature for a period of 30 minutes, enabling the formation of a clot. Afterward, these tubes were centrifuged at 3000 rpm for 10 minutes. Once completed, the separated serum was carefully transferred to another tube and stored in a freezer at a temperature of -20°C to maintain its integrity for subsequent analysis

In order to facilitate comprehensive serum analysis, the separated serum was divided into three parts and stored in Eppendorf tubes specifically designed for this purpose. These analyses will include the assessment of liver enzymes such as GPT, GOT, ALP T.TSB.

It is important to note that these meticulous procedures ensure that accurate results are obtained during laboratory investigations conducted on these blood samples .

Examinations both biochemical and hematological

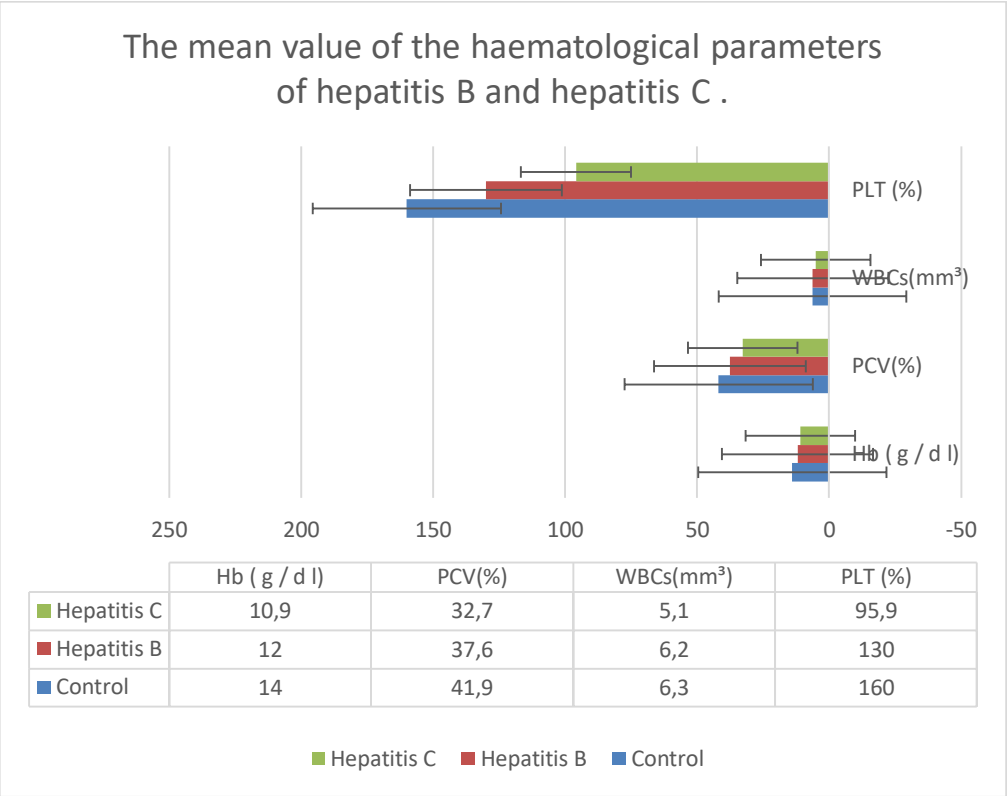
Evaluation of each of the biochemical parameters (Glutamate-Pyruvate Transaminase (GPT), Glutamate Oxaloacetate Transaminase (GOT), and Alkaline Phosphatase (ALP), using a Reblotron kit defined by Roche Diagnostic GmbH (15,16,17) for each of the biochemical parameters. utilizing a gadget from Biolabo Lab and a spectrophotometer (18,19), it is possible to analyze the levels of bilirubin in the blood. (Hb, PCV, WBCs, and PLT) determined by using the Coulter blood measuring device

Nitroblue-Tetrazolium (NBT) tincture to reduce neutropenia Reduction of Nitroblue Tetrazolium (NBT) dye is an indicator of superoxide ion production. The reduced amount of NBT, formosan, that accumulates in cells is related to their phagocytic activity (20). statistical analysis The data for the current study were collected using Genstat software and analyzed by ANOVA (one-way analysis). The LSD was used to make comparisons between hemodialysis patients, peritoneal dialysis patients, and the control group and between before and after dialysis. $P < 0.01$ was considered statistically significant .

