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EUCOCYTE COUNTS OF HIV INFECTED CHILDREN IN ABA METROPOLIS

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ABSTRACT

This study investigated the leucocyte counts of children infected with HIV in Aba Metropolis. The study population was 242 subjects recruited from Abia State University Teaching Hospital Aba, Abia State. They were made up of 121 children infected with HIV and 121 children not infected with HIV. They were male and female children who visited the hospital for HIV screening test. Those with HIV were the children that tested positive while those without HIV were the children that tested negative. Their records were retrieved from the record section of the hospital. Routine laboratory methods for the determination of white blood cell count, Differential count and CD4+ Cell Counts were used. The result showed that the mean values for the parameters studied in both male and female children without HIV infection were higher than those of the children with HIV in all the age ranges, except the total white blood cell count that reverse were the case. For the CD4+ cell count, the mean values for the age range 5-9 years was the highest, followed by age range 1-4 years and lastly 10-14 years in both the male and female children. The study therefore concludes that the leucocytes counts in children without HIV infection were higher than those of the children with the infection and that

this might be due to the fact that the virus attacks the cells thereby decreasing their number.

Keywords: *Leucocytes, children, infection, human immunodeficiency, and Lymphocyte.*

INTRODUCTION

This study evaluated the haematological parameters of children infected with HIV in Aba Metropolis. The leucocyte counts of both male and female children living with the virus were used as the study group, while those without the infection were used as the control subjects. Human immunodeficiency virus (HIV) is a retrovirus called lento virus. The genomic is made up of Ribonucleic acid (RNA) and each virus has two single chain of RNA for replication. The virus needs a host cell and the RNA must first be transcribed in Deoxyribonucleic acid (DNA) which is done with the enzyme reverse transcriptase. HIV infects mainly the CD4+ lymphocytes (T-cells), but also to a lesser degree Monocytes, Macrophages and Dendritic cells (these cells are also CD4+ Cells). Once infected, the cells turn into an HIV placating cells and losses its function in the human immune system. The virus is spherical with a diameter of about ^{1}/10,000m and like other viruses does not posses a cell wall or nucleus (Bolton *et al*, 2007, Huang *et al*, 2000).

For it to enter into the host cell, HIV uses the CD4 molecules to attach to T-cells, the CD4 molecules is expressed in the surface of subset of T-cells (T-helper cells) but also on monocytes, macrophages, and dendrite cells. However, monocytes for example have ten times fewer CD4 receptors than

CD4 T-lymphocytes (T-helper cells) (Bachou *et al*, 2006).

One or more of the virus GP 120 molecule bind lightly to CD4 molecule in the cell surface. The binding of GP 120 to CD4 results in a conformational change in the GP 120 molecule. This conformational change allows GP 120 to bind to a second molecule on the cell surface known as the HIV co-receptor. The two major co-receptors for HIV 1 are CCRS and CXCR. (Sheela *et al*, 2016, Miles 1992).

During acute infection, the transmitting virus is almost invariably an RS virus which is predominant during early stage of infection. Under T-cell control, the B-cells produce tons of plasma cells which produce and release antibodies against HIV antigens in the blood. This process is called seroconversion. During early infection, HIV remains concentrated in the lymph node where it replicates in huge number and infects more CD4 T-cells. Swollen lymph nodes (generalized peripheral lymphadenopathy) are often the clinical feature seen in persons with HIV infection for the first few months and years of infection (Ellaurie *et al,* 1988, Ezeonu *et al,* 2014).

The cells that constitute the haemopoietic system are the red and white blood cells, the red blood cells (RBC) have haemoglobin that transports oxygen to the tissues and organs of the blood. Different types of white blood cells make up the immune system. Primarily, these include neutrophil, eosinophils, basophils, lymphocytes and monocytes. Among the T-lymphocytes, approximately one-third has CD4 receptors and two third have CD8 receptors. CD4+ T-lymphocytes (T-helper

cells) coordinate the functions of the adaptive immune systems and are often one of the first to respond to HIV infection (Adetifa *et al,* 2006, Ruhinda *et al,* 2012).

The macrophages engulf the HIV particles and present it to the CD4 receptors and stimulates the CD4 receptors to respond to HIV infection in two ways sending signal to β - lymphocytes and cytotoxic killer cells. The antibodies produced by the β-lymphocytes are used by clinicians to detect HIV infection. Thus CD4+ T-lymphocytes is a major marker (Mellor *et al,* 1997, Parinitha and Kukarni 2012).

Sub-Saharan Africa has continued to bear the greatest burden of HIV and AIDS epidemic with approximately 67.6% of the 2.6 million of total new infection and 72.2% of the 1.8 million deaths in 2009 (FMOH 2010). Over the decade the epidemic, once dominated by males has become progressively feminized and in sub-Sahara Africa approximately 57% of adults living with HIV are women. Over 90% of infection in children is acquired through mother to child transmission and as more women contact the virus, the number of children infected has been growing (FMO 2001). Since the first case of AIDS was reported in a 13 year old girl in Nigeria, in 1986, the epidemic has persisted with national HIV sero prevalence rate of 1.8% in 1991, 5.8% in 2001, 4% in 2005 and 4.6% in 2008. It is currently at 4.1% in 2010 antenatal survey. The prevalence rate in the states of Nigeria ranges from1.0% to 12.7%. Abia State has prevalence rate of 7.3% (IMPACT 2010, Okchukwu *et al*, 2010).

