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A Study on the Activities of Liver Enzymes in HIV/AIDS Patients

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A study was conducted to compare the activities of liver enzymes in 25 patients with human immunodeficiency virus (HIV) infection and those with the acquired immunodeficiency syndrome (AIDS). The patients were between 20 and 50 years of age. The findings were compared with reference subjects who were negative to the antibody produced by the human immunodeficiency virus. The activities of serum alanine-aminotransferase ($P<0.01$), asparte-aminotransferase ($P<0.03$) and alkaline phosphatase ($P<0.001$) observed in HIV infected/AIDS patients were significantly higher than those in the reference group. Non significant differences were observed with regards to sex in the serum levels of the three afore-mentioned liver enzymes. Therefore, it may be concluded that increase in the three liver enzymes is most likely due to impairment/involvement of the liver in HIV infection. The enzymes may be useful markers for HIV and AIDS.

Key words: Human immunodeficiency virus (HIV), acquired immunodeficiency syndrome (AIDS), liver enzymes

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Introduction

AIDS is one of the most severe infection ever known to have attacked the human population. It is caused by a retrovirus named human immunodeficiency virus (Sabatier, 1987). HIV is a ribonucleic acid (RNA) retrovirus so designated because of its genome which encodes an unusual enzyme called reverse transcriptase, which allows deoxyribonucleic acid (DNA) to be transcribed from RNA. Thus HIV can make copies of its own genome as DNA in the host's cells such as human T4-helper lymphocytes and this leads to the elaboration of vast numbers of viral particles (Montagmier ***et al.***, 1984). Although immunological dysfunction is common to all AIDS patients, the clinical spectrum of HIV infection is diverse and multiple organ involvement is frequently evident (Dalgteish ***et al.***, 1984). Liver disease has been linked to HIV infection and may manifest as fever of unknown origin (PUO), hepatomegaly or sub-clinical abnormalities in liver function tests (Montagmier ***et al.***, 1984; Dalgleish ***et al.***,1984; Cooper ***et al.***, 1984; Tietz ***et al.***, 1983). The authors suggested that the major cause of hepatitis in HIV patients is infection by a secondary virus called the Cytomegalo virus (CMV).

However, it is of interest that HIV has been detected in the liver cells of AIDS patients. It may be that those cells targeted for apoptosis are the same cells infected with HIV (Cooper ***et al.***, 1984). In various forms of liver disease, serum levels of numerous cytosolic, mitochondria and membrane associated enzymes are increased. The degree of elevation varies with the type of disease. Alanine and aspartate aminotransferases and alkaline phosphatase are the enzymes that are most often measured for evaluation of liver disease or diseases affecting the liver or in diseases where the liver is implicated (Tietz ***et al.***, 1983). The knowledge of the intracellular location of enzymes can therefore assist in determination of the nature and severity of a pathological process if suitable enzymes are assayed in the blood.

The objective of the present study was to compare the activities of certain liver enzymes between healthy and HIV-infected or AIDS patients that are expressed in the serum.

Materials and Methods

Patients

Twenty-five patients confirmed to be HIV positive were recruited into the study. The control group consisted of twenty-five apparently healthy volunteers who were HIV negative. Both groups examined were Hepatitis B surface antigen negative and were not known to suffer from any major liver disease at the time of study. Blood samples from these two groups (age between 20 and 50 years) were collected into appropriate sample tubes and processed according to standard procedures. The blood enzyme activities determined quantitatively as described by Tietz (1983).

Results and Discussion

The range of ALT, AST, ALP observed in HIV/AIDS patients were between 24.2-44.7 IU/L, 20.7-40.1IU/L and 43-61IU/L, respectively. The range of enzyme activities for the reference group

were between 10.7-14.7IU/L, 10-13.1, 24.6-30.7IU/L, respectively. There was a significant increase in serum ALT ($P<0.01$), AST ($P<0.03$) and ALP ($P<0.001$) in HIV/AIDS patients compared with reference group. This observation is in consonance with that of Wild-up ***et al.*** (1993) in which there was significant increase in the activities of the two enzymes (ALT and AST) considered. This is also consistent with the findings of Wild-up ***et al.*** (1993) and Bowen ***et al.*** (1985) who recorded a significant increase in the activities of the three afore-mentioned enzymes investigated.

It is of interest to note that HIV has been detected in the liver cells with noticeable pathogenesis of the affected cells in infected individuals and since HIV/AIDS patients tend to suffer more chronic, unrelenting forms of many secondary disease, it is therefore likely for the liver too to be affected and subsequently the changes in activities of the liver enzymes in HIV/AIDS patients. HIV attack host cells and take over the control of the infected cells leading to eventual death of the cells and subsequently the release of cellular contents into the surrounding medium of which enzymes constitute 20%. This may be responsible for the increase in the level of liver enzymes in infected liver cells. Changes in the three mentioned liver enzymes should not be surprising since it is likely that an intact immune response to viral replications is necessary to produce the hepato-cellular necrosis and inflammation seen in active hepatitis due to HIV/AIDS infection.

Among HIV/AIDS patients, liver involvement averages 28%, as reported by Rex (1987). Although, other causes of increased serum/plasma level include: hepatitis due to hepatitis B virus, drug toxicity, extra-hepatic cholestasis, cirrhosis, hepatobiliary disease, genetic abnormalities with increased production of enzymes, enzyme induction and proliferation of enzyme producing cells, for example in cancer patients, however these conditions were not implicated in the sect of patients examined. It is possible nonetheless, that these other conditions could be secondary to HIV infection and thus contributes to increase in the activities of the liver enzymes examined perhaps at different degrees. A detailed analysis which could include differential enzyme studies could clarify other sources of ALT, AST and ALP increase in serum/plasma. From these findings it therefore becomes necessary to estimate serum levels of ALT, AST and ALP, other liver enzymes and isoenzymes in HIV/AIDS patients to be able to at least monitor prognosis and progressive involvement of the liver cells. This would require continuous monitoring of the patient. In such a case, a sharp increase from the steady state concentrations in a particular patient may be an indication of early or late involvement of the liver cells either mildly or severely in the absence of other known causes.

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