Results and Discussion

Hematological parameters:

The data shown in figure 1 showed that there was a significant (P 0.01) in the average value of Hb, PCV, and WBCs for child with hepatitis C compared with the control group. However, there was no significant difference with hepatitis B. Comparing with hepatitis C and with hepatitis B to the control group revealed with hepatitis C had a significant (P 0.01) decrease in PLT while the child with hepatitis B did not exhibit a significant decrease in PLT patients with hepatitis C, but there was no significant difference in patients with hepatitis B when compared to the control group.



	Hb (g / d l)	PCV(%)	WBCs(mm³)	PLT (%)
Hepatitis C	10,9	32,7	5,1	95,9
Hepatitis B	12	37,6	6,2	130
Control	14	41,9	6,3	160

Figure (1). The mean value of the haematological parameters of hepatitis B and hepatitis C.

According to the findings presented in figure (2), there was a statistically significant reduction (P 0.01) in the average value of Hb, PCV, WBCs, and PLT in patients hepatitis C patients when compared with the control group; however, there was no such significant reduction in patients hepatitis B patients .

In the study that we conducted, the parameters of hemoglobin, white blood cells, platelet count, and plasminogen activation time (PLT) in figure (1) and (2) revealed a substantial decrease in hepatitis C infection when compared with the characteristics of hemoglobin, white blood cells, and PLT in the healthy group. These findings are consistent with what was found in the study. the ones that came before (21,22,23,24,25,26,27,28,29,30,31,32). It's known that liver illnesses can cause a variety of hematological abnormalities (22), so be on the lookout for those. Hypoplasia of the bone marrow and pancytopenia have both been observed in patients with viral hepatitis (31) . During the first three weeks of the condition, patients with acute viral hepatitis typically exhibit symptoms including a reduction in hematocrit, anemia, thrombocytopenia, leukopenia, and aplastic anemia .

This is because viral hepatitis can sometimes be accompanied by a transient inhibition of bone marrow function as well as autoimmune hemolytic anemia . It is common knowledge that viral and human antigens can share epitopes, and when these shared epitopes are presented by antigen-presenting cells, they have the potential to set off an autoimmune response . An increased rate of hemolysis has been seen in several patients who were diagnosed with acute hepatitis. This was found to be the result of an extravascular defect in the red cells, which led to a decreased red cell lifespan . Because active liver illness commonly increases in plasma volume, dilutionary anemia is another reason that could be considered for this observation. Because bilirubinemia is usually exclusively attributed to liver illness and reticulocytotic does not appear until the patient recovers from acute symptoms of hepatitis due to

transient bone marrow suppression (28), the hemolytic condition that is associated with viral hepatitis often goes unnoticed . This is because reticulocytotic does not arise until after the patient has recovered from acute symptoms of hepatitis . The most common reasons for anemia in patients who have chronic liver illness include bleeding that occurs as a result of poor blood clotting brought on by thrombocytopenia or a lack of blood clotting factors (33) . Patients with chronic hepatitis C may experience thrombocytopenia as a consequence of multiple reasons, including inhibition of the bone marrow, a reduction in the production of liver thrombopoietin, and an autoimmune process . The severity of having low platelets can be affected by several clinical factors, including age, gender, the severity of liver disease, and the degree of viremia. Infection with HCV can have an influence on thrombogenesis in one of two ways: either it can have a direct suppressive effect on the bone marrow, which leads to a reduction in the generation of megakaryocytes, or it can have a direct effect on megakaryocytes, which leads to a reduction in the production of platelets (29) . Patients who have HCV infection have been shown to have abnormalities in their bone marrow and blood counts (34,23,35), and there is evidence that HCV replication occurs in the peripheral blood cells of these patients . The results of the Hb, WBCs, PCV, and PLT variables in Figure (1) and (2) showed that there was no significant significance for hepatitis B in either gender when compared with the Hb, WBCs, PCV, and PLT variables in the healthy group . These findings concurred with those of (32) and went against the findings of the study (21,22,36,27). Statistical analysis showed that there was no significant difference between those infected with the hepatitis B virus and those in the healthy control group, despite the fact that the findings of the hematological parameters in the current study showed that hepatitis B patients had lower values than the healthy control group had .