It is therefore on the basis of the above findings that this study deemed it necessary to investigate the leucocytes counts of the children infected with HIV in Aba Metropolis.

MATERIALS AND METHODS

The total number of children recruited into the study were 242 including 121 children infected with HIV and 121 not infected with the virus. They were all within the age range of 1 to 14 years

All the children were recruited from Abia State University Teaching Hospital Aba, Abia State where those infected with the virus were attending Antiretroviral therapy clinic while the non infected children were those that went for screening in the above hospital but tested negative. The HIV non infected group was used as control while the infected children served as the study group.

The subjects were categorized into 3 subgroups based on age ranges which include 1-4 years, 5-9 years and 10-14 years. This was necessary to statistically assess and observe the effect of HIV infection on the haematological variations in each group. The retrospective study spanned from January 2009 to December 2013.

DATA COLLECTION

Case folders of subjects included in the study population were retrieved from the record section of their respective clinics and data required for this study were obtained. Results of laboratory investigations and their S.1 units retrieved were White blood cell count, differential counts,

and CD4+ Cell count. Routine laboratory methods for the analysis of these parameters were used.

DATA ANALYSIS

The data obtained from the study were analyzed with descriptive statistics:- mean, standard deviation and standard error of the mean and analysis of variance (ANOVA) using IBM statistical package for social science version 26.

ETHICAL APPROVAL

Ethical approval for the study was obtained from the ethical committee of Abia State University Uturu, Abia State Nigeria.

RESULTS

This study has investigated the leucocyte counts in HIV infected and HIV not infected children in Aba metropolis and the finding were as stated below.

In all the parameters studied which include lymphocyte count, CD4+ count, Monocyte count, polymorphonuclear leucocyte count and WBC count and in both males and females in all the age groups the frequency and percentage frequency of the HIV infected children were found to be the same with that of the children without HIV infection when compared. Figures 1- 10.

Monocyte count $x10^3/\mu l$

The mean values for the age range 1-4, 5-9 and 10-14 years of the HIV infected male children were 83.0, 71.0, and 73.0 respectively while that of the HIV not infected male children were 9.33, 8.84 and 8.25 figure 1.

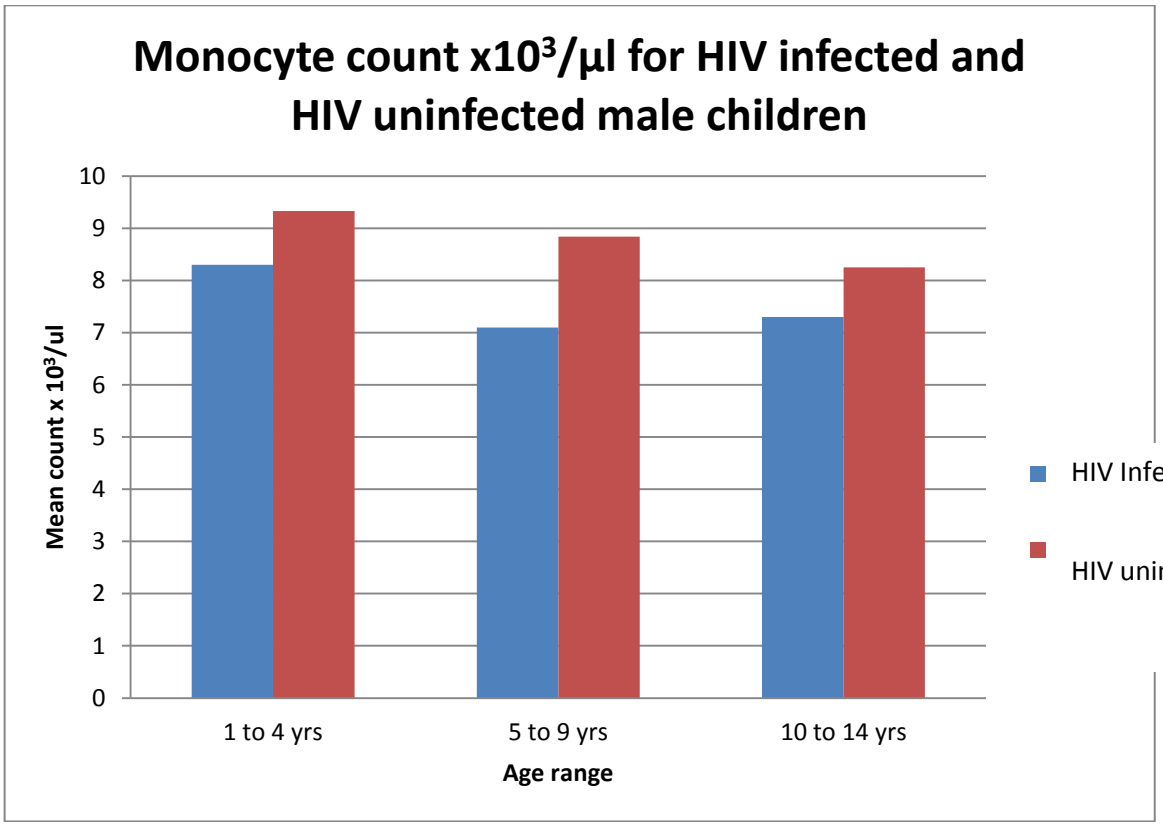
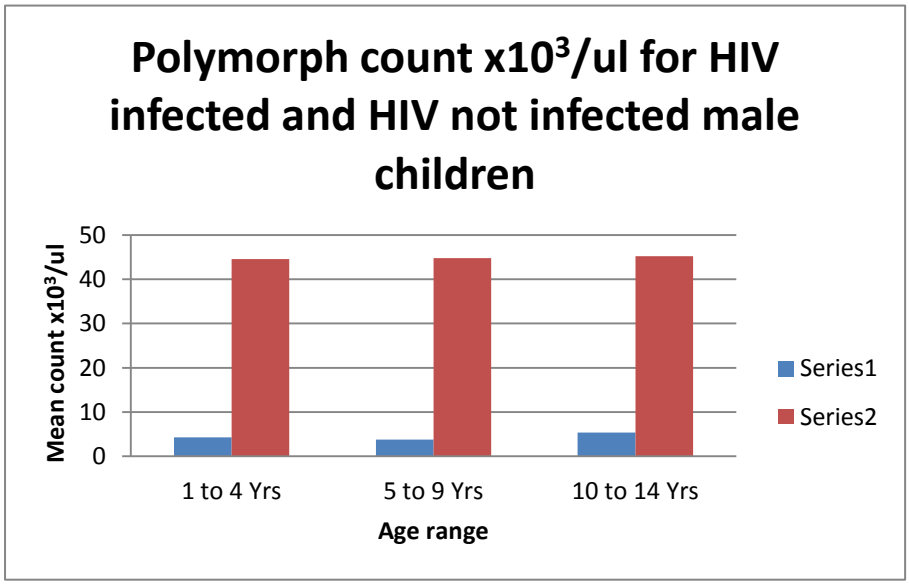


