

Aminotransferase Profile in HIV Positive Patients

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Abnormal liver biochemistries are a frequent feature of HIV disease. Analysis of liver-associated enzymes may help focus the diagnostic workup. The present study attempts to assess the following – 1) To study whether the liver functions are deranged in HIV positive patients by estimating the serum AST & ALT levels. 2) Whether or not aminotransferases can be used as a diagnostic & prognostic tool. The mean \pm SD serum AST & ALT in control group was demonstrated to be 22.15 ± 2.67 IU/L & 17.85 ± 1.84 IU/L which was found to be increased to 95.85 ± 26.9 IU/L ($p < 0.001$) & 85.67 ± 28.56 IU/L ($p < 0.001$) in HIV positive patients. The increase was found to be statistically highly significant. It could be concluded that the liver function tests are deranged in HIV positive patients as compared to control. The deranged serum AST & ALT levels may identify patients requiring further investigations, thus can be used as a diagnostic & prognostic tool.

Key words: Aspartate Aminotransferase, Alanine Aminotransferase, HIV/AIDS.

The liver is a major part of reticuloendothelial system and is a site of HIV replication and organ for many opportunistic infections. The average HIV infected patient receives many anti-microbial agents and the drug toxicity is a common cause of deranged liver functions in this group. In HIV infected individuals abnormal biochemical test results,

jaundice, or hepatomegaly can develop as a result of hepatic parenchymal disease. The transaminases (ALT and AST) are enzymes made in the liver. When liver cells are damaged or dying, ALT and AST leak into the bloodstream. Conditions which cause these liver enzymes to rise above normal include viral hepatitis, excessive alcohol intake/alcoholic liver disease, liver inflammation from medications and certain herbs, auto-immune hepatitis, fatty liver, inherited liver diseases and liver tumors.

MATERIAL AND METHODS

The present study on, "Aminotransferase profile in HIV Positive Patients", was carried out in Department of Medical Biochemistry, Government Medical College, Aurangabad, Maharashtra, India. Forty HIV positive and 40 healthy and HIV negative control cases were

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included in the study with mean age [morbid (27 males and 13 females) and control cases (28 males and 12 females)] approximately 35 years.

Inclusion Criteria

HIV positive patients were included.

Exclusion Criteria

Hepatomegaly cases 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 and Rapid Capillus Latex Agglutination Test. Blood samples from healthy individuals were collected in the OPD, processed for HIV testing and after confirming HIV negativity the samples were analyzed biochemically. The biochemical investigations were performed on the fully automated analyzer – Erba Superstat 919.

The table 3 shows the method employed with normal values of all biochemical parameters

tested. Enzymatic methods [IFCC] were applied for estimation of both serum AST and ALT. Wavelength used was 340 nms for AST and ALT both. Formula applied for calculation of both AST and ALT was-Absorbance/min * Factor (1768). Normal vaules = Serum AST= 00 – 37 IU/L and Serum ALT = 06-40.

Statistical analysis used

Statistical analysis was done by applying the paired “t” test. Results were presented as mean ± standard deviation(SD).

RESULTS

The mean age of the control group including morbid group was calculated to be 35.17 years (22 to 53 years) and 34.65 years (22 to 55 years).

The mean ± SD serum AST and ALT in control group was found to be 22.15 ± 2.67 IU/L

Table 1. Mean age and sex differentiation in control and morbid group

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

Table 2. Mean ± SD in control and morbid group

Biochemical Parameter	Max-Min Range [Control]	Max-Min Range [Morbid]	Mean ± SD	
			Control Group	Morbid Group
AST [IU/L]	28-18	803-59	22.15 ± 2.67	95.85 ± 26.9*
ALT [IU/L]	22-15	180-41	17.85 ± 1.84	85.67 ± 28.56*

* p < 0.001 (highly significant) when compared to control group

Table 3. Methods used for AST & ALT estimation showing normal values

Biochemical Parameter	Method	Wavelength (nms)	Formula	Normal Value [IU/L]
Serum AST	Enzymatic [IFCC]	340	Absorbance/min * Factor (1768)	00 – 37
Serum ALT	Enzymatic [IFCC]	340	Absorbance/min * Factor (1768)	06 – 40

and 17.85 ± 1.84 IU/L which was found to be increased to 95.85 ± 26.9 IU/L and 85.67 ± 28.56 IU/L in HIV positive patients. The above data on statistical analysis and p value was found to be highly significant for AST and ALT ($p < 0.001$).