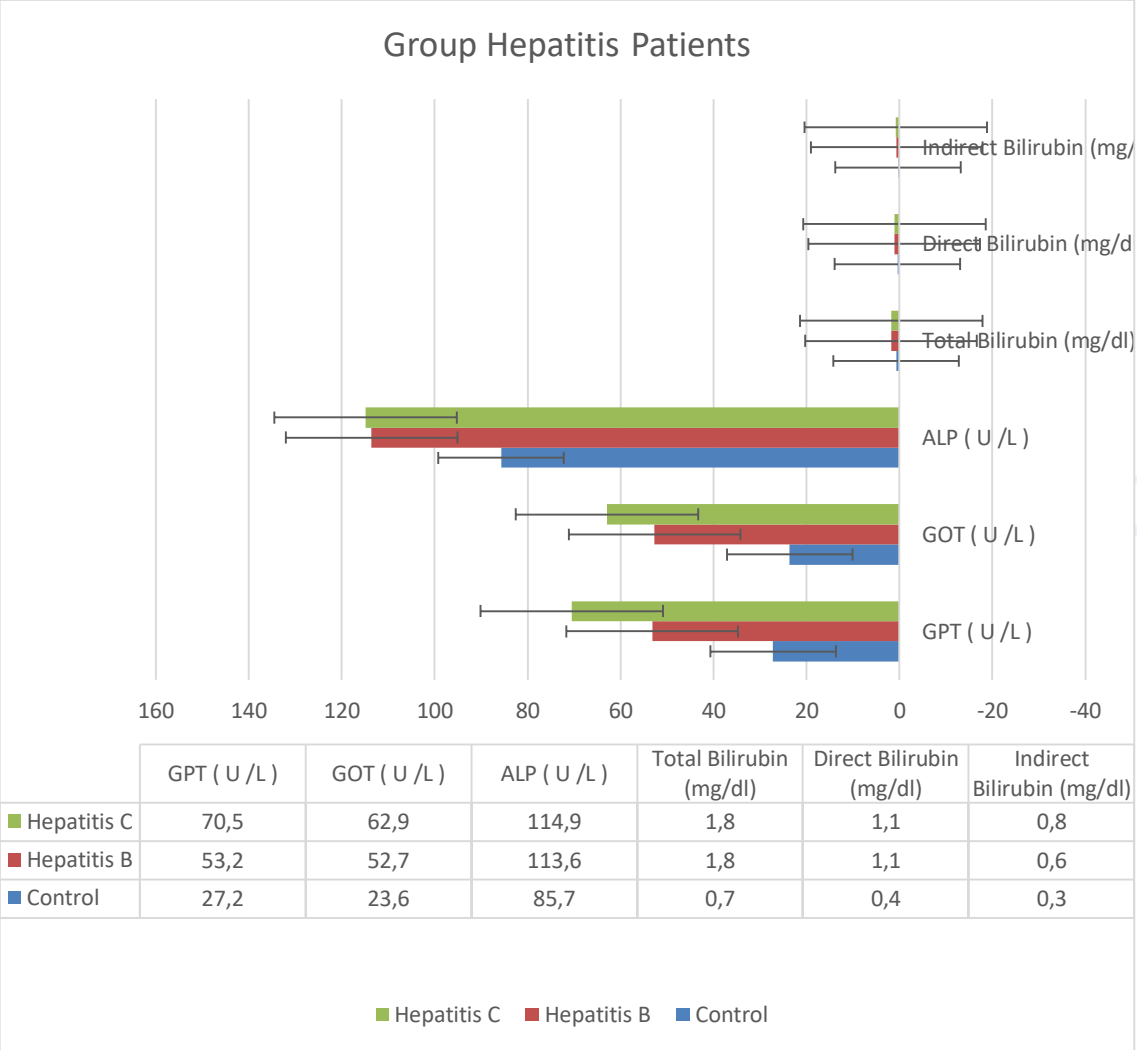
Biochemical parameters: A statistical analysis of the biochemical characteristics was presented in (figure 3), which shows that there is a significant increase (P 0.01) in the average value of GPT, GOT, ALP, total bilirubin, direct bilirubin, and indirect bilirubin infected with viral hepatitis B and hepatitis patients. compared to the group that served as the control, the Epidemic C .