Figure 1: Histogram showing the monocyte count x10^3/µl for HIV infected and HIV not infected male children.

For the female children infected with HIV, the mean values for the age range 1-4, 5-9, and 10-14 years were 1.37, 65.0, 66.0 respectively while that of the female children without HIV infection were 8.99, 7.46 and 8.65 figure 2.



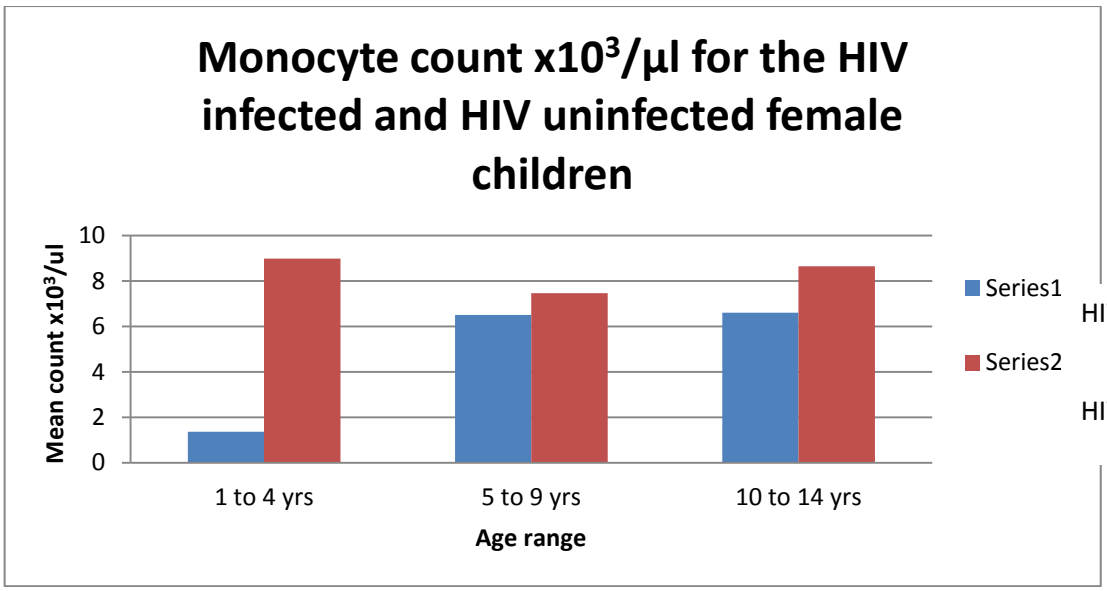


Figure 2: Histogram showing the monocyte count x10³/µl for the HIV infected and HIV nuinfected female children

Polymorphonuclear leucocyte count x10³/µl

For the male children infected with HIV, the mean values for the age range 1-4, 5-9, and 10-14 years were 43.0, 3.8, and 5.4 respectively while that of the male children without the infection were 44.54, 44.82, and 45.22 figure 3.

