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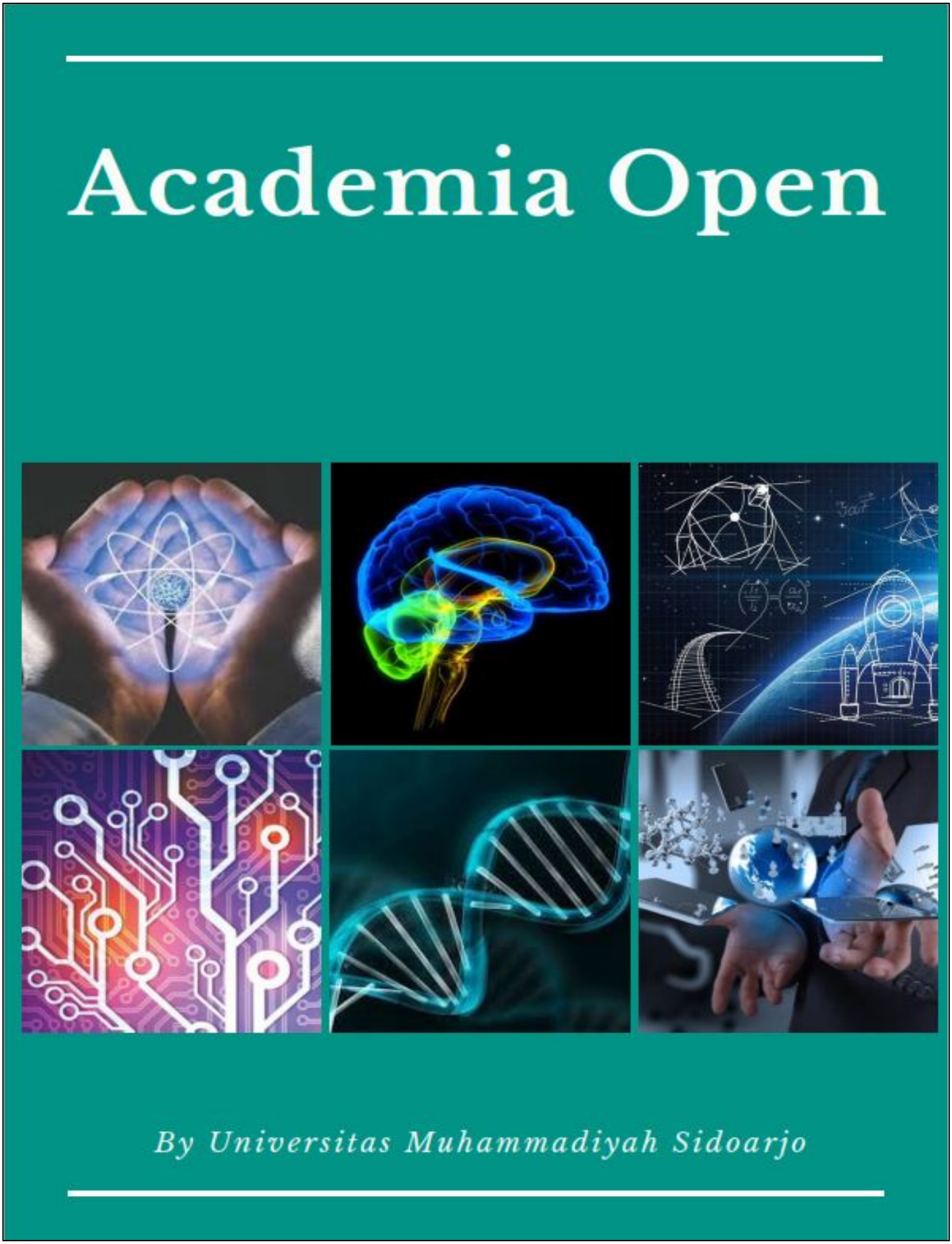

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Evaluation of Some Hematological Parameters in HCV Infected Patients Among Blood Donors at Thi-Qar Province

Evaluasi Beberapa Parameter Hematologi pada Pasien yang Terinfeksi HCV di Antara Donor Darah di Provinsi Thi-Qar

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Abstract

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Hepatitis C virus is a major health problem because of its effect on the liver and health and its being life-threatening if not treated early. It also affects the blood parameters of those infected. The current study conducted in Thi-Qar province revealed changes in some blood parameters of the infected group compared to the control group, where a slight decrease was recorded in WBCs, RBCs, PCV, MCV, MCH, PLT, Lymp. but no significant differences were found, except for red blood cells, which were 0.03 at a significant level 0.05. It was also found that the highest infection rate was in the age group of 30-39 years, while no infection was recorded in the age group of 50-59 years.

