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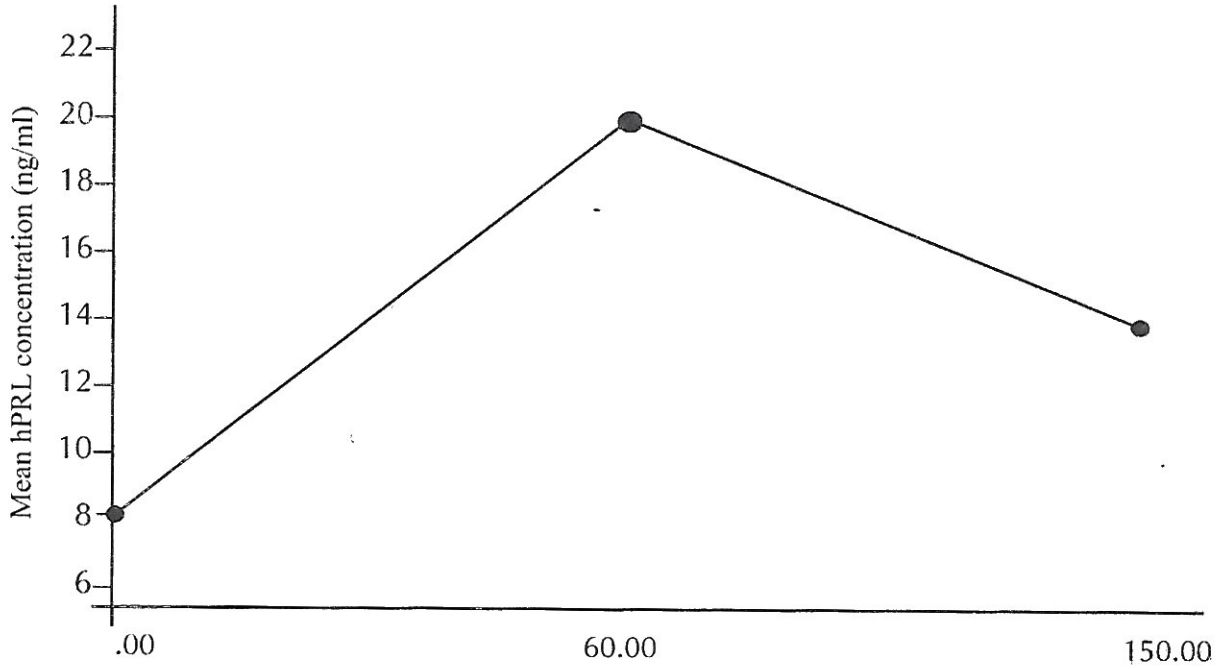

Duration of academic exercise (minutes)

Fig. 1: Bi-phasic response of prolactin secretion during academic exercise in young adult males.

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CD4 COUNTS IN HIV POSITIVE SUBJECTS BEFORE AND DURING ANTI-RETRO VIRAL THERAPY

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ABSTRACT

This study was designed to assess the impact of three drugs used in anti-retroviral therapy (ART), on the $CD4^+$T cell count and weight of the HIV seropositive participants. For this study, 50 Symptomatic HIV seropositive participants on combination anti-retroviral therapy (ART) of Starudine, Lamivudine & Nevirapine were recruited for the study. Similarly, 15 HIV seronegative subjects were recruited and they served as Control Subjects. Blood sample collected from the participants were used to determine $CD4^+$ T cell counts by magnetic field method while the weight of the participants were determined using weighing scale. The result showed that the mean ($\pm$SD) blood $CD4^+$T cell count before ART was 192 ± 109 while 2 months after commencing the therapy was 259 ± 108. However, the mean CD4T cell count in Control subjects was 844 ± 133. This showed that the $CD4^+$T cell count was significantly reduced in the HIV seropositive participants before and after 2 months ART compared with the control value ($P<0.05$ in each case). Amongst the HIV seropositive subjects, 92% had improved $CD4^+$T cell count, 6% had no difference in their $CD4^+$T cell count; while 2% had decreased $CD4^+$T cell count between pre and 2 months post ART. There was a significant reduction in weight of HIV seropositive participants compared with that of Control participants ($P<0.05$). 90% of the HIV infected participants gained weight, 6% lost weight while 4% had no difference in weight within the period under study. The finding in the present study showed the impact of HIV infection on both $CD4^+$T cell count and weight. An appreciation in both $CD4^+$T cell count and weight in this HIV seropositive subjects within 2 months of ART portends possible good prognosis. However, the failure of appreciation in some relevant percentage of studied participants calls for attention.

Key words: HIV; CD4 T cell; Weight; ART; Subjects.

