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# A Comparative Study Of Liver Enzymes In The Individuals With Malarial Infection And Normal Healthy Individuals

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**Abstract:**
**Background**: Obligate intracellular parasites cause malaria. The elimination of malaria has been hindered for centuries owing to the many pathophysiology and environmental factors involved. The sporozoites type of the malarial parasite has the potential to induce organ congestion, sinusoidal obstruction, and cellular inflammation in liver cells. The aforementioned alterations in hepatocytes have the potential to result in the release of parenchymal enzymes (transaminases) and membrane enzymes (alkaline phosphatase) from the liver into the bloodstream.
**Aim:** The objective of the research was to investigate the impact of malaria parasitaemia on hepatic enzyme metabolites.
**Method**: The study was conducted on total 100 individuals including 50 cases and 50 control group. The study is conducted in the tertiary care hospital attached with Rohilkhand medical college and hospital, Bareilly. The liver enzymes were analyzed by fully automated ERBA EM-360 biochemistry analyzer and malaria antigen card test (J. Mitra Kit) was used to detect malaria.
**Result**: In our study we had observed statistically significant level of liver enzymes were increased in the individuals who has malarial infection and liver enzymes were normal in the normal individuals.
**Conclusion**: The study found that people with malaria had significantly higher amounts of AST and ALT than the controls.

**Keywords**: Malaria *(plasmodium vivax)*, Alanine amino transaminase (ALT), Aspartate aminotransferase (AST), alkaline phosphatase (ALP).

## Introduction:

Malaria is a poverty-related infectious illness that poses a public health risk in warmer and tropical countries specially in Asian countries [1]. Obligate intracellular parasites cause malaria. The elimination of malaria has been hindered for centuries owing to the many pathophysiology and environmental factors involved[2]. Asexual Plasmodium parasites cause a systemic inflammatory response, defining clinical malaria[3]. Malaria is often caused by one of four Plasmodium species: *Plasmodium falciparum*, *Plasmodium ovale*, *Plasmodium malariae*, or *Plasmodium vivax*[4]. *Plasmodium falciparum* is responsible for most malaria-related fatalities worldwide[5]. Malaria is mostly caused by *P. falciparum* and *P. vivax*, with *P. falciparum* being the leading cause of mortality. *Plasmodium* is spread predominantly by the bite of an infected female *Anopheles* mosquito. Infection may also arise from exposure to contaminated blood products as well as congenital transmission[6]. People who have severe malaria often have liver problems, which can show up as jaundice, hepatomegaly[7].

The liver performs several activities such as detoxification, protein synthesis, digesting, glycogen storage, and hormone production[8]. The majority of these activities are enzymatic and involve many enzyme types. Enzymatic reactions produce many of the body's essential macromolecules. Aminotransferases primarily work in the liver and have significant clinical consequences. When there are a lot of malaria parasites in the body, liver enzymes go up to a certain amount[9].

The sporozoites type of the malarial parasite has the potential to induce organ congestion, sinusoidal obstruction, and cellular inflammation in liver cells. The aforementioned alterations in hepatocytes have the potential to result in the release of parenchymal enzymes (transaminases) and membrane enzymes (alkaline phosphatase) from the liver into the bloodstream[2,10]

Hyperbilirubinemia, mostly unconjugated, is a typical sign of *P. falciparum* and *P. vivax* malaria. It happens because both parasitized and non-parasitized erythrocytes break down, and liver damage also plays a role[7].

Therefore, the goal of this study is to look at how hematological factors and liver functions change in people who have malaria. It will also look at how the number of parasites in the blood affects these changes as biomarkers in malaria patients.

## Aim:

The aim of the study was to find out the association of liver markers in the subjects with malarial infection and in healthy individuals. And objective of the study was to estimate liver enzymes in both groups.

## Method:

The study conducted on total 100 individuals including 50 cases and 50 control group. The study is conducted in the tertiary care hospital attached with Rohilkhand medical college and hospital, Bareilly. The hepatic markers (ALT, AST, ALP, total protein, total bilirubin, albumin and globulin) were analyzed by fully automated ERBA EM-360 biochemistry analyzer and malaria antigen card test (J. Mitra Kit) was used to detect malaria. Both groups (subjects with malarial infection and normal healthy person) were included in this study. People between the ages of 18 and 60 were included in this study; people younger than 18 were excluded.

## Statistical Analysis:

The data was generated and put into an MS Excel sheet, and then the analysis was carried out using the Statistical Package for the Social Sciences (SPSS 19.0.2) programme for Windows. In order to determine whether any of the data are statistically significant, we have used one-way ANOVA to calculate p-value.

