Serum ALP & GGT Levels in HIV Positive Patients

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Research Article

***Abstract*:** Analysis of liver-associated enzymes may also help focus the diagnostic workup. The present study attempts to assess the following in HIV positive patients – (1) To study whether the liver functions are deranged in HIV positive patients by estimating the serum ALP & GGT levels. (2) Whether or not it can be used as a diagnostic & prognostic tool. The mean ± SD serum ALP & GGT in control group was demonstrated to be 43.12 ± 4.13 IU/L & 19.52 ± 2.93 IU/L, according to the present study, which was found to be increased to 129.5 ± 126.12 IU/L ($p < 0.01$) & 57.27 ± 26.35 IU/L ($p<0.01$) in HIV positive patients. The increase was found to be statistically significant for ALP & GGT. It could be concluded that the liver function tests are deranged in HIV positive patients as compared to control. The deranged serum ALP & GGT levels may identify patients requiring further investigations thus can be used as a diagnostic & prognostic tool.

***Keywords*:** Alkaline Phosphatase, Gamma Glutamyl Transferase, HIV/AIDS.

1. Introduction

The liver is a major part of the reticulo-endothelial system and is a site of HIV replication & organ for many opportunistic infections. The liver receives a large percentage of cardiac output & is a window to diagnosis of infections in HIV positive patients. A rise in ALP levels can indicate liver trouble if GGT levels are also elevated. Patients with predominantly elevated ALP and GGT are described as having cholestatic disease. Elevation of ALP occurs as a result of obstructed bile flow of either the intra-hepatic or extra-hepatic biliary tree. Patient with elevated ALP levels commonly have granulomatous liver disease. Causes of elevated ALP and GGT levels include primary biliary cirrhosis, fatty liver, alcoholic liver disease, liver inflammation from medications and certain herbs, liver tumors, & gallstones or gall bladder problems. The results of LFTs though rarely diagnostic, may identify patients requiring further investigations. Therefore the aims and objectives of present study were: (1) To study whether the liver functions are deranged in HIV positive patients by estimating the serum ALP & GGT levels. (2) Whether or not it can be used as a diagnostic & prognostic tool.

2. Materials and Methods

The present study on, "Serum Alkaline Phosphatase & Gamma Glutamyl Transferase Levels in HIV Positive Patients", was carried out in Department of Medical Biochemistry, Government Medical College, Aurangabad, Maharashtra, India. Forty HIV positive and 40 healthy & HIV negative control cases were included in the study with mean age [morbid (27 males & 13 females) & control cases (28 males and 12 females)] approximately 35 years.

Inclusion Criteria – HIV positive patients were included.

Exclusion Criteria – Alcoholic patients, congestive heart failure, liver tumors, & patients with bone disorders were excluded.

The serum samples were collected from the Department of Microbiology after they were confirmed to be HIV positive by the ELISA Recombigen Test & Rapid Capillus Latex Agglutination Test. Blood samples from healthy individuals were collected in the OPD & were analyzed biochemically. The biochemical investigations were performed on fully automated analyzer – Erba Superstat 919.

Enzymatic methods [Adaptation by Wilkinson et al of the Bessey Lowry et al method for ALP & Szasz, Rosalki, & Tralow Method for GGT] were applied for estimation of both serum ALP & GGT. Wavelength used was 407 nms for both.

Formulae:

Serum ALP [IU/L] = Absorbance/min * Factor (2713) [Normal Value = 15 – 112 IU/L].

Serum GGT [IU/L] = Absorbance/min * Factor (2121) [Normal Value = 05 – 54 IU/L].

Statistical analysis used: Statistical analysis was done by applying paired "t" test. $p \leq 0.05$ was taken to be significant.

3. Results

Table 1: Mean Age & Sex differentiation in Control & Morbid Group

Group	Mean Age (Years)	No. of Males	No. of Females
Control	35.17	28	12
HIV Positive Cases	34.65	27	13

The mean age of the control group including morbid group was calculated to be 35.17 years (22 to 53 years) & 34.65 years (22 to 55 years) [table 1]. The mean ± SD serum ALP & GGT level was found to be increased in HIV positive patients. The increase was statistically significant ($p < 0.01$).