These findings were consistent with those obtained in earlier investigations (36,38,39,40,31,41,32,42,1). There is evidence to suggest that viral hepatitis A, B, C, D, and E may be to blame for a significant elevation in transaminase levels (43,44). In viral hepatitis, there has been a poor link between elevated enzymatic volume and the degree of liver injury. As a result, greater levels of liver enzymes may signal the existence of liver illness, but they cannot be used to predict the degree of liver damage or kinds of disease (45,46) .

Since GPT is found in the hepatic cytosol and GOT is present nearly entirely in mitochondria and cytosol, higher enzymatic levels may reflect the activity of the disease process that is now taking place (47,48). The ALP enzyme is found throughout the body, particularly in the intestines, bones, liver, and placenta. It is also produced in the body. Higher levels of ALP, in the absence of bone illness and pregnancy, almost often indicate compromised bile duct function. This, in turn, causes stimulation of enzyme synthesis by hepatocytes and bile duct epithelium as a result of blockages (47). Higher levels of ALP activity may be involved. In several conditions affecting the parenchyma of the liver, such as hepatitis (48) . Higher levels of T.S.B can be utilized as an indication of dysfunction in bile secretion. Bile duct obstruction can also be induced by a viral infection, and both of these conditions can be followed with dysfunction in the parenchyma (47) .

Neutrophil activity parameters: The findings presented in figure 3 demonstrated that there was a significant decrease (P 0.01) in neutrophil activity in child infected with hepatitis B and C compared to the group that served as the control.

According to the findings presented in figure 3 there was a statistically significant reduction (P 0.01) in the level of neutrophil activity seen in patient who were infected with hepatitis B and hepatitis C when compared to the group that served as the control.



	GPT (U /L)	GOT (U /L)	ALP (U /L)	Total Bilirubin (mg/dl)	Direct Bilirubin (mg/dl)	Indirect Bilirubin (mg/dl)
Hepatitis C	70,5	62,9	114,9	1,8	1,1	0,8
Hepatitis B	53,2	52,7	113,6	1,8	1,1	0,6
Control	27,2	23,6	85,7	0,7	0,4	0,3

Figure (2). The mean value of the biochemical parameter of hepatitis B and hepatitis C.

The results of neutrophil activity measured using Nitroblue Tetrazolium dye are presented in Figure (3). These results reveal a significant decrease in instances of hepatitis B&C in patients in comparison to the healthy group, and these results are comparable with the findings of other research (23,51). Neutrophils are a type of white blood cell that are characteristic of acute inflammation and rapidly collect in great numbers in areas where an infection is present. Neutrophils have a very brief lifespan (hours to days), but during that time they are responsible for a wide variety of actions in the host defense system. These functions include phagocytosis, the elimination of germs through the use of reactive oxygen intermediates, and other processes. Neutrophils have traditionally been understood

primarily in terms of the role that they play in the innate immune response; however, there is evidence to suggest that they may also play a role in the adaptive immune response. (52). Neutrophils play a key part in the nonspecific immune response and resistance to pathogens, particularly in antibacterial resistance as effectors, cell stimulation, and control. They reveal several characteristics that are essential to the immune system of an organism, including the production and adhesion of vascular endothelial cells, migration to inflammatory sites through the walls of blood vessels, recognition and phagocytosis of irritating molecules, and degradation and release of proteins from granules (53). In response to chemotaxis (chemotaxis) produced at the site of inflammation, chemotaxis of neutrophils happens in the direction of a stimulus gradient. In addition, chemotoxins cause an increase in neutrophil metabolism, aggregation, and the ability to kill bacteria (54).

