



Original Research Article

The Values of CD4 Count, among HIV Positive Patients in FMC Owerri

Obeagu Emmanuel Ifeanyi^{1*} and Obeagu, Getrude Uzoma²

¹Diagnostic Laboratory Unit, University Health Services, Michael Okpara University of Agriculture, Umudike, Abai State, Nigeria

²Department of Nursing Science, Ebonyi State University, Abakaliki, Nigeria

*Corresponding author

ABSTRACT

Keywords

CD4 Count,
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The values of CD4 Count was carried out. One hundred and sixty four subjects were sampled, comprising one hundred and fourteen HIV positive subjects and fifty HIV negative subjects which served as the control. CD4 count was analyzed using standard techniques. The results showed that HIV positive subjects had a significantly lower CD4 count (390.00 ± 107.09) when compared with the HIV negative subjects (970 ± 220.05) respectively.

Introduction

Human immunodeficiency virus (HIV)

Human Immunodeficiency Virus (HIV) is a lentivirus (a member of the retrovirus family) that causes acquired Immunodeficiency Syndrome (AIDS) (Weiss, 1993).

This is a condition in humans in which progressive failure of the immune system allows life threatening opportunistic infection and cancers to thrive.

Infection with HIV occurs by the transfer of blood, semen, vaginal fluid, pre-ejaculate or breast milk of the infected person to HIV free person. Within these body fluids, HIV is present as both free virus particles and virus within infected immune cells.

The four major routes of transmission are unsafe sex, contaminated needles, breast milk, and transmission from an infected mother to her baby at birth (perinatal transmission). (Fox *et al.*, 1992).

Viruses such as HIV cannot grow or reproduce on their own, the need to infect the cells of a living organism in order to replicate. The human immune system usually detects and kills viruses fairly quickly, but HIV attacks the immune system itself, the very thing that would normally get rid of the virus. (Ascher *et al.*, 1990)

HIV is a causative organism of autoimmune deficiency syndrome which was recognized as a new disease syndrome in the early 1980's in the USA with the unusual

occurrence of pneumocystis carinii pneumonia and Kaposi's sarcoma in previously healthy young men (Greene, 1991). This retrovirus was isolated from a young homosexual man with lymphadenopathy. The virus was identified and classified in the family Retroviridae genus lentiviranae (Baker *et al.*, 2007).

Under the electron microscope, the viruses were revealed as a cylindrical core with nucleic acid cloned and sequenced. The cylindrical core is 80-130nm in diameter, it has a unique three layered structure, and innermost is the genome nucleocapsid complex.

This complex is enclosed within a capsid which is surrounded by a host cell membrane derived envelope, from which viral envelope glycoprotein 'spikes' project. HIV infects a wide variety of tissues in humans including the marrow, lymph node, brain, skin and bowel (Baker *et al.*, 2007). This retrovirus differs from other retroviruses such as human T lymphotropic virus (HTLV) 1 and 2. The virus was eventually named Human Immunodeficiency Virus (Cohan *et al.*, 1986).

It is transmitted mostly sexually in blood or blood products and pre-natally. The most at risk of acquiring HIV infection are homosexuals, injecting drug misusers and those with bisexual orientation. Others include individuals receiving unscreened blood or blood products, infants born of infected women.

There are various strains of HIV and are designated by a code with geographically informative letters and sequential numbers placed either in brackets, or as a number, or as a subscript. Example HIV_{-sf33} and HIV -2 (Pantaleo *et al.*, 1995)

If there is a laboratory evidence of HIV infection, certain indicator diseases that require presumptive and definitive diagnosis are diagnostic of AIDS, AIDS is an illness characterized by one or more indicator diseases. (Safrit *et al.*, 1995).

Acute HIV is usually characterized by fever, malaise, lymphadenopathy and rash. These conditions are subclinical. A chronic infection of AIDS that follows is asymptomatic in early stages. If an individual is infected with this virus, the virus acts so quick destroying the immune system making the individual prone to little infections.

HIV is present all over the world and the long term consequences of this pandemic will affect every country one way or another over time. This is an evolving pandemic threatening global public health and health care provision, as well as political and economic stability (Kuby, 1997).

The CD4⁺ count is used to measure immune status and HIV disease progression (Tolstrup *et al.*, 2004).

CD4 count is the number of CD4 cells per microlitre of blood. It is used to stage the patient's disease, determine the risks of opportunistic illness, assess prognosis and guide decisions about when to start antiretroviral treatment (CDC, 2009). The main objectives of this study to determine the mean values of CD4 count on HIV positive subjects.

Materials and Methods

Sample size calculation

The sample size for this study was calculated based on Ijeoma *et al.*(2010) 8.1% prevalence of HIV in Owerri in 2010.

$$n = \frac{1.96^2 \times 0.08 (1.00-0.08)}{(0.05)^2} = 114 \text{ samples}$$

Informed consent

Participant information sheet (PIS) was given to the prospective participants. After reading and understanding the PIS, questions were asked and proper explanations given. They consented to participate in the study by signing the informed consent form.

Eligibility criteria

Informed consented subjects (both HIV/AIDS positive patients and HIV negative controls).

Subjects

One hundred and fourteen HIV positive subjects aged 18-65 years attending Heart to Heart clinic of Federal Medical Centre, Owerri between June and December, 2013 were screened. Fifty HIV negative subjects were also screened and they served as controls.

