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Prevalence of Patients Living with HIV/AIDS with Their CD4$^+$ Counts in Some Hospitals in Minna, Niger State, Nigeria

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Abstract

This study was conducted over a period of nine months on the prevalence of HIV and the CD4$^+$ counts among women attending selected Hospitals (Dr Musa Inuwa, General, Clinic A, IBB, and Clinic B hospitals) in Minna. A total of 500 patients were screened. Questionnaires were used to gather relevant data on sampled patients. Cyflow counter and Hematology analyzer were used to determine CD4$^+$ and hematological parameters (Hb and WBC). Of the 500 samples, 408 tested negative while 92 tested positive, translating to a prevalence rate of 18.4%. The age group 25 – 34 years had the highest number of cases under HIV positive pregnant women (67.7%). The CD4$^+$ count was shown to be significantly ($p < 0.05$) lower in HIV positive pregnant women not on ART (146.17 ± 29.52 cell/µL), while HIV negative non-pregnant women had the highest count of 978.26 ± 13.00 cell/µL. The mean Hemoglobin concentration was similarly significantly lower in women that are HIV positive, pregnant but not on ART (7.95 ± 0.61 g/dL) while those not pregnant and HIV negative (11.90 ± 0.12 g/dL). However, the WBC count was significantly higher in HIV positive non-pregnant women on ART (22.21±2.74 $\times 10^9$/L). The prevalence of HIV within the sampled hospitals is very high with the various factors showing close associations. It is then recommended that government and non-government organizations should intensify efforts to enlighten the populace on the need for HIV screening.

Keywords: HIV (Human Immunodeficiency Virus); AIDS (Acquired immunodeficiency syndrome); Prevalence; Pregnancy, patients

1. Introduction

Over the last thirty years, more than 25 million people have lost their lives to HIV [1]; presently, over 36 million others, about half being women of reproductive age, are living with the deadly virus [2]. Also, mother-to-child infection puts some one million children in the list of the infected. Overall, the data sits largely in the developing countries: over 90% of infected children and two-thirds of adults are in Africa (Centre for Disease Control and Prevention [3]. The Human Immunodeficiency Virus (HIV), a retrovirus of the Lentivirus subgroup, which is responsible for HIV infection and the subsequent Acquired Immunodeficiency Syndrome (AIDS) [4] remains - as the data above suggest - a serious threat to public health and the economy.

The design of any serious combative measure against HIV necessarily requires reliable knowledge of the factors favoring its continued spread. Mother-to-child transmission prevention programs have been a major source of data used to infer the risk factors and prevalence of the infection in majority of the African countries, the data being from the women participating in such programs. Results gotten from such studies may be generalized on the rest of the women in the populace which are in the reproductive-age bracket, given the far reach of antenatal services and the comparatively high background fertility.

Minkoff *et al*. [5] pointed out ways of reducing the transmission of the virus, including enabling of women to optimally maintain their health using their test results, and the training of staff, alongside provision of equipment, to disallow nosocomial transmission of the virus and other deadly pathogens. Mother-to-child transmission can be combated by HIV counseling, conducting tests, anti-retroviral (ARV) prophylaxis, safer delivery and safer infant feeding practices. It is very important that people, including pregnant women, make themselves available for counseling and tests, if HIV/AIDS is to be effectively managed in the general population. The survival and health of both mothers and children could be ensured by screening expecting women to access ARV drugs; this cuts chance of infecting new-born with the virus slim and improves the mothers' quality of life [3]. Documented data on the prevalence of human immunodeficiency virus (HIV) infection among women, whether pregnant or not, in Minna, Niger State Nigeria are lacking, thereby necessitating this study.

2. Material and methods

2.1 Study Area

This research was conducted in the following hospitals, all of which are in Minna: Clinic A, Dr Musa Inuwa Hospital, General Hospital, Clinic B, IBB Specialist Hospital. Minna, the capital city of Niger State Nigeria has a population of 3,950,249 and land mass of 29.484 sqm. It lies on latitude of 9.35' N and longitude of 6.32'E. It is roughly 150 km away from Abuja. It is occupied mainly by the Nupes, Hausas and Gbagy [6].

2.2 Study Population

Five hundred (500) volunteers, all women, were the subjects of the study. They were all attendees of General Out Patient Department (GOPD) and Obstetrical and Gynecology (O & G) departments of the five hospitals used for the study (Clinic A, Dr Musa Inuwa Hospital, General Hospital, Clinic B, IBB Specialist Hospital Minna). The participants were engaged for this study from January to September, 2016. Eligible patients were administered questionnaires to collect data on their HIV and socio-demographic status. Blood samples were collected from the hospitals in the following distribution: 50 from Clinic A, 100 from Dr Musa Inuwa Hospital, 200 from General Hospital, 50 from Clinic B and 100 from IBB Specialist Hospital.