The process of phagocytosis, which is carried out by polymorphonuclear neutrophils and mononuclear cells, is a crucial component of the host's defense mechanism against bacterial or fungal infections. The process of phagocytosis can be broken down into several primary stages, which are as follows: chemotaxis (the migration of phagocytes to inflammatory sites), the binding of molecules to the surface of the phagocytic cell, engulfment (phagocytosis), and intracellular killing by oxygen-dependent (oxidative burst) and oxygen-independent mechanisms. Systems of Control (55).

Lazarin et al (1984) carried out more research and concluded that patients suffering from acute hepatitis B (AHB) had lower levels of phagocytic activity. It has been hypothesized that serum inhibitory factors and circulating immune complexes detected in the sera of AHB patients may play a significant role in the inhibitory effect that they have on the phagocytic activity of neutrophils in these individuals (56). In both acute and chronic forms of viral hepatitis, phagocytic activity and the ability to destroy intracellular bacteria are reduced. This result may have something to do with the fact that bilirubin has an inhibiting influence on the function of neutrophils. The process of phagocytosis could be affected when bilirubin binds to cell membranes since this could cause major changes to the characteristics and activities of the cell membrane.

Additionally, bilirubin inhibits the shunt activity of neutrophil hexaphosphate monophosphate and nicotinic diphosphate oxidase intermediates (NADPH), which are oxygen producers. Free radicals, which ultimately result in a reduction in neutrophil proteolytic activities (57,51).

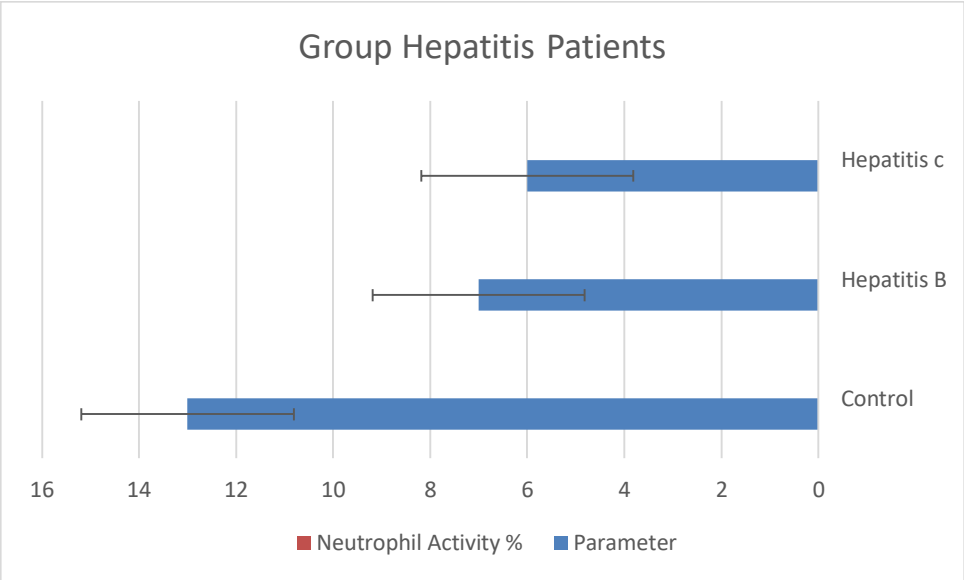


Figure (3) Neutrophil activity by using Nitroblue Tetrazolium stain in hepatitis B and hepatitis C.

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