Sample collection

Informed consented subjects were sampled. About 2.5mls of blood was added into ethylene diamine tetra acetic acid (EDTA) bottle and mixed immediately by reverse uniform inversion for platelet and CD4 counts. CD4 count was performed using cyflow counter 1 manufactured by paretic GmbH, Germany.

CD4 count

By automation using cyflow counter 1 manufactured by Partec GmbH Germany.

The principle behind this test is the sample flows through a capillary into the flow cuvette. Here, the sheath fluid takes it with it. Because of the specific flow cuvette geometry the sheath and sample current are speeded up. You get a very narrow, laminar flowing sample stream. This means, the sample stream does not get mixed with the sheath stream. The cells or particles labeled with fluorescent colouring pass the measuring area one after the other. The cells or particles are individually illuminated by the excitation light and the fluorescent light is measured and analyzed.

Procedure:

Wash the machine twice with 960µl cleansing solution, rinse with 960µl of rinse solution. Run control using count check bead to get an acceptable peak. Then add 20µl of monoclonal antibody and 20µl of blood. Mix and incubate in the dark for 15mins. Add 800µl of buffer and slot the tube in the machine. Results are displayed on the LCD screen.

Statistical analysis

The data obtained were subjected to some statistical analysis such as the mean (X), standard deviation (SD), standard error of mean (SEM), student's t-test and Pearson moment of correlation using statistical package for social sciences (SPSS) version 17. The results were expressed in mean ± standard error of mean.

Result and Discussion

The mean value of CD4 Count among the study subjects are shown in table below CD4 counts were significantly lower in HIV patients ($P < 0.05$) when compared with the seronegative subjects (control).

Result obtained in this study showed a significant reduction in CD4 count in HIV patients when compared to their seronegative control ($p < 0.05$), which conforms to the work of Omoregie *et al.*, 2009, who found a significant reduction in CD4 count of HIV positive individuals when compared with the seronegative controls. The HIV attacks and destroys cells with the CD4 antigen and this explains why HIV positive patients had lower CD4 counts than

HIV – Negative individuals (control) (Lafeuiliade *et al.*, 1992).

The findings of this study indicates in HIV Positive individuals with a decrease in CD4 count whereas CD4 T Cells is the major immune arm attacked by HIV. The level of CD4 should be established early in HIV positive patients to find out when to commence treatment for a better well-living of the affected patients.

Table.1 The mean values of CD4 count among the study group

Parameter	HIV Negative subjects (n = 50)	HIV Positive subjects (n =114)	P Value
CD4 (cells/ μ l)	970 \pm 220.05	390.0 \pm 107.09	P < 0.05

NB: Figures are in mean \pm standard deviation; n= number tested

References

- Ascher, M., S., Sheppard, H., W., (1990). AIDS as immune system activation. *J. Acquired Immune Deficiency Syndromes*; 3: 177.
- Baker, F., J., Silvertan, R., E., Pallister, C., J., (2007). Haemaostasis in Introduction to Medical Laboratory Technology. 7th ed, Honeyland Resources limited. PP 387.
- Centres for Disease Control and Prevention (2009). Guidelines for prevention and treatment of opportunistic infections in HIV-1 infected adults and adolescents: Recommendations from CDC, the national institutes of Health and the HIV medicine association of the infectious diseases society of America.
- Cohan ,A.J, Philips, T.Mand Kessler, C.M. (1986). Circulating coagulation inhibitors And AIDs. *Ann. Intern. Med*, 104: 175-180
- Fox, C., H., Cottler-Fox, M., (1992). The pathology of HIV infection. *Immunol. Today*; 13: 353.
- Greene, W., C., (1991). The molecular biology of human immunodeficiency virus type 1 infection. *New Engl. J. Med*; 324: 308.
- Ijeoma, B., C., Kalu, I., G., Nwachukwu, C., U., Nwachukwu, I., G., (2010). Incidence cases of HIV/AIDS infection in Owerri West local government area of Imo State, Nigeria. *Journal of Biological Science*; 5(4): 304-309.
- Kuby, J., (1997). The immune system in AIDS. In Immunology: 3rd edition; Freeman and Company. Pp 523-541.
- Lafeuillade, A., Alessi, M., C., Poizot-Martin, I., (1992). Endothelial cell dysfunction in HIV infection. *J Acquir Immune Defic Syndr*; 5:127-131.
- Omoregie, R., Osakwe, S., I., Ihemeje, V., Omokaro, E., U., Ogefere, H., O., (2009). Correlation of CD4 count

- with platelet count, prothrombin time, activated partial thromboplastin time among HIV patients in Benin City, Nigeria. *West Indian Med. J*; 58(5): 1-9.
- Pantaleo, G., Fauci, M., S., (1995). New concepts in the immunopathogenesis of HIV infection. *Annu. Rev. Immunol.*; 13: 487.
- Safrit, J., T., Koup, R., A., (1995). The immunology of primary HIV infection: which immune responses control HIV replication? *Curr. Opin. Immunol.*; 7: 456.
- Tolstrup, M., Ostergaard, L., Laursen, A., L., (2004). "HIV/SIV escape from immune surveillance: focus on Nef". *Curr. HIV Res*; 2(2):141-151.
- Weiss, R., A., (1993). How does HIV cause AIDS. *Nature*; 460(7256): 711-716.