2.3 Sample Size Formula

Sample size was estimated using Krejcie Morgan method [7]:

$$N = \frac{T^2 P(1-P)^2}{M^2}$$

Where, N is the sample size, T is the standard normal deviation at 1.96, P is the prevalence of disease, 0.24 (NGSACA) and M is the marginal tolerable error at 0.05.

$$N = \frac{1.96^2 \times 0.24(1-0.24)^2}{0.05^2}$$

N = 280.28

Thus, the sample size was computed to be 280. However, a total of 500 subjects were used in this study.

2.4 Blood Sample Collection

Vein puncture technique [8] was employed for blood sample collection. The upper arm of the subject was tied with soft tubing tourniquet; methylated spirit was used to sterilize the puncture site; vein puncture was made with needle attached to a 5 ml syringe and syringe full of blood was collected. The 5 mL blood was transferred into a labeled ethylene-diamine - tetra-acetic acid (EDTA) container to prevent clothing.

2.5 Screening for HIV

This was done using Determine HIV1/2 kit (Abbot Laboratories II, USA). Sterile micropipettes were used to transfer 2 drops of plasma to the test pad. The test was given fifteen minutes to develop after the plasma migrated to the patient and control lines. It was read at the end of that time. All samples that came out positive were subjected to further screening using Unigold and statpak HIV1 / 2. A third assay (Statpak HIV1/2) was used to confirm results discordant between Determine HIV 1/2 and Unigold HIV 1/2. This was in accordance with the National algorithm for HIV screening.

2.6 Result Interpretation

Positive results were inferred from presence of red lines in both patient window and control window; negative was inferred from just one red line being in the control window only. A test result is invalid if no red line appeared on the control window and patient window.

2.7 Statistical Analysis

Statistical Package for the Social Science (SPSS) was used for the analysis. Data obtained from the study were subjected to Chi square test to compare and test for relationship between the means at $p < 0.05$.

3. Results and Discussion

3.1 Results

3.1.1 Seroprevalence of HIV

The seroprevalence of HIV among women from the five hospitals in Minna is shown in Table 3.1. Of the samples tested, 81.6% (408 out of 500) came negative while the rest- 18.4% (92 out of 500) were positive. The highest occurrence of positive tests was from General Hospital samples (57), while the lowest was from Clinic B, Minna.

Table 3.1: The Prevalence of HIV in the Study Area

Study Area	Total No. Screened	Total No. Positive	Total No. Negative
G. H. M	200	57	143
IBB	100	23	77
M.I.W.	100	9	91
Clinic A	50	2	48
Clinic B	50	1	49
Total	500	92	408
Percentage (%)		18.4%	81.6%

G.H.M – General Hospital Minna; IBB – Ibrahim Badamasi Babangida Hospital Minna; M.I.W– Dr. Musa Inuwa Hospital Wushishi Estate Minna.

3.1.2 Antiretroviral therapy

Table 3.2 presents the statistics of infected pregnant and non-pregnant women that undergo ART (Antiretroviral Therapy) management.

Table 3.2: Statistics of HIV Positive Cases

	ART Management		
	On ART (%)	Not on ART (%)	Total
Pregnant Women	25(80.6)	6(19.4)	31
Non-Pregnant Women	42(68.9)	19(31.1)	61
Total	67(72.8)	25(27.2)	92

$\chi^2 = 1.444$, $p = 0.322$

On ART – On Antiretroviral Therapy, Not on ART – Not on Antiretroviral Therapy

Eighty one percent (80.6 %) of pregnant women (25 out of 31) were undergoing ART, while 19.4 % (6 out of 31) were not. Of the non-pregnant women, 68.9 % (42 out of 61) were on ART while 31.1 % (19 out of 61) were not. From the chi square analysis, it can be concluded that there was no significant ($\chi^2 = 1.444$, $p = 0.322$) association between pregnancy status and ART management.

3.1.3 Cluster of Different (CD4$^+$) Counts

The cluster of different (CD4$^+$) counts of different HIV status among pregnant and non-pregnant women placed on therapy (ART) and not on Antiretroviral (ART) is shown in Figure 3.1. The results showed that the (CD4$^+$) count of women void of HIV and pregnancy was significantly ($p < 0.05$) higher (978.26) than the count obtained in the other groups. However, the CD4$^+$ count of subjects who were HIV positive and pregnant but not on ART (146.17), those positive of HIV, pregnant but on ART (491.84), those who were HIV positive non-pregnant not on ART (346.37), those HIV positive non-pregnant on ART (523.85) and that who were HIV negative but pregnant (809.32). HIV positive pregnant women on ART (491.84) and HIV positive non-pregnant women on ART (523.85) had CD4$^+$ counts not significantly ($p > 0.05$) different from one another, i.e., the counts were similar to each other.

