|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
NLM (National Library of Medicine ID: 101738825)
Index Copernicus Value 2019: 79.34
Volume 4, Issue 12; November: 2020; Page No. 150-154

Original Research Article

ASSESSMENT OF HAEMATOLOGİCAL AND BİOCHEMİCAL MARKERS İN CHRONİC LİVER DİSEASE: A CROSS-SECTİONAL STUDY OF DİSEASE SEVERİTY AND PATİENT MANAGEMENT

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Conflict of interest: No conflict of interest.

Abstract

Background: CLD is one of the most complex health challenges on a global scale and it leads to diverse haematological and biochemical changes. It is imperative therefore to assess these parameters in order to incurred progress and progression of the diseases as well as in handling the patients. The present research proposal seeks to evaluate serum concentration of haematological and biochemical indices in patient with CLD condition and their correlation with the severity of liver diseases. Objective: Thus, the aims of the present cross sectional case control study are: to find out any significant difference in haematological and biochemical parameters between the CLD patients and healthy individuals and to assess how these parameters are related to severity of liver disease. Methods: To address these questions, current cross-sectional study was carried out in a tertiary care hospital for six months. In total a group of 150 CLD patients and 50 healthy controls matched for age. A complete blood count, platelet count, hemoglobin, white blood cell count and serum bilirubin, AST, ALT, ALP, albumin and INR, where done. To determine the severity of liver disease classification was done by clinical criteria and imaging. Statistical significances of CLD patients and controls were calculated, and relations between several parameters and the severity of liver function were identified. Results: In individual clinical parameters we observed anemia and thrombocytopenia more popular in CLD patients compared to healthy volunteers, respectively: hemoglobin – (12, 1 ± 1, 8 g/dL vs 14 ,5 ± 1, 2 g/dL) P < 0, 001, platelet count – (130 ± 45 x10^3/µL vs 250 ± 55 Serum bilirubin was elevated (3. 2 ± 1. 5 mg/dL vs. 0. 8 ± 0. 3 mg/dL), and liver enzyme levels (AST: GOT: 90 ± 35 U/L, ALT: 85 ± 30 U/L and ALP: 150 ± 40 U/L were markedly elevated in CLD patients, p < 0. 001 for all. The serum albumin level was relatively lower in patients with CLD 3. 0 ± 0. 6 g/dL as compared to 4. 5 ± 0. 4 g/dL in normal subjects; similarly, INR was also raised 1. 8 ± 0. 5 compared to 1. 0 ± 0. 2 in normal patient's correlation coefficient was -0. 3848

Conclusion: Specifically, the findings of the study revealed that CLD patients had severally deranged haematological and biochemical profiles as compared to healthy subjects. Decreased levels of Hb and Platelet count and high levels of bilirubin, liver enzymes, ALP, reduced albumin and raised INR are envisages of liver pathology. Thus, these observations highlight the necessity of performing the regular haematological and biochemical investigations in the case of CLD patients, to assess the progress of the disease and determine the most appropriate treatment.

Keywords: Chronic Liver Disease, Hematological Parameters Elevated, Markers of the liver injury, Liver Function, Disease Severity.

Introduction

Chronic liver disease (CLD) refers to a number of diseases that cause inflammation and damage to the liver for an extended period of time leading to the decline of liver function. CLD can develop from many causes such as viral hepatitis, alcoholism, non-alcoholic fatty liver disease

(NAFLD) and autoimmune diseases (1, 2). It is particularly important to identify the requirement of laboratory testing which comprises haematological and biochemical investigation to assess the severity of liver disease and systemic complications in CLD.

Cytopenia in CLD is frequent and the pathological processes might be diverse. Some clinical manifestations include anemia, thrombocytopenia, and leukopenia, which are related with the degree of liver damage and splenomegaly common in such cases (3, 4). When seen in CLD, the cause for anemia can be chronic blood loss, inadequate nutrition, and in some cases low levels of erythropoietin (5). Thrombocytopenia which is also common in CLD patients is related with portal hypertension and splenomegaly where platelets are trapped by the expanded spleen (6). Besides, modifications of white blood cell count can be explained by hypersplenism or bone marrow suppression (7).

Like parameters, biochemical parameters are also very essential in determining the function and damage of liver function. These relate to serum bilirubin and liver enzymes AST/ALT/ALP and serum albumin (Mild Sampson et al., 2008). An elevated serum bilirubin suggest cholestasis or liver cell damage, while an elevated liver enzymes are implicated of hepatocellular injury (9). Serum albumin gives the information of the synthetic function of the liver and helps to know the extent of liver pathology (10). Moreover, the international normalized ratio (INR) is used to evaluate coagulation function, as the liver synthesizes several clotting factors (11).