INTRODUCTION

The Human Immunodeficiency Virus (HIV), which causes the disease Acquired Immunodeficiency Syndrome (AIDS) has caused a lot of concern the world over. A survey conducted by the Federal ministry of Health in Nigeria in 2003 showed that the AIDS epidemic was continuing to grow[1] hence the deep concern. The $CD4^+$ subset of T-lymphocytes is the prime target of the HIV on entry into a host. Cells bearing CD4 molecules on their cell membranes act as receptor for attachment of the envelope protein gp 120 (HIV-1)[2]. Although the CD4 subset of T-lymphocytes is the prime target on entry into a host, HIV also infects other cell lineages such as macrophages and monocytes, which express CD4 molecules at lower densities[3].

The infected cells undergo changes in Human Lymphocytes Antigen (HLA) Class II phenotype and are cleared from the circulation, which then leads to depletion of absolute $CD4^+$ cell numbers[4]. The depletion of $CD4^+$ leads to loss of normal function of the cells and thus contributes to the immunopathogenesis of AIDS, development of opportunistic infections which leads to full blown AIDS. Specific therapy to control viral replication has become a cornerstone in the management of HIV-infected patients[5,6]. Anti-retroviral therapy is undergoing continual evolution and current recommendation will change over time[7]. Highly active anti-retroviral Therapy (HAART) may offer the best hope for the control of HIV disease.[8,9,10] In this study, 3 drug combinations (Stavudine, Lamivudine & Nevirapine) were used in the management of the participants. The possible effect these drug combinations on the $CD4^+$ T cell counts and weight of the participants was assessed.

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SUBJECTS, MATERIALS AND METHODS

Subjects: A total of 50 HIV/AIDS subjects (24 males and 26 females) attending antiretroviral clinic at Nnamdi Azikiwe University Teaching Hospital were recruited for the study and followed up for 2 months. The HIV infected participants were in the category of symptomatic stage II. They were aged between 18-54 years. These HIV infected participants were on Lamivudine, Stavudine & Nevirapine. 15 Apparently healthy HIV seronegative subjects (8 males and 7 females) aged between 22-59 years old were also recruited to serve as control subjects. Blood samples collected from all the participants were screened for HIV and the blood CD4 counts of the HIV infected participants were measured before and during anti-retroviral therapy while the CD4⁺T cell count was determined once for the control participants using the magnetic field method. The weights of all the participants were determined at the same time of collection of blood for CD4 T cell' count. Ethical approval was obtained from the ethical committee of the Teaching Hospital. Informed consent was also obtained from the subjects.

METHODS

HIV screening: HIV screening was performed using the HIV kit (ACON Laboratories, San Diego, USA). The procedure is as described by the manufacturer and is an immunochromatographic method. In brief, a drop of serum was placed in the slot for sample and 2 drops of buffer provided was added. For a negative result, only one pink line appears (in the control line) but for a positive result, two pink lines appear, one in the control line and the other in the test line. For all analysis the internal control line must appear to validate the result.

Determination of CD4⁺ T cell count: The CD4⁺T cell count was determined by the magnetic field method (Dyna Bead Ltd. UK). The technique uses magnetic polymer beads coated with anti-CD4 monoclonal anti bodies to capture and isolate CD4 Tlymphocytes from whole blood. Briefly, 225µl of washing solution (PBS) was added to a tube containing 250 µl of blood. Diluted CD14 was then added. Tube was then capped, mixed by tilting and was then incubated for 10 minutes at room temperature. Magnet was placed in the tube for 2 minutes; after which 200µl was transferred into another appropriately labeled tube containing 200µl PBS. Into this solution was added 25µl anti-CD4, mixed and incubated for 10 mins. This was followed by the addition of the magnet and the supernatant solution discarded while 500µl of PBS was then added to the subnatant. Subsequently, 50µl of lysing solution was added, vortexed and left for 5 minutes at room temperature before addition of 50µl of Acridine orange. The solution was fed into the Improved Neubauer counting chamber and the CD4⁺T cells were counted.

Determination of weight: The weight of the subjects were measured bare feet standing upright by using a measuring scale calibrated in kilograms (kg) (HANA scale, China), before and during anti-retroviral therapy.

ARTs combination dosage: The antiretroviral combination Stavudine, Lamivudine and Neviraprine were administered orally to the 50 HIV/AIDS subjects for a period of 2 months. Informing the participants of the need and benefits to adhere strictly to dosage recommendation ensured strict compliance. The Dosage of the drugs were Stavudine tablets 40mg twice daily, Lamivudine tablet 150mg twice daily, Neviraprine tablets 200mg daily.

Statistical Analysis: Variables were expressed in mean and standard deviation while the difference in mean was compared using student t-test. Associations between variables were determined using correlation coefficient. Significant level was considered as $P<0.05$.

RESULT

The mean (±SD) CD4 T cell count before the anti-retroviral therapy was 192 ± 109 while 2 months post anti-retroviral therapy was 259 ± 108. The CD4⁺ count pre and post anti-retroviral therapy showed a significant difference ($P<0.05$) (Table 1).