Highlights:

1. Hepatitis C impacts liver health and alters blood parameters.
2. Significant RBC change noted; highest infection in 30–39 age group.
3. No infections in the 50–59 age group recorded.

Keywords: HCV, Hematological, ELISA, Thi-Qar

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Introduction

Hepatitis C virus (HCV) is a common viral disease that affects millions of people around the world [1]. This virus causes acute inflammation of the liver, and in some cases it may turn into chronic inflammation that lasts for years, leading to serious health complications such as cirrhosis and liver cancer [2]. HCV is a virus that is transmitted primarily through blood, making its transmission methods closely linked to behaviors such as the use of shared needles, untested blood transfusions, and exposure to contaminated medical equipment [3]. Studies show that many people infected with the virus can live for years without showing obvious symptoms, making this disease a "silent killer"[4]. However, regular screening of blood parameters is a vital step in diagnosing this disease in its early stages. These parameters include a complete blood count, which can show changes in immune cell levels [5]. Research suggests that up to 85% of people with hepatitis C develop chronic HCV, increasing their risk of serious complications [6]. According to the World Health Organization, hepatitis C is a leading cause of death worldwide, with millions of new cases reported each year [7].Understanding the relationship between hepatitis C and hematological parameters is crucial, as it can help improve early detection and treatment strategies. This understanding contributes to reducing the health burden of the disease, which improves the quality of life for those affected. Therefore, this research seeks to explore this relationship in detail, and analyze the available data to understand the potential effects of HCV on hematological parameters [8].

Methods

Five ml of blood was collected and distributed by adding 3 ml in gel tube to obtain serum for HCV test, and 2 ml of blood was placed in an EDTA tube to test of complete blood count.

The number of donors who were tested was 39,754 from December 2023 to October 2024, in Main Blood Bank of Thi-Qar province, southern Iraq, and the number of those infected with HCV was 20 persons.

The donors were screened by ELISA using Fortress kits (CV-2209-3) to detect HCV according to the manufacturer's instructions, 100µl of the diluent were added to the wells except blank, then 10µl of the donors' serum were added with the addition of positive and negative control, covered and placed in incubator for 30 minutes at 37 C°, after which it was washed five times. Then 100µl of conjugate were added to all the wells except the blank, which was also covered and placed in incubator for 30 minutes, then washed five times with the addition of 50µl of the substrate A and 50µl of the substrate B and placed in the incubator for 10 minutes, then 50µl of the stop solution was added and read at a wavelength of 450 nanometers. The negative or positive samples were determined by calculating the cut-off value, where samples that are equal to or higher than cut-off are considered positive, while samples that are less than cut-off are considered negative.

Statistical analysis

T-test was used to determine the significant differences of hematological parameters between 20 individuals HCV infected and 20 healthy individuals as control group, also Chi-square test was used to determine the significant differences of age group with HCV infection at level 0.05 by SPSS software version 29.

Result and Discussion

Result

Through the current study, it was found that the number of people infected with HCV is 20 people through examining 39,754 donors. The hematological parameters of the infected were studied and compared with the control group. The results were as in table (1).

Mean of hematological parameters	Infected group	Control group	p- value
WBC	7.045	7.995	0.92
RBC	4.555	5.27	0.04*
Hb	15.57	16.19	0.39
PCV	44.475	45.365	0.27
MCV	83.35	85.495	0.18
MCH	29.725	30.39	0.41
MCHC	35.63	35.615	0.49
Platelets	233.2	272.1	0.08

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Lymphocyte%	32.355	35.01	0.26
Neutrophil%	54.975	54.675	0.17

Table 1. *Compared among mean of hematological parameters for Infected and control groups*

*significant different

By comparing the blood parameters of the infected group and the control group, differences were found in some of them, for example, there was a slight decrease in WBCs, RBCs, Hb, PCV, MCV, MCH, Plat and Lymp in infected group compared to control group, but these differences were not significant, except for RBC, which recorded significant differences.

When distributing infected according to age groups, the age group of 30-39 years was the most infected group, while age group 50-59 no recorded any infected, there were also significant differences, as the p-value was 0.03, as in table (2).