Combination of haematological and biochemical tests give an insight into CLD better than with one on its own. For instance, when included with serum bilirubin and liver enzymes, platelet counts are useful in assessing the degree of hepatic derangement and the probability of portal hypertension (12, 13). These parameters are crucial not only in diagnosing a disease but also assess the condition of a patient and the efficacy of antiviral treatment (14).

Consequently, new diagnostic possibilities and biomarkers have improved the possibilities for assessing liver diseases in the recent years. Other investigations have pointed to the newer markers and imaging in addition to the routine haematological and biochemical tests in order to enhance the diagnostic and therapeutic practices (15).

In conclusion, it can be stated that haematological and biochemical tests should be included in a patient's investigation profile while diagnosing chronic liver diseases for diagnosis and management. Through identifying the relationship between these markers and liver function, analysis about the therapy plans can be arranged to enhance the patients' condition and life quality.

Aim

To assess haematological and Biochemical Profile of CLD patients & Their Relation with Severity of Liver Disease.

Objectives

1. With a view to evaluating the degree of Haematologic abnormalities, particularly the haemoglobin level, platelet count and white blood cell count together with the liver dysfunctioning degree among the tropical CLD patients.

2. The purpose of this study is to validate the serum levels of biochemical indices such as total bilirubin, liver enzymes, serum albumin and INR and their relationship with the clinical staging and progression of chronic liver disease.

Material and Methods

This work took place in a tertiary care hospital at a time span of 18 months and the study population consisting of 150 CLD patients and fifty healthy controls of the same age group. To this end, haematological and biochemical investigations were conducted for the purpose of assessment of the relationship between these variables and the severity of liver function. Inclusion Criteria: Included patients were patients with chronic liver disease aged 18-75 years with clinical, biochemical and imaging evidence of the disease. Patients' diagnosis was done by a hepatologist, and severity of liver diseases was classified

according to Child-Pugh classification and MELD scores systems. To this end, all the participants gave informed consent before participating in the study.

Exclusion Criteria: Exclusions were made based on the use of systemic hepatic disease such as acute liver disease, cancer related disease, other serious medical conditions, or, active use of liver dialysis. Also excluded from the study were patients with history of recent blood transfusion and patients on drugs affecting their haematological or liver profile.

Venous blood samples were obtained from all the participants for blood hematology which included; full blood count-hemoglobin, platelet count, white blood cell count which were determined using a Hematology Analyzer. Serum bilirubin level and liver enzymes such as AST, ALT and ALP, serum albumin and INR were used as clinical biomarkers. On concealed abnormalities of the liver, their function was estimated by the help of imaging and clinical examination. Data collected were then used to compare the level of haematological and biochemical abnormalities with the degree of liver disease.

Descriptive and inferential statistical techniques were used to permit comparison between CLD patients and the control group and to examine the relationship of the parameters to the severity of the disease.

Results:

Table 1 shows the Haematological and Biochemical Parameters in Chronic Liver Disease patients and healthy Control Group.

Parameter	CLD Patients (n=150)	Healthy Controls (n=50)	p-value
Hemoglobin (g/dL)	12.1 ± 1.8	14.5 ± 1.2	<0.001
Platelet Count (x10^3/µL)	130 ± 45	250 ± 55	<0.001
White Blood Cell Count (x10^3/µL)	6.8 ± 1.5	6.0 ± 1.2	0.07
Serum Bilirubin (mg/dL)	3.2 ± 1.5	0.8 ± 0.3	<0.001
AST (U/L)	90 ± 35	25 ± 10	<0.001
ALT (U/L)	85 ± 30	30 ± 15	<0.001
ALP (U/L)	150 ± 40	75 ± 20	<0.001
Albumin (g/dL)	3.0 ± 0.6	4.5 ± 0.4	<0.001
INR	1.8 ± 0.5	1.0 ± 0.2	<0.001