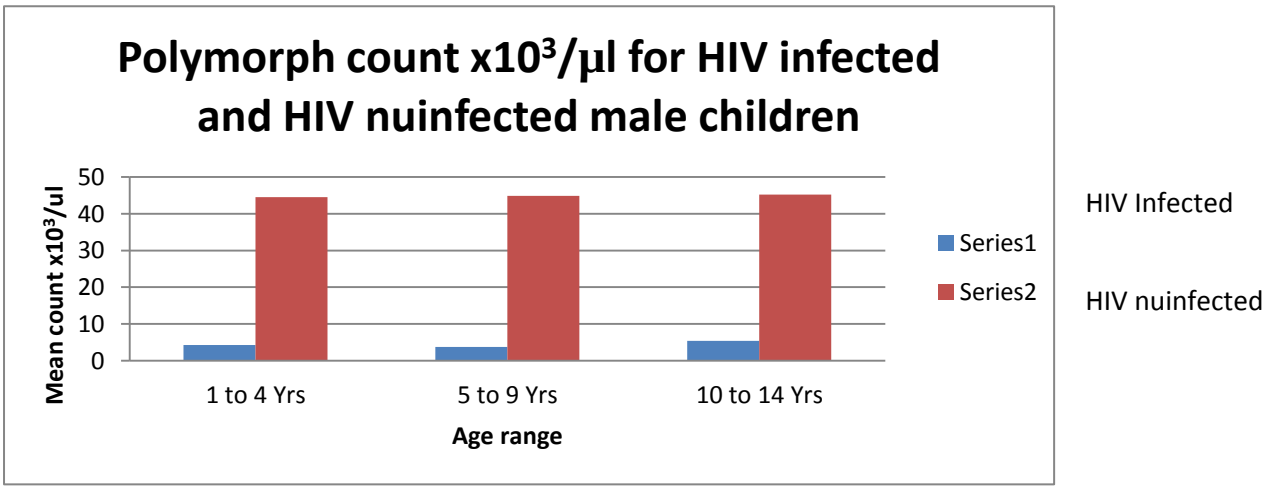


Figure 3: Histogram showing the polymorph count x10³/µl for the HIV infected and HIV uninfected male children

For the female children with the infection the mean values for the age range 1-4 years, 5-9 years and 10-14 years were 4.2, 3.4 and 2.6 respectively while that of the female children without the infection were 47.62, 43.62 and 48.07 figure 4.

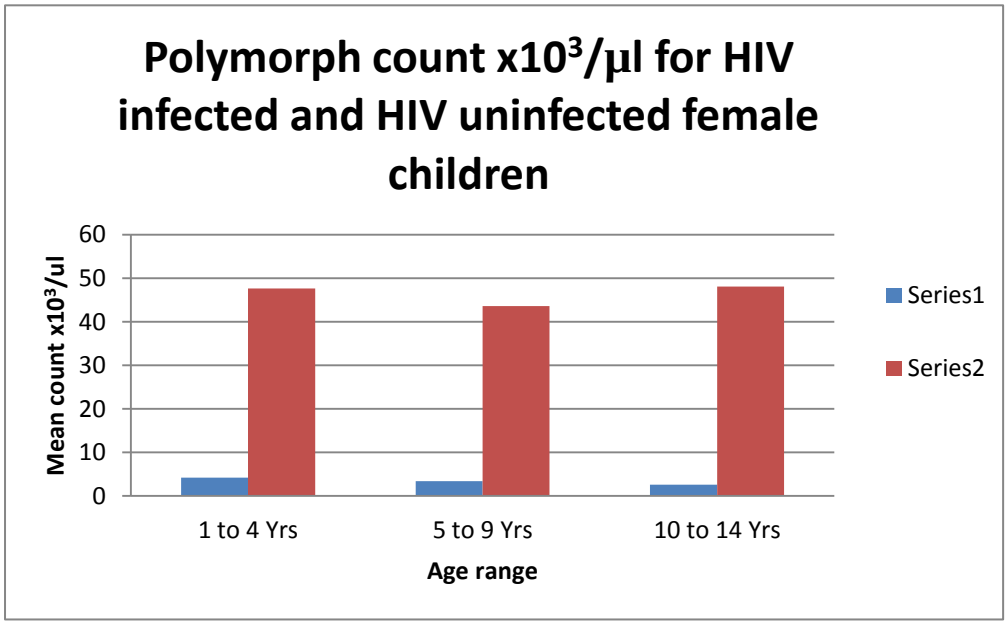


Figure 4: Histogram showing the polymorph count x10³/µl for the HIV infected and HIV uninfected female children

Lymphocyte count X10³/µl

For the male children infected with HIV, the mean values for the age range 1-4 years, 5-9 years, and 10-14 years were 3.79, 5.04 and 5.14 respectively while that of the male children without the infection were 34.74, 38.66 and 35.02 figure 5.