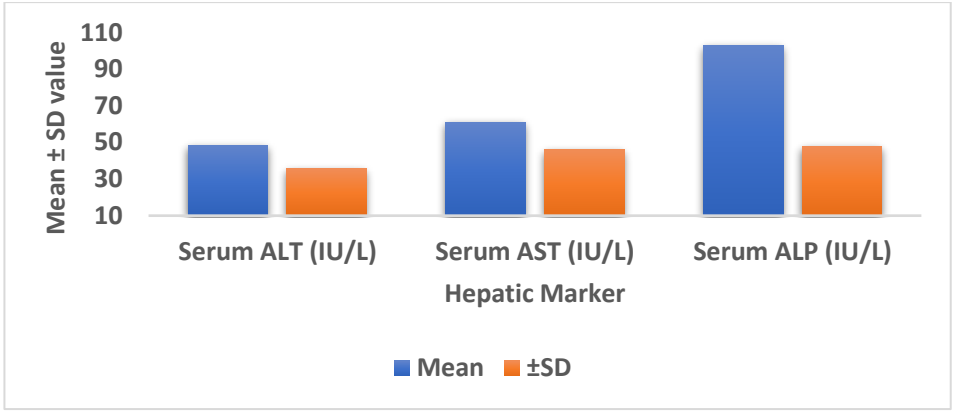
## Results and Observations:

The current study was conducted on 100 individuals including 50 cases with malarial infection and 50 healthy individuals. Hepatic markers were estimated for both the group. Table-1 is showing the comparison of liver enzymes in the patients who has malarial infections and normal healthy persons.

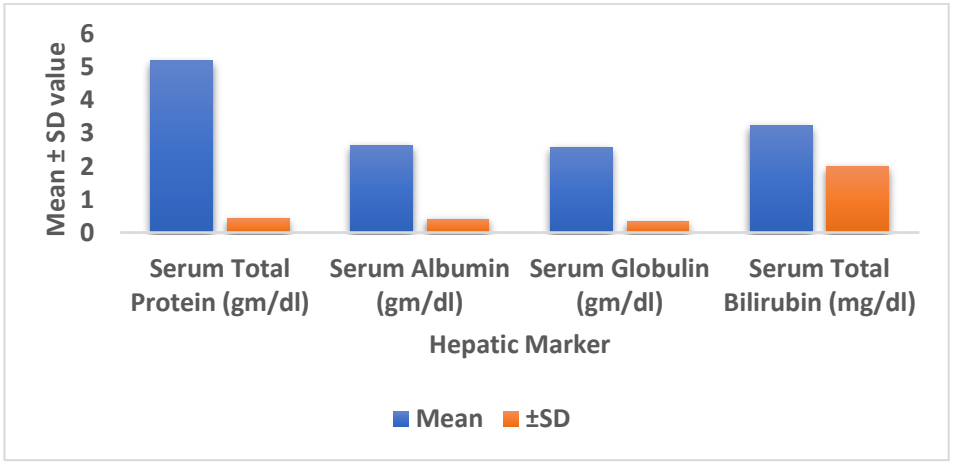
| Hepatic Markers | Subject with Malarial Infection | | Normal Subjects | | p-value |
|---|---|---|---|---|---|
| | Mean | ±SD | Mean | ±SD | |
| **Serum ALT (IU/L)** | 48.52 | 35.80 | 22.75 | 6.22 | 0.0045** |
| **Serum AST (IU/L)** | 61.00 | 45.96 | 23.29 | 4.36 | <0.001** |
| **Serum ALP (IU/L)** | 103.19 | 47.77 | 91.44 | 39.25 | 0.22 |
| **Serum Total Protein (gm/dl)** | 5.20 | 0.42 | 6.74 | 0.74 | <0.001** |
| **Serum Albumin (gm/dl)** | 2.63 | 0.40 | 3.70 | 0.64 | <0.001** |
| **Serum Globulin (gm/dl)** | 2.57 | 0.32 | 3.05 | 0.63 | <0.001** |
| **Serum Total Bilirubin (mg/dl)** | 3.23 | 1.99 | 0.83 | 0.47 | <0.001** |

**Table-1: Comparison of hepatic marker in the patients of malarial infection and normal healthy individuals. p-value <0.01 (**) is considered as statistically highly significant.**

