



Effect of Azidothymidine on CD4 Positive T Cells in HIV Positive Patients

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ABSTRACT: The effects of Azidothymidine (AZT) on the level of CD₄ positive T cells in seropositive HIV patients regularly visiting the University Teaching Hospital, Port Harcourt and Braithwaite Memorial Hospital were selected for this investigation. Treatment group consisted of patients that received AZT at doses of 5mg/kg orally whereas the control group received placebo. The result shows that AZT increased significantly ($P \leq 0.01$) CD₄ + T cells level from $700 \pm 3.00\mu\text{l}$ to $950 \pm 3.00\mu\text{l}$ while in the control group the significant decline ($P \leq 0.01$) of CD₄ + T cells continued. This is indicative of the protective effects of AZT in preventing the destruction of CD₄ + T cells by the HIV virus. The increased CD₄ + T cells levels in the AZT treated patients was followed by concomitant reduction of the frequencies and severity of the HIV disease symptoms such as opportunistic infections and Lymphadenopathy. The control group had increase in the frequency and severity of these symptoms. The results of this study indicate that the use of AZT in the treatment of HIV positive patients is justified and therefore recommended especially in blacks. @JASEM

Acquired Immune deficiency syndrome (AIDS) is caused by HIV (Human Immuno deficiency Virus), a human retrovirus with long incubation period followed by a slowly progressive fatal outcome. The main feature of AIDS is profound immunosuppression, primarily affecting cell – mediated immunity. The HIV attacks CD₄ + T cells and cause lysis of these cells with consequent reduction of the CD₄ + T cells. This reduction on the CD₄ + T cells accounts for most of the immunodeficiency at later period in the course of the HIV infection

(Fauci *et al.* 1986). Correlation exists between the onset of constitutional symptoms of AIDS and the level of CD₄ + T cells in HIV patients (Fauci *et al.* 1985, Bacchetti and Moss 1989). Many studies have also demonstrated that this destruction of CD₄ + T cells population results in a critical immune deficiency that allows for the development of a wide range of opportunistic infections and tumors (Yoffe and Fauci 1987, Mc Dougal and Moss 1985)

Azidothymidine (AZT) is an antiretroviral drugs which inhibits HIV DNA replication in the CD₄ + T cells and thus has been used in the prophylactic treatment of AIDS symptoms (Sattentau, Claphan, & Weisis, 1988, Englund and Baker, 1997, Burger and Meenhorst, 1995 and Hammer, 1997). The therapeutic effectiveness of AZT was demonstrated in Caucasians whose AIDS disease is associated with HIV – 1 (Yoffe and Fauci, 1987). The AIDS disease in Black Africans is associated with HIV – 2, a Virus which is genetically different but morphologically related to HIV – 1. The effectiveness of AZT against

AIDS disease has not been sufficiently investigated among Nigerians. Consequently, it is the aim of this study to investigate the effectiveness of AZT against the development and progress of AIDS disease in Nigerians.

MATERIALS AND METHODS

The Azidothymidine (Zidovudine) drug was purchased from Ciba – Geigy Ltd, Swiss Nigerian Chemical Co. Ltd, Lagos. While Ferrous Sulphate was purchased from Vital Pharmaceutical Co. Hospital Road, Port Harcourt.

Sample Collection: Seropositive HIV patients in the University Teaching Hospital and Braithwaite Memorial Hospital, all in Port Harcourt were randomly selected for the study. Treatment group consists of 8 patients and these were administered 5mg/kg of Azidothymidine and 200mg of ferrous sulphate orally while the control group was given 200mg tablet of ferrous sulphate. Both groups were followed up for a period of 6 months and had pretreatment baseline estimation of CD₄ + T cells levels done before commencement of treatment. Levels of CD₄ + T cells were obtained during the course of treatment at 1 month, 3 month and 6 month. Presence or absence of anticipated side effects were noted during follow-up. Patients were educated on response to treatment indicated by reduction in constitutional symptoms, elevation of mood and overall well being of the patient. Test of significance using the Chi-square test were carried out.

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RESULTS AND DISCUSSION

The levels of CD₄ + T cells in treated and untreated (control) AIDS patients at 1,3 and 6 months periods indicates that the average pretreatment value for the treatment group was $700 \pm 3.00/\mu\text{l}$ whereas that for the control was $680 \pm 3.00/\mu\text{l}$.