DISCUSSION

According to the present study mean \pm SD serum AST and ALT in control group was 22.15 ± 2.67 IU/L and 17.85 ± 1.84 IU/L which was found to be deranged i.e. increased to 95.85 ± 26.9 IU/L ($p < 0.001$) and 85.67 ± 28.56 IU/L ($p < 0.001$) in HIV positive patients. Dworkin *et al.*, Schniederermann *et al.*, Huang *et al* demonstrated increase in serum AST and ALT levels [AST = 133 IU/L and serum ALT = 99 IU/L; AST = 162 IU/L and ALT = 124 IU/L] in AIDS patients.^{5,11,6} Vazmediano *et al* found elevated levels of serum transaminases in the patient [serum AST level = 105 IU/L and serum ALT = 114 IU/L].¹² Bonancini M, et al demonstrated peak serum ALT level to be 331 IU/L and nadir serum ALT level to be 67 IU/L.³ McGowan *et al.*, found serum ALT levels to be raised in 16 out of 28 patients.⁷ Ball demonstrated hepatomegaly to be a frequent finding and nearly two third of AIDS patients have raised liver enzymes (serum AST, ALT, and ALP) at some stage of their disease. Raised serum transaminases suggest hepatocellular damage for which there are many possible causes including opportunistic hepatic infection, malignancy, and drugs.² Poles *et al.*, demonstrated liver test abnormalities to be seen in 85% of HIV positive patients. Patients with viral hepatitis had significantly elevated serum AST ($p = 0.037$). All the diagnostic groups had elevated liver chemistries.⁹

Poles, Lew *et al.*, stated that upto 90 % of patients with AIDS had abnormalities of the liver associated enzymes.¹⁰ Patients with predominantly elevated transaminases usually were described as having hepatocellular disease. Hepatocellular patterns reflect liver injury, and these enzymes are released into the blood stream from either cell necrosis or increased cell permeability. Marked elevations usually result from typical and HIV-related viral hepatitis, drug-induced or toxin-induced liver disease or ischaemic injury. Despite an increased risk

associated with liver biopsy, it is the most specific diagnostic technique for parenchymal liver disease in patients seropositive for HIV. Amrapurkar DN, et al concluded that serum transaminases was elevated in 13% of the HIV positive patients.¹ Von Appen *et al.*, concluded that serum transaminase levels were increased in the HIV positive patients [AST = 73 IU/L and ALT = 129 IU/L].¹³

Dezzutti CS, et al demonstrated that HIV-infected participants had significantly higher HCV RNA levels ($P < 0.0001$) and aspartate transaminase (AST) levels ($P < 0.0001$), but not alanine transaminase (ALT) levels ($P > 0.05$) as compared with HIV-uninfected participants. However, among HIV coinfecting participants, elevated AST levels ($P = 0.04$) and lower CD4 levels ($P = 0.02$) were associated with cryoglobulinemia.⁴

Ogunro *et al.*, demonstrated mean \pm SEM ALT and AST activities (IU/litre) of 48.7 ± 3.1 and 54.3 ± 3.3 respectively in AIDS patients ($p < 0.001$) than 21.3 ± 2.9 and 25.6 ± 1.3 respectively observed for the same enzymes in HIV-1 infected patients and 20.1 ± 3.1 and 24.5 ± 2.6 respectively in controls.⁸

Patients with predominantly elevated aminotransferase (greater than 3 times normal) usually are described as having hepatocellular disease. According to the present study predominantly elevated levels of both AST and ALT (max AST = 803 and ALT = 180) were demonstrated. Marked elevations usually result from typical and HIV related viral hepatitis, drug-induced, or toxin-induced liver disease, or ischemic injury. Thus estimation of serum aminotransferase may help focus the diagnostic workup. The serum aminotransferase may also be useful in the prognosis of HIV positive patients. HIV positive patients with highly elevated aminotransferase levels were found to have a poor prognosis.

CONCLUSIONS

Both AST and ALT levels were found to be markedly elevated in HIV positive individuals. Patients with predominantly elevated aminotransferase levels are usually described as having hepatocellular disease. Thus aminotransferase are useful in the diagnostic

workup in HIV positive patients. HIV positive patients with highly elevated aminotransferase levels have a poor prognosis and therefore these enzymes can be used as a prognostic tool. The deranged serum AST and ALT levels may identify patients requiring further investigations, thus can be used as a diagnostic and prognostic tool.

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Abbreviations

AST = Aspartate Aminotransferase

ALT = Alanine Aminotransferase

IFCC = International Federation of Clinical Chemistry