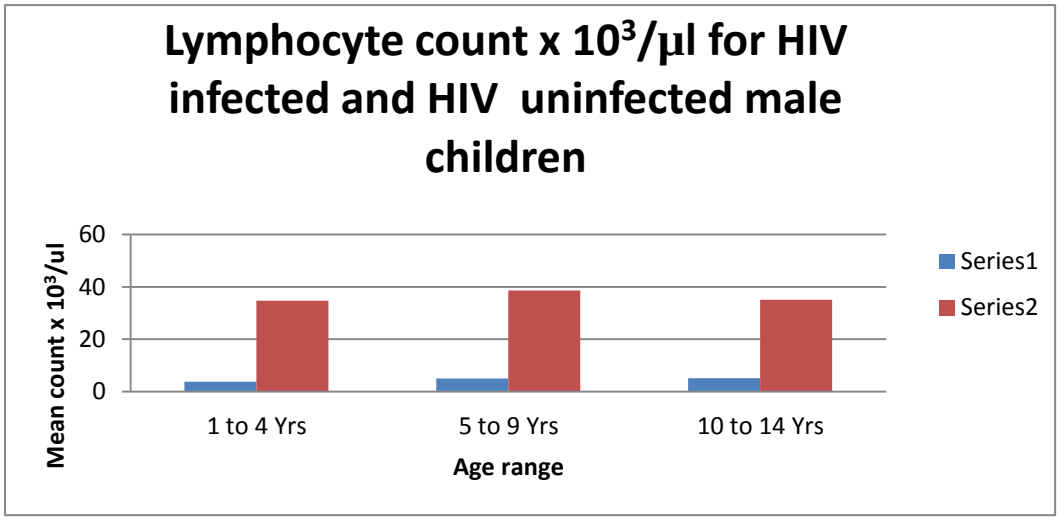


Figure 5: Histogram showing Lymphocyte count x 10^3/µl for HIV infected and HIV not infected male children

For the female children with the infection, the mean values for the age ranges 1-4 years, 5-9 years and 10-14 years were 4.32, 4.36 and 3.65 respectively while that of the female children without HIV infection were 41.46, 42.73 and 41.67 figure 6.

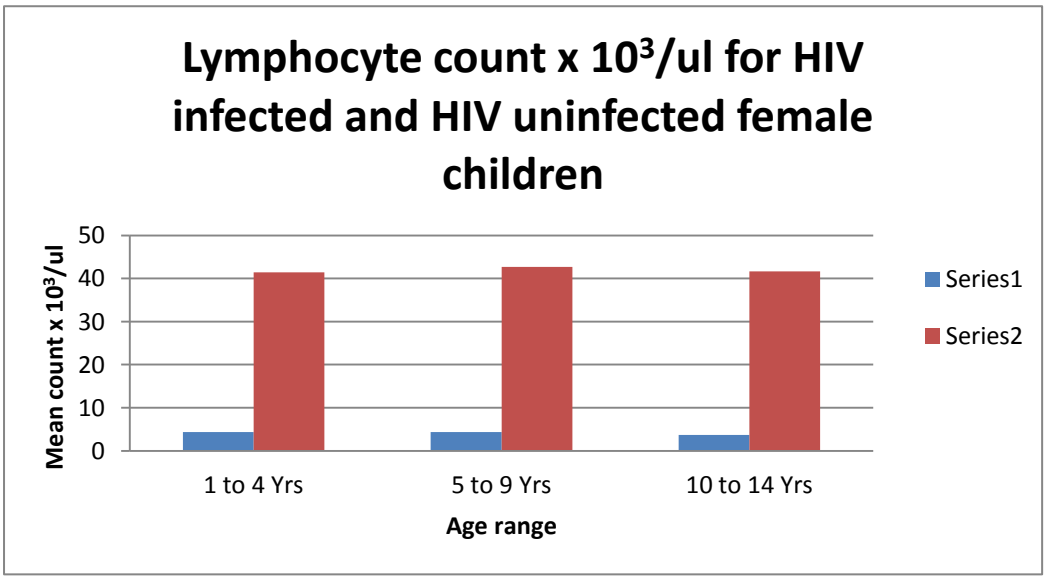
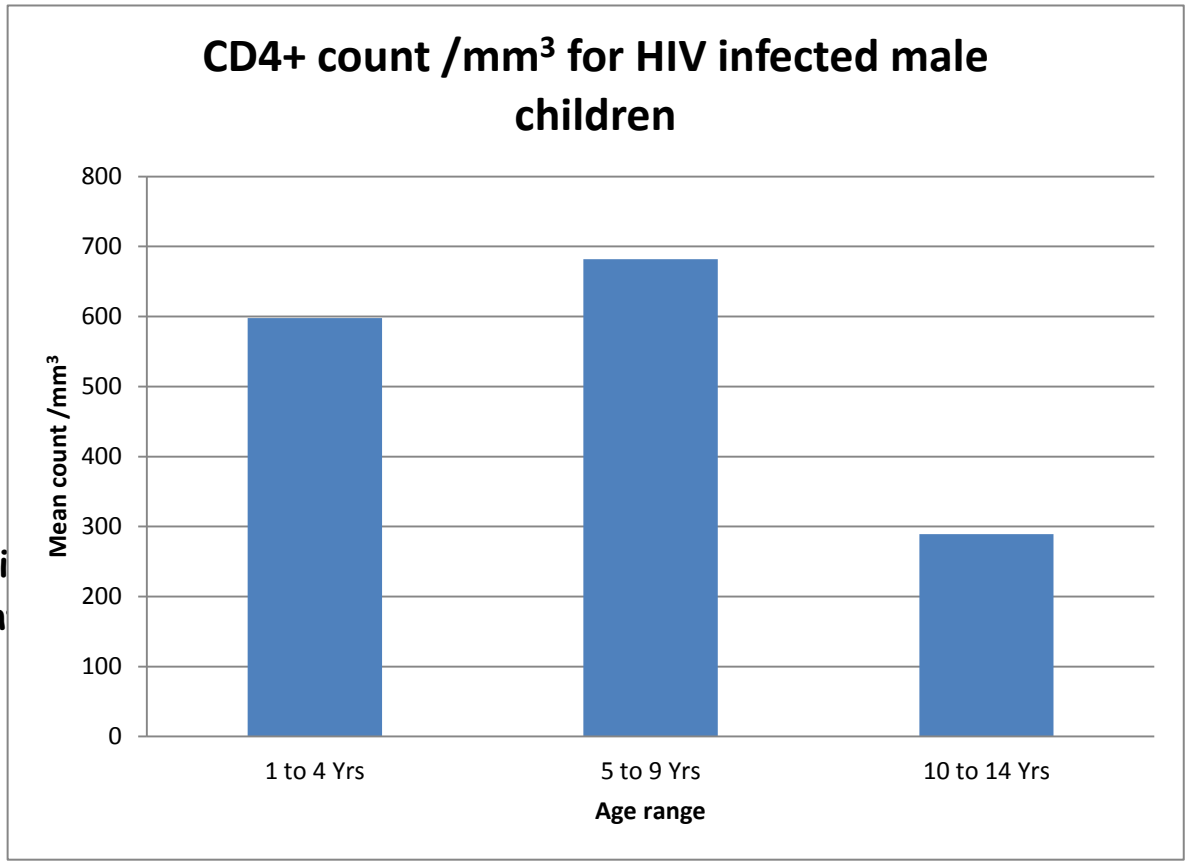