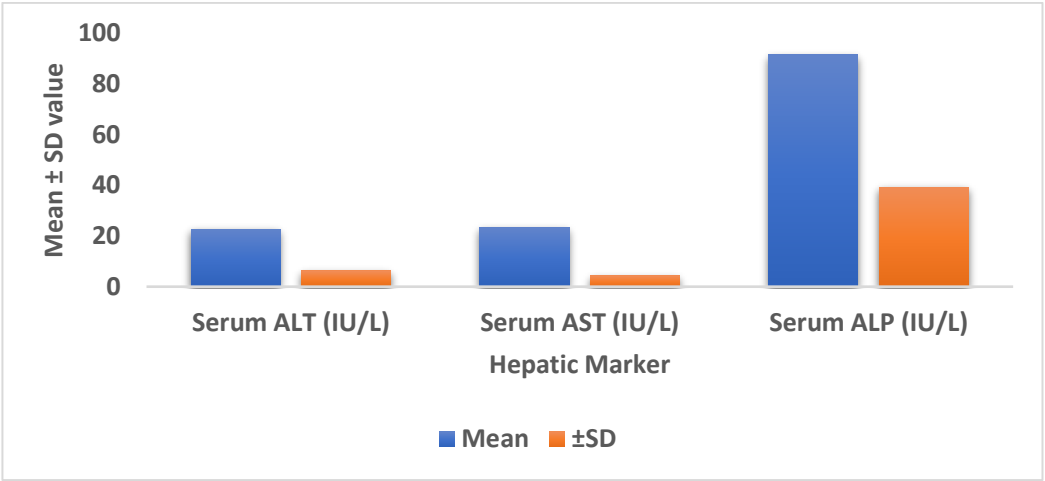
In our study we had observed the normal value of liver enzymes in healthy individuals and increased level of ALT, AST and serum total bilirubin and decreased level of serum total protein in the cases (who has malarial infection), Which was statistically highly significant with p-value <0.01. Serum ALP level was normal in the both group and p value was 0.22, which was (p-value >0.05) considered as statistically not significant.



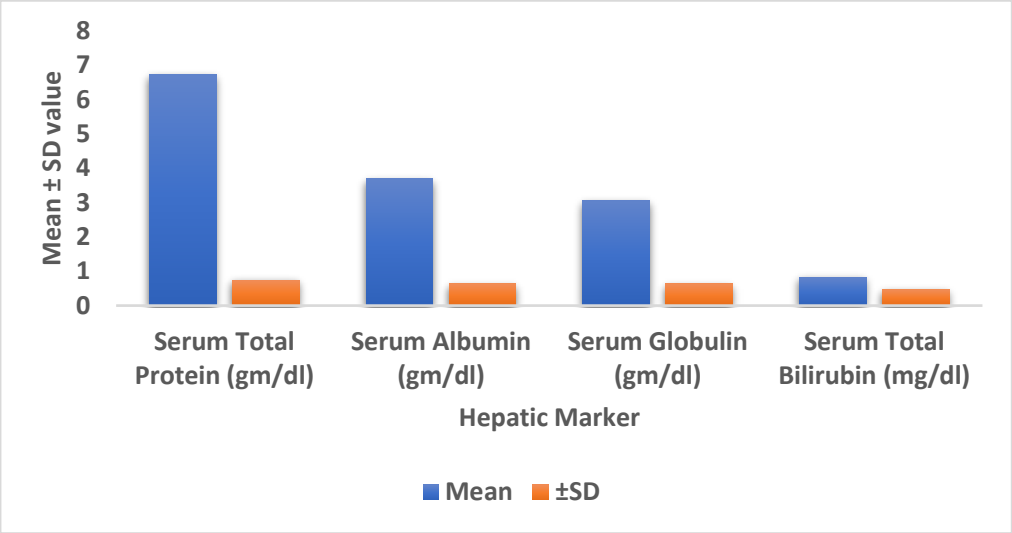

**Graph chart-1: Comparison of Liver enzymes in the patients of malarial infection.**




**Graph chart-2: Comparison of serum total protein and serum total bilirubin in the patients of malarial infection.**




**Graph chart-3: Comparison of Liver enzymes in normal healthy subjects.**




**Graph chart-4: Comparison of serum total protein and serum total bilirubin in normal healthy subjects.**

## Discussion:

In our study we have found abnormal level of liver marker in the patient of malarial infection and normal level in normal subjects. Serum ALT, AST and total bilirubin level were increased in malarial infection which statistically highly significant and serum total protein level was lower in malarial infection as compared to normal subjects, which was also statistically significant. Abul Fazil et. al; were observed increased level of serum bilirubin (>3.0)[11], Ali Hassan Abro et. al; were found elevated level of serum ALT, AST and bilirubin and lower level of serum total protein level in the patients of malarial infection as compared to normal healthy individuals[12], Nour Eldaim Elnoman Elbadawi et. al; were observed high level of liver enzymes (ALT and AST) and serum total bilirubin, and lower level of serum total protein in malarial infection as compared to normal subjects[10]. In the study of Debojyoti Bhattacharjee et. al;[13], Saima Rafiq et.al;[14], Aksharaditya Shukla, C.V. Kulkarni and Aseem Rangnekar[15] were also observed abnormally increased level of liver enzymes (ALT and AST) and serum total bilirubin in the malarial infection and lower level of serum protein in cases as compared to normal healthy individuals. Typically, elevated levels of bilirubin in cases of uncomplicated malaria may be attributed mostly to the hemolysis of both parasitized and non-parasitized red blood cells, as well as damage to hepatocytes. The primary cause of elevated bilirubin levels in this investigation was hepatic impairment [7].

## Conclusion:

The presence of acute, moderate and high parasitemia in patients has been seen to impact the activity of AST and ALT enzymes, indicating a correlation between the infection and liver damage and affect the synthetic function of liver.

**Conflict of Interest**: Nill

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