Table 2: ALP and GGT levels (Mean ± SD) in Control & Morbid Group

Parameter	Range [Control]	Range [Morbid]	Mean ± SD	
			Control Group	Morbid Group
ALP [IU/L]	52-35	782-45	43.12 ± 4.13	129.5 ± 126.12*
GGT [IU/L]	25-15	154-32	19.52 ± 2.93	57.27 ± 26.35*

** $p < 0.01$ (significant when compared to control group)*

4. Discussion

According to the present study mean ± SD serum ALP & GGT in control group was found to be 43.12 ± 4.13 IU/L & 19.52 ± 2.93 IU/L which was increased to 129.5 ± 126.12 IU/L ($p < 0.01$) [Max range = 782 IU/L] & 57.27 ± 26.35 IU/L ($p<0.01$) [Max range = 154 IU/L] in HIV positive patients. 35 % of the HIV positive patients had serum ALP levels, & 37.5 % of the HIV positive patients had serum GGT levels above the upper limit of normal. This was in accordance with study by Schniedermann D et al (1987) who demonstrated serum ALP to be 593 IU/L in AIDS patients. In patients with intra-hepatic Mycobacterium avium intercellulare infections serum ALP levels were markedly elevated ($p=0.002$). [1] Glasgow B. et al (1985) showed mild elevations of serum ALP patients infected with Mycobacterium avium intercellulare, Cytomegalovirus, & Kaposi's sarcoma. [2] Dworkin B., et al (1987) showed the average values in AIDS patients for serum ALP = 183 IU/L & serum GGT = 186 IU/L ($p<0.05$). [3] Payne T H, et al (1991) found elevations of serum ALP in excess of 1000 IU/L in 17 % of AIDS patients. [4] Ball S.G. (1994) stated that nearly two third of AIDS patients have raised liver enzymes (serum AST, ALT, & ALP) at some stage of their disease. The presence of a marked elevation of serum ALP suggests bile duct obstruction or hepatic infiltration. The majority of biochemical abnormalities are associated with secondary infections and the drugs advised to treat them. The results of LFTs though rarely diagnostic, may identify patients requiring further investigations. [5] Poles M, et al (1996) found an elevated serum ALP level above 300 IU/L. [6] Poles MA, et al (1997) demonstrated that patients with elevated ALP and GGT are described as having cholestatic disease. [7] Rai R, et al (2002) stated that both fibrosis scores of 3 or greater & total scores of 5 or greater were associated with elevated ALT, AST, & gamma-glutamyl transpeptidase levels ($P <0.01$). [8] Ogunro PS, et al (2005) found mean ± SEM ALP & GGT activities (IU/L) of 84.8 ± 4.3 and 47.5 ± 4.1, respectively in AIDS patients, which were significantly higher ($p<0.001$) than 56.4 ± 3.2 and 25.1 ± 1.7, respectively observed for the same enzymes in HIV-1 infected patients and 54.6 ± 4.3 and 24.2 ± 2.1, respectively in the controls. [9] Patients with predominantly increased ALP & GGT are described as having cholestatic disease. The processes that cause granulomatous inflammation are the most common causes of cholestatic liver disease in patients infected with HIV. These include infiltrating infections such as Mycobacterium avium intercellulare, mycobacterium tuberculosis, fungal infections, and protozoal infections as well as drug hepatotoxicity, neoplasia, peliosis hepatic and biliary tract disorders. Clinicians can treat lymphoma, Mycobacterium avium complex, cytomegalovirus and other disorders and the estimation of serum ALP & GGT may help in diagnosing these liver diseases in patients infected by HIV.

5. Conclusion

Both serum ALP & GGT levels were found to be predominantly elevated in HIV positive patients. The enzyme levels may serve as a prognostic indicator since HIV positive patients with highly elevated levels of these enzymes had a poor prognosis. The presence of marked elevation of serum ALP & GGT helps to identify patients requiring further investigations such as USG, liver biopsy, & ERCP. Thus HIV positive patients with predominantly elevated serum ALP & GGT levels should undergo further investigations, thereby leading to a diagnosis of particular infecting organism. Therefore it could be concluded that serum ALP & GGT levels may help in management of patients infected with HIV & may be a useful parameter in diagnostic workup in HIV positive patients.

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