The CD₄ + T cells value for the treatment group rose significantly ($P \leq 0.01$) from $700 \pm 3.00/\mu\text{l}$ to $850 \pm 5.00/\mu\text{l}$ on month 03 and to $950 \pm 5.00/\mu\text{l}$ on the 6th month. On the other hand the CD₄ + T cells value for the control (untreated) group decreased significantly ($P \leq 0.01$) from $680 \pm 3.00/\mu\text{l}$ to $480 \pm 2.00/\mu\text{l}$ on month 01 and then to $300 \pm 1.00/\mu\text{l}$ on the 6th month. Although the pretreatment level of the CD₄ + T cells in the treatment group was not significantly different from that of the control group, there was

significant difference between the treatment and the control group at the end of 1st, 3rd and 6th month of the study (see figure 1). Figure 1 shows a graph of estimated CD₄ + T cells levels of both groups plotted against the duration of study. The treatment group had a steadily rising curve while the control group had a curve that steadily declined. This is indicative of the protective effect of AZT on the CD₄ + T cells against the destructive effect of the HIV Virus on the CD₄ + T cells. The treatment group had corresponding improvements in their symptoms with marked reduction in lymphadenopathy, decrease in incidence of opportunistic infections and increased sense of well being. Both objective and subjective improvement occurred in the treated group and correlated with rise in CD₄ + T cells during the course of this study.

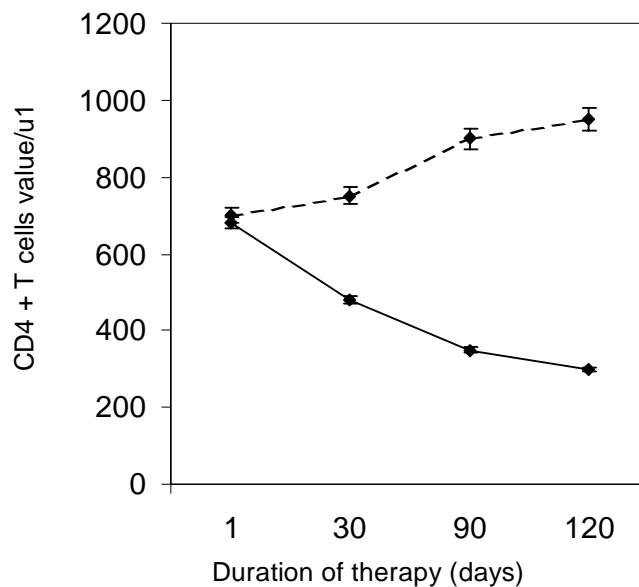


Fig. 1. Estimated CD4 +T-cells of both treatment and control groups plotted against the duration of study.

The result of this current research shows that Azidothymidine an antiretroviral agent effective in the treatment of HIV in Caucasians is equally effective in raising the level of CD₄ + T cells in the Black African HIV patient, thus reducing the severity of constitutional symptoms as well as improve the overall well being of the patient. This may be due to the ability of Azidothymidine in inhibiting HIV DNA replication in the CD₄ + T cells by competing with thymidine triphosphate for incorporation into DNA. It is also active against HIV – 1 and HIV – 2 (McLeod & Christopher, 1997). At P

≤ 0.01 the CD₄ + T cells value of the treatment group at the 3rd month ($850 \pm 5.00/\mu\text{l}$) was significantly greater than the pretreatment value of the treatment group ($700 \pm 3.00/\mu\text{l}$). The CD₄ + T cells value of the treatment group at the 6th month ($950 \pm 5.00/\mu\text{l}$), was also significantly ($P \leq 0.01$) greater than the control value of $300 \pm 1.00/\mu\text{l}$ at the 6th month. The treatment group had corresponding improvement in the symptoms with marked reduction in lymphadenopathy, decreased incidence of opportunistic infections and increase sense of well-being. Both of objective and subject improvements

occurred in the treated group and correlated with the rise in CD₄ + T cells levels during the course of this study. These findings support the view expressed by previous workers who reported an improvement in constitutional symptoms and a rise in CD₄ + T cells levels in Caucasians who were HIV seropositive patients, treated with Azidothymidine (Yoffe & Fauci, 1987, Schapiro & Winters, 1996).

In conclusion, the findings of this study may justify the use of AZT an antiretroviral agent effective against HIV – 1 and HIV – 2 in the treatment of HIV infection in Blacks.

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