Figure 6: Histogram showing Lymphocyte count x 10^3/ul for HIV infected and HIV uninfected female children

CD4+ Cell Count/mm^3

For the male children infected with HIV, the mean values for the age range 1-4 years, 5-9 years, and 10-14 years, were 598.0, 682.0, and 289.0 respectively figure 7.



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For the female children infected with HIV, the mean values for the age ranges 1-4 years, 5-9years and 10-14 years were 620.0, 911.0, and 585.0 respectively.

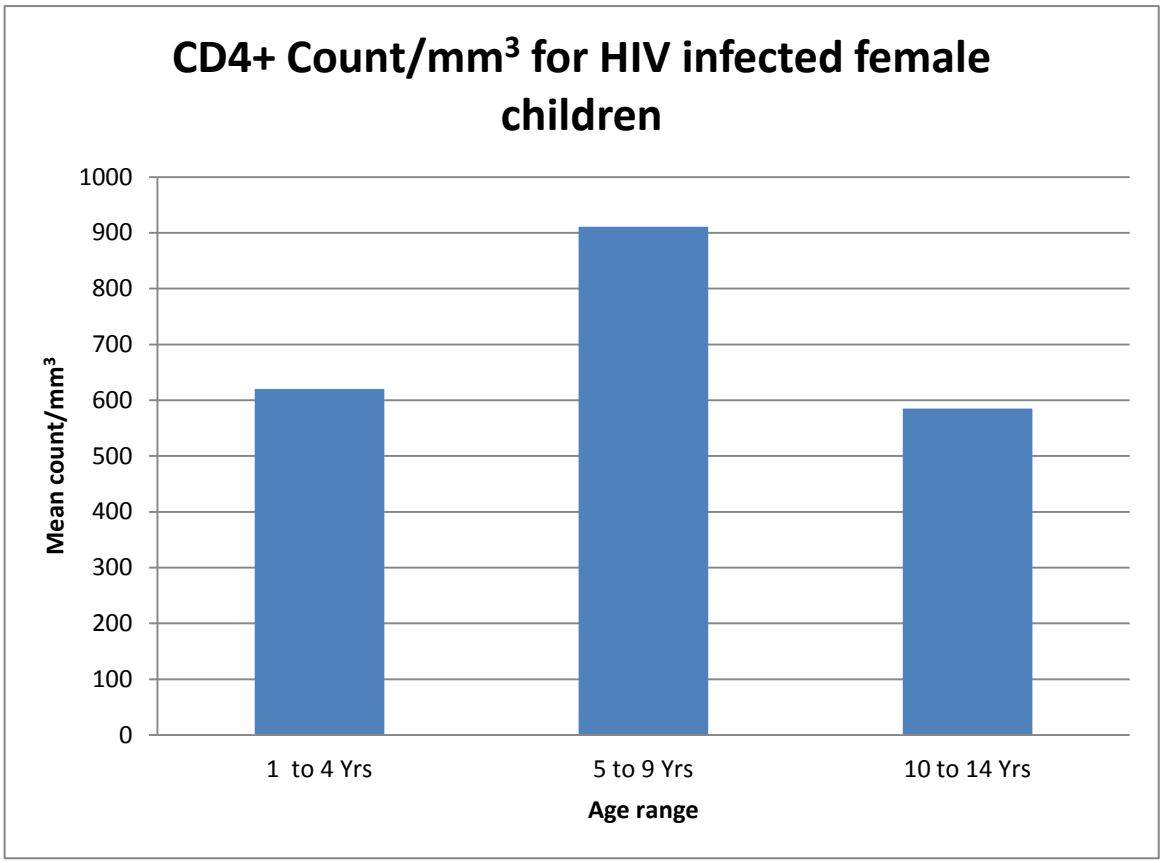

Figure 8: Bar chart showing CD4+ Count/mm^3 for HIV infected female children