The mean CD4 count in the control subjects was 844 ± 136 S.D. This was significantly higher than the values obtained in the HIV positive subjects pre and 2 months post anti-retroviral therapy ($P< 0.15$ in each case). This is shown in fig 1.

About 90% of subjects gained weight while 4% lost

weight and 6% had no change in weight for the period of 2 months. In the control subjects, no appreciable weight change was observed.

There were positive correlations between the weight at 2 months antiretroviral therapy and age ($r=0.285$; $p<0.05$); between weight at 2 months and CD4 count pre-antiretroviral therapy ($r=0.289$; $p<0.05$); and between weight at 2months and weight of subjects' pre-anti-retroviral therapy ($r=0.937$; $p<0.01$). The subjects who had increase in $CD4^+$ count were those that gained weight in this study. In this study the highest prevalence was between the age ranges of 32-38 years (36%).

DISCUSSION

According to the World Health Organization, $CD4^+$ count of between 400 and 1100 is considered within normal range. Of the 50 subjects studied only 8% had $CD4^+$ count within this range before commencing ART. This is not unexpected as most HIV/AIDS subjects whose count are still within the normal range are asymptomatic with less risk of infection thus they do not seek medical attention. If a patient is asymptomatic and has $Cd4^+$ count higher than 500cells/mm^3, no anti-retroviral therapy is recommended". In this case the subjects were symptomatic hence treatment was commenced. After 2 months of antiretroviral therapy, 92% of the subjects had increased $Cd4^+$ counts. This agrees with the work by Brechtl et al[10] and Pezzotti et al[12] who concluded from their work that HAART regimens appear to have positive effects on $CD4^+$ count, HIV viral load and body weight.

Table 1: Mean (±Sd) $CD4^+$T cell Count in Symptomatic HIV Positive subjects pre-ART and at 2 months-ART and Control Subjects.

Subjects	Mean $CD4^+$ T cell counts
Symptomatic HIV (pre-ART)	192 ± 109
Symptomatic HIV (2months ART)	259 ± 108
Control subjects	844 ± 108

Thus, ability of the HIV virus to infect $CD4^+$T cells was probably reduced due to HAART intervention. However, the drop in CD4 count in 6% of the symptomatic HIV positive subjects may suggest ART failure. Bretchtl et al noted that treatment failure was not uncommon. There could be a number of reasons for this. Individual reaction to the drugs, however, the biochemical toxicity was not estimated. Also, the $CD4^+$ count of the subject on reporting may affect response as well as ability to rebound. Also, short-term recovery may be difficult for some subject as we note the limitation of this investigation, which was for a short term of 2 months. Another important factor is the compliance to ART, which is considered a crucial determinant of treatment success[13]. According to Ickovics et al[14], non adherence to anti-retroviral therapy remains a formidable barrier in the management of HIV, resulting in the development of resistance and drug failure.

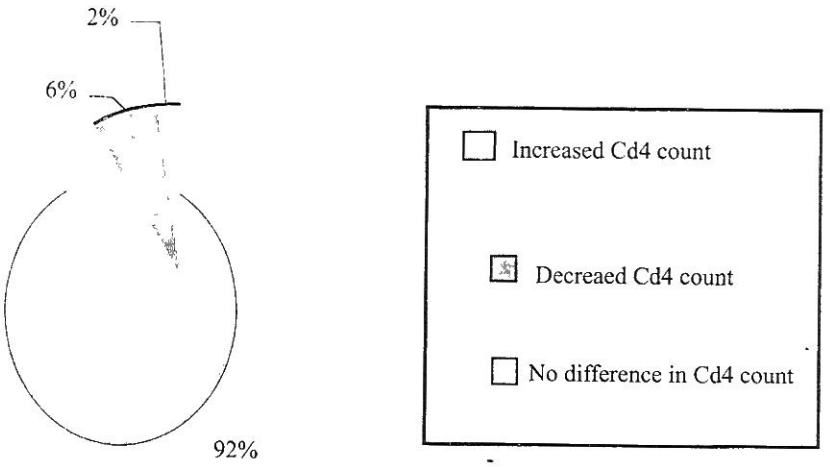
2% of the subjects showed no difference in their CD4 counts.

The subjects in this study also showed marked increase in body weight (90%) while 4% had decreased weight. 6% of the subject had static weights. Predominantly, those that gained weight were those that had increased $CD4^+$ count, post-ART showing improved prognosis. This might explain the positive association observed between the weight of the symptomatic HIV positive subjects by 2 months post-ART and pre-ART $CD4^+$T cell count. This agrees with the work by Hartshom and Cooley[7] and Bretchl[10] who reported improved body weight following ARTs.

CONCLUSION

The HAART gave marked improvement in CD4 count, weight and better prognosis in the 2 months of the study. Weight loss or gain may be used to monitor disease progression or improved prognosis prior to next hospital visit. It is important to note that this is a short term observation.

Fig 1: Subjects who had an increased CD4 count after retroviral therapy, those who had no effect or had counts decreased CD4



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