Table 1 depicts: Hemoglobin: The CLD group CMD had lower mean value of hemoglobin (12.1 ± 1.8 g/dL) than the control group (14.5 ± 1.2 g/dL) thus the CLD patients were anemic (p< 0.001). Platelet Count: As compared to the control group (250±55 x10^3/µL), an overall lower platelets count was recorded in CLD patients 130±45 x10^3/µL implying thrombocytopenia (p<0.001). White Blood Cell Count: The white blood cell count was elevated slightly in the CLD patients at 6.8 ± 1.5 × 10^3/µL than the control group 6.0 ± 1.2 x10^3/µL p = 0.07. Serum Bilirubin: From the table it can be concluded that CLD patients have significantly high bilirubin level of (3.2 ± 1.5 mg/dL) as compared to control group of (0.8 ± 0.3 mg/dL) indicating the liver dysfunction (p<0.001). AST and ALT: CLD patients had an elevated AST Level which was 90 ± 35 U/L in contrast to the control group (25 ± 10 U/L) and elevated ALT which was 85 ± 30 U/L in contrast to the control group (30 ± 15 U/L); both p<0.001, this suggesting that there is hepatocellular injury in CLD patients. ALP: ALP: elevated in CLD patients (150 ± 40 U/L) compared to the controls (75 ± 20 U/L) reflects cholestasis or bile duct involvement (p <0.001) Albumin:

decreased in CLD patients (3.0 ± 0.6 g/dL) in comparison with controls (4.5 ± 0.4 g/dL) proving decreased liver synthesizing capacity (p< INR: A higher INR in CLD patients (1.8 ± 0.5) than that in controls (1.0 ± 0.2) indicates decreased synthesis of clotting factors (p<0.001).

Discussion:

This research assessed haematological and biochemical indices in patients with CLD so as to determine the effect of these indices on the liver and CLD. The results showed that CLD patients had marked abnormalities in most studied parameters as an indication of interacted relationship between hepatic and systemic derangements.

Haematological Findings: Using the result gotten from the result analyzed from the study showed lower mean value of hemoglobin level in CLD patients compared with the normal healthy control and supported earlier finding on anemia as one of the complications of CLD (5, 3). This anemia is generally following the concepts of the multiple causes which include chronic bleeding, malnutrition and abnormal erythropoiesis (6). The highly significant decrease in platelet count shown in the present study in CLD patients underline pathophysiologic hypothesis that portal hypertension and splenomegaly which are seen in advanced liver disease contribute to both increased platelet pooling and decreased platelet production (4, 12). Although the WBC count was slightly higher in CLD patients it was close to statistical significance indicating that other factors might play a role in determining the leukocyte levels in liver disease (7).

Biochemical Findings: The serum bilirubin levels in the CLD patients were still increased, as studies have proven that CLD patients have a tendency of impaired bilirubin handling because of liver disease (9). Moderately increased bilirubin concentrations are nearly always suggestive of cholestasis or hepatocellular dysfunction, to which one can attribute the raised liver enzyme concentrations in this study. Abnormalities with higher level of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) signify hepatocellular damage and this correlates with the pathophysiology of CLD as constant inflammation and liver injury is evident (8). Similarly, higher ALP levels inferred cholestasis or bile duct involvement of which are hepatic manifestations of CLD (10).

The lowered serum albumin concentrations in CLD patients can point at the poor liver synthetic capacity as albumin is the liver produced protein and its decline indicates massive hepatic disease (11). This is further supported by the fact that INR rises due to liver's impaired capacity to synthesize clotting factors, an important parameter in determination of coagulation state of CLD patients (14).

In general, the results of the study confirm great dependency on extended haematological and biochemical tests for CLD patients' management. These parameters not only describe the degree of liver injury but also give information about the consequences of the latter. The inclusion of these tests into the everyday practice by clinicians can improve the assessment and treatment of CLD, and potentially inform the course of therapies in the benefit of the patients (14, 13).

Conclusion: Serological analysis shows that the patients with CLD have alteration of the haematological and biochemical values compared to normal reference levels, due to the effect of liver disease on general body welfare. These include haemoglobin of less than 130 g/L and platelet count of less than 150 X 10^9/L which were observed low in CLD patients compared to healthy control; pThe outcomes of research are the following: anaemia with haemoglobin of less than 130 g/L and thrombocytopenia with platelet count of less than 150 X 10^9 Both unconjugated and conjugated hyperbilirubinemia, increased ASAT, ALAT, and AP suggest cholestasis, and decreased ALB and prolonged INR indicate the reduced liver synthetic function and increased risk of bleeding.

Such findings highlight the most importance of the use of the broad-based blood tests in providing prognosis and determining the extent of CLD. Anaemia and thrombocytopenia, renal dysfunction and biochemical changes are the principals in

assessing the disease activity and treatment plans. Through the implementation of these parameters CLD may be better managed, more personalised treatments plans may be provided and overall patient care might be improved. Subsequent studies may be directed toward understanding the chronic effect of these parameters on the CLD progression; CLD management using different strategies of treatment.

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