WBC COUNT X10^3/µl

For the male children with HIV infection, the mean values for the age ranges 1-4 years, 5-9 years and 10-14 years were 7.66, 8.32 and 8.33 respectively while that of the male children without the infection were 6.54, 6.99 and 6.70 figure 9.

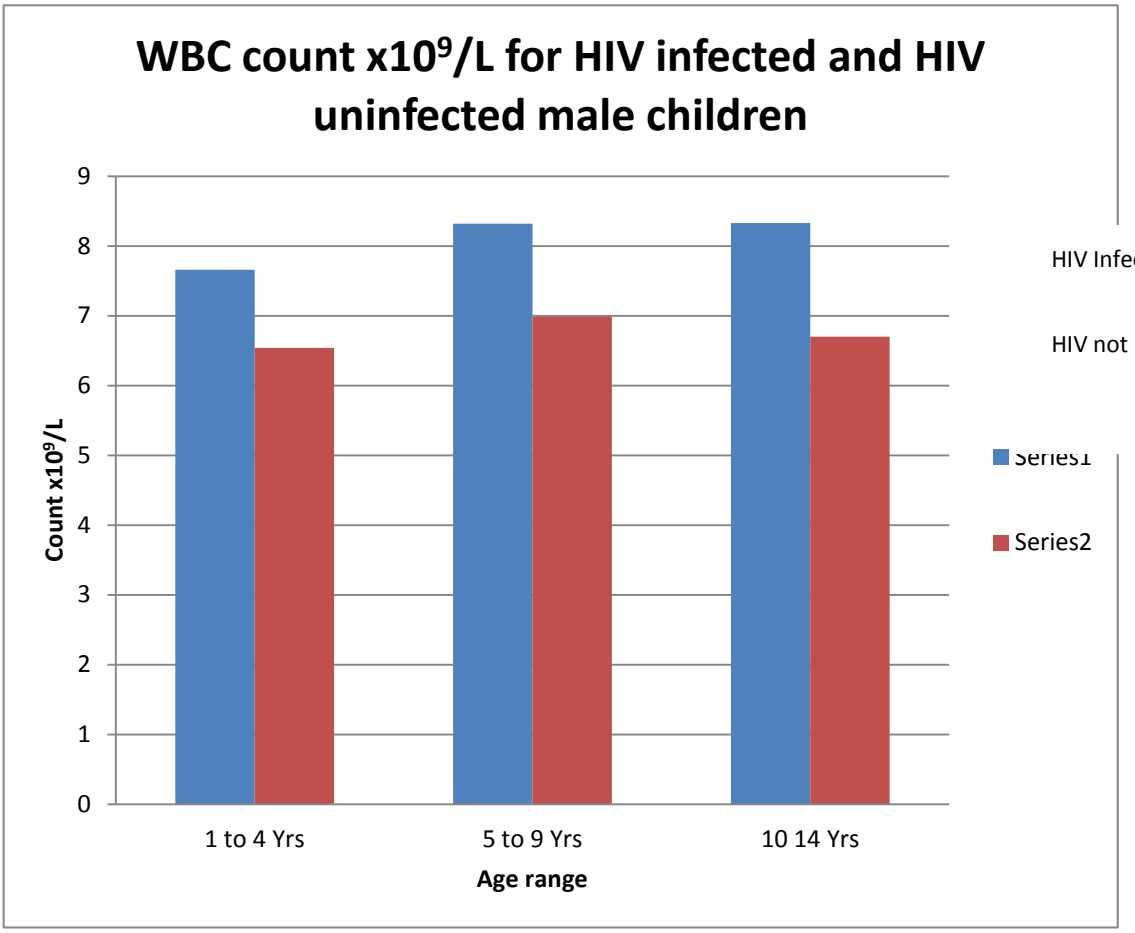

Figure 9: Histogram showing WBC count x10^9/L for HIV infected and HIV uninfected male children

For the female children with HIV infection, the mean value for the age ranges 1-4 years, 5-9 years and 10-14 years were 9.08, 8,98, and 7.33 respectively while that of the children without HIV were 6.94, 6.75 and 6.77 figure 10.