Age groups-years	Numbers of infection	p- value
20-29	5	0.03*
30-39	10	
40-49	4	
50-59	0	
60-69	1	
Total	20	

Table 2. *Numbers of HCV infection according of age groups:*

Discussion

Hepatitis is an inflammatory disease of the liver that has a major impact on health [9]. The main risk factor for hepatocellular carcinoma is HCV [10]. The incidence of HCV is increasing at an alarming rate, which will lead to an increase in the death rate among people in the next 20 to 30 years [11]. HCV is associated with abnormalities in blood parameters. If HCV infection is not diagnosed and treated in time, it will lead to life-threatening conditions such as cirrhosis and hepatocellular carcinoma [12]. Variation in blood parameters may indicate that the patient has blood complications even after recovery [13]. It causes anemia, neutropenia, leukopenia, and thrombocytopenia among infected individuals [14].

The current study showed a slight decrease in some blood parameters: WBCs, RBCs, PCV, Hb, MCV, MCH, PLT, Lymp in patients compared to the control group, but it was not significant, except for RBCs, which recorded significant differences. These results are consistent with the results of the study conducted in Narowal city, which designated a significant decrease in the levels of Hb, WBCs, HCT, MCHC, platelets and lymphocytes in HCV patients compared to control group, but showed an increase in the levels of neutrophils in HCV patients, while MCV and MCH were not different between HCV patients and control group [15]. Other studies have shown that patients have a decrease of platelet [16,17]. Various studies have also mentioned that those affected have a decrease in Hb [18]. The values of blood parameters such as Hb, WBCs and platelets were decreased in patients with HCV compared to the control group, and no significant differences were observed in RBC for either group [19]. However, in the current study, a decrease in RBC was recorded, with significant differences observed.

The results of the current study differed from other studies that reported that the group infected with HCV showed higher levels of WBCs, RBC, Hb, lymphocytes, and PCV than the control group [20]. The increased WBCs count may be due to increased HCV RNA load [21]. Infection with the HCV stimulates stem cells to increase the production of lymphocytes, which are the central cells in the immune system and are responsible for adaptive immunity, as they contribute to neutralizing the virus by producing antibodies [13].

HCV is responsible for manipulating (by producing autoantibodies that attack various host structures) and depleting the host immune response in an ineffective attempt to eliminate virus-infected cells.The cellular defense system against infection, especially WBC, is critical in patients with hypoproteinemia and, consequently, a deficient humoral immune response. [22].

Decrease of WBCs make patients more susceptible to infections and bacterial and other diseases, as WBC are the most important factor in the immune system [19].

Decrease of platelets are also due to various causes, including disease progression, bone marrow suppression, age, gender, number of virus particles in the blood, and severity of liver disease [23]. Or due to decreased synthesis of thrombopoietin (a protein involved in stimulating platelet production in the bone marrow) through the production of antiplatelet antibodies or their destruction through hypersplenism. A decrease in platelets, which are involved in

blood clotting, even if they are still within the normal range, can exacerbate this already existing deficiency, with severe effects on blood clotting in patients [24].

Decrease of Hb is caused by increased levels of hepcidin (a protein produced by the liver, which plays a role in iron metabolism), which reduces the intestinal absorption of iron and prevents its release from liver stores. This leads to iron deficiency, which results in iron deficiency anemia. This may progress to clinically significant anemia[22]. Platelets and Hb decrease may be due to the use of interferon-ribavirin therapy given to patients with chronic HCV [25,26].

Through the current study, it was found that the highest infection rate was for the age group of 30 – 39 years, it also showed significant differences. which is consistent with the conducted in Thi-Qar province stated that the highest rate of infection for age groups 30-40 years [27]. And study conducted in Pakistan stated that the highest rate of infection for age groups is less than 40 years [28]. However, the results of the current study differ from the study conducted in Najaf, which stated that the highest infection rate was for the age group of 40- 50 years [29]. But Khalaf & Hussein found the highest infection rate in the age group of 50-59 among hemodialysis patients in Thi-Qar province [30]. Also, Stroffolini & Stroffolini, who stated that the highest infection rate was for the age group <40 years [1].

The reason for the infection of the age group of thirty years more than other groups is perhaps due to the effectiveness and activity of this age group and their endurance of hard and dangerous work and most of their time at work, which makes them more susceptible to infection than others.

Conclusion

The current study revealed changes in some blood parameters of the infected group compared to the control group, where a slight decrease was recorded in WBCs, RBCs, PCV, MCV, MCH, PLT, Lymp. but no significant differences were found, except for red blood cells, which were 0.03 at a significant level 0.05. It was also found that the highest infection rate was in the age group of 30-39 years, while no infection was recorded in the age group of 50-59 years.

Therefore, more studies are needed to reveal the effects of HCV on the blood parameters of infected. Our studies lack monitoring of the clinical cases of infected due to the lack of sufficient data on the onset of infection, their places of residence, and whether they are receiving care or otherwise.

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