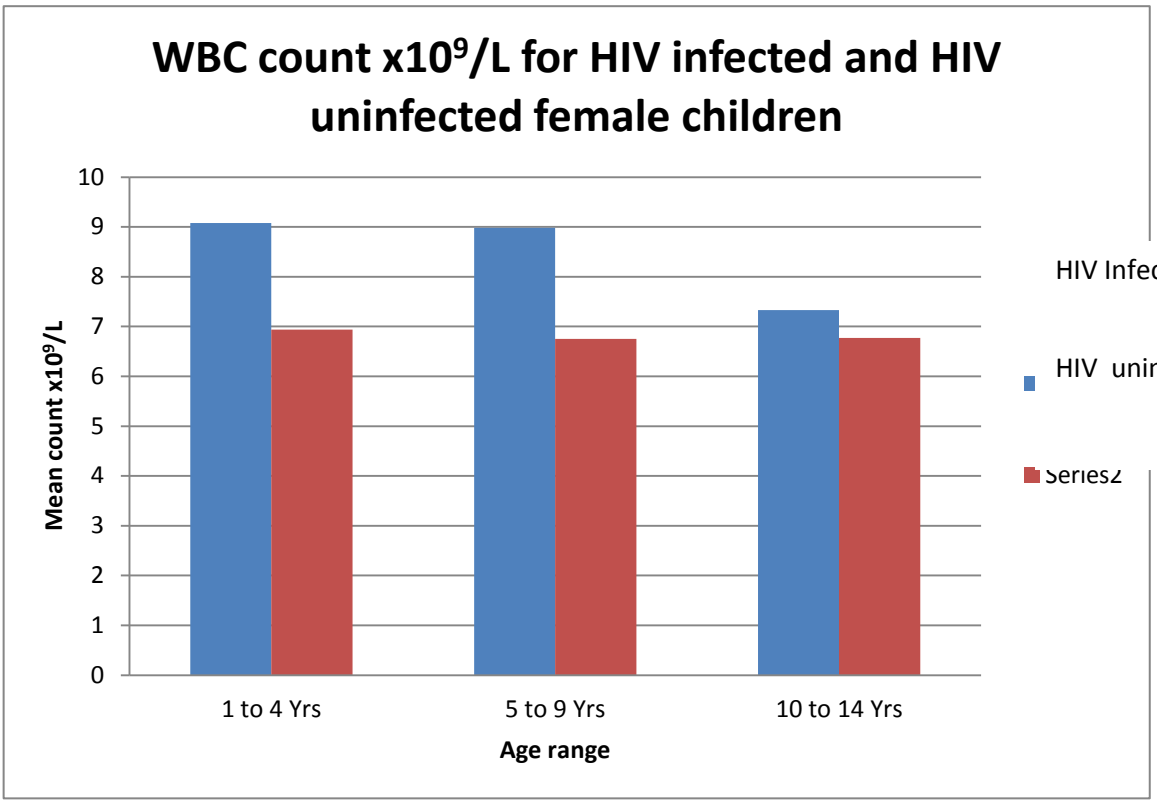

Figure 10: Histogram showing WBC count x10⁹/L for HIV infected and HIV uninfected female children

DISCUSSION

This study evaluated the leucocyte counts of the children infected with HIV in Aba Metropolis.

The parameters investigated were Monocyte count, polymorphonuclear leucocyte count, lymphocyte count, CD4+ count and WBC count. In all the above parameters studied, the frequency and percentage frequency of both male and female children with HIV in all the age ranges were the same when compared statistically with those of the children without HIV infection (figures 1-10).

This was the finding due to the fact that the number of HIV infected children in the study population was the same as that of the children without the infection.

For the monocyte count, the mean values in both the male and female children without HIV, in all the age ranges were higher than that of the children with the infection (figures 1 and 2).
The findings were the same in the Polymorphonuclear Leucocyte count and lymphocyte count, (figures 3 – 6). For the CD4+ count, the mean values for the age range 5-9 years was the highest followed by age range 1-4 years and lastly age range 10-14 years figures 7 and 8.

For the WBC count, the mean values in both the male and female children with HIV infection in all the age ranges were higher than those of the children without the infection, (Figures 9 and 10).

As stated above, the HIV infected children have higher counts of the leucocytes than the children not infected with HIV in all the age ranges except in the Total White Blood cell count where reverse was the case. This could be as a result of the fact that the virus attacks different series of the leucocytes thereby decreasing their population. This eventually leads to the manifestation of the symptoms of HIV in the infected children (Munyazesa *et al*, 2012, Mathews *et al,* 2013).

Depending on the time of HIV transmission in utero, majority of blood cell lines have haematological failure. At birth to 4 or 5 months of age, there is blood line failure also. At the initial

period of HIV infection, the initial response of blood cells, are virtually normal. (Bhomik *et al,* 2015, De Santus *et al,* 2011).

In acute to latent HIV infection the granulocytes increase with lymphocytes being normal. As HIV attacks the lymphocyte and CD4+ - T lymphocytes, the CD4+ T lymphocyte dies off thereby reducing the immunity in advanced and chronic stage of HIV infection. There were increase in white blood cell count, erythropoiesis, granulocytopoiesis and lymphocytopoiesis as well as megakaryopoiesis (Perinita and Kulkarni 2012, Dikkshite *et al*, 2001).

This study therefore concludes that the leucocyte counts of the children infected, with HIV is lower than that of the children not infected with the virus.

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