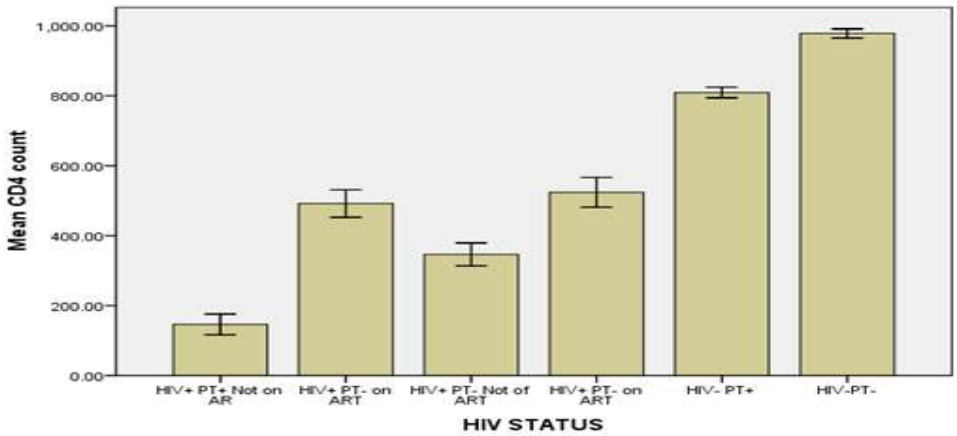

Figure 3.1: HIV/pregnancy and CD4$^+$ count

HIV+ PT+ Not on ART – HIV positive pregnant women not on Antiretroviral Therapy; HIV+ PT+ on ART – HIV positive pregnant women on Antiretroviral Therapy; HIV+ PT- Not on ART – HIV positive non-pregnant women not on Antiretroviral Therapy; HIV+ PT- on ART – HIV positive non-pregnant women on Antiretroviral Therapy; HIV- PT+ - HIV negative pregnant women; HIV- PT- - HIV negative non-pregnant women

3.1.4 HIV/pregnancy and Hemoglobin Count (g/dL)

The hemoglobin counts of different HIV status among pregnant and non- pregnant women placed on ART and not on ART are shown in Figure 3.2. The result showed that the hemoglobin count of women void of HIV and pregnancy was significantly ($p < 0.05$) higher (11.90) than the count of subjects who were HIV positive and pregnant but not on ART (7.95), those positive of HIV, pregnant but on ART (9.08) and those not pregnant but HIV positive but not on ART (8.07). However, the hemoglobin counts among the HIV positive subjects were not significantly ($p > 0.05$) different from one another, i.e., the counts were similar to each other.

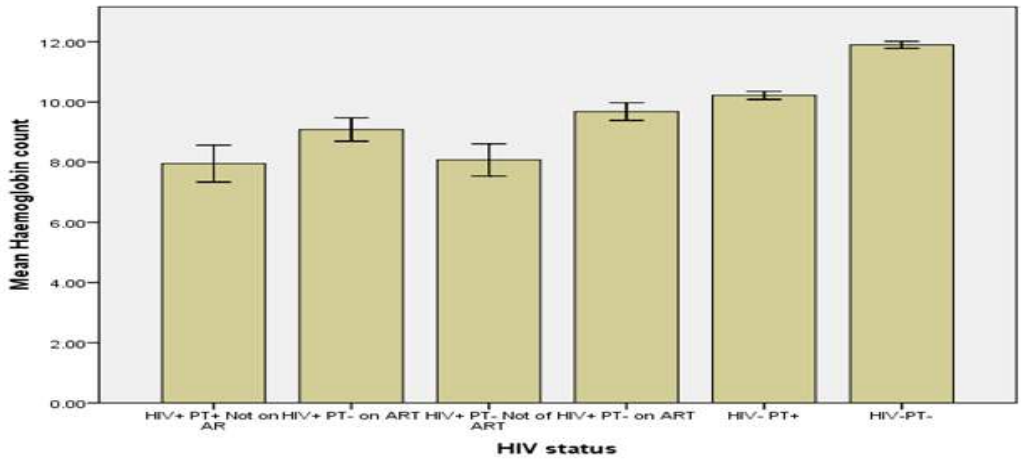

Figure 3.2: HIV/pregnancy and Hemoglobin count (g/dL)

HIV+ PT+ Not on ART – HIV positive pregnant women not on Antiretroviral Therapy; HIV+ PT+ on ART – HIV positive pregnant women on Antiretroviral Therapy; HIV+ PT- Not on ART – HIV positive non-pregnant women not on Antiretroviral Therapy; HIV+ PT- on ART – HIV positive non-pregnant women on Antiretroviral Therapy; HIV- PT+ - HIV negative pregnant women; HIV- PT- - HIV negative non-pregnant women.

3.1.5 HIV/pregnancy and White Blood Cells (WBC) (×10^9/L)

The WBC of different HIV status among pregnant and non-pregnant women placed on ART and not on ART are shown in Figure 3.3. The results showed that the WBC count of women who were HIV positive, not pregnant and on ART was significantly ($p < 0.05$) higher (22.21) than the count obtained in all other groups. However, the WBC count of subjects who were HIV positive and pregnant but not on ART (3.67), those who were HIV positive, non-pregnant and not on ART (7.70) and those who were HIV positive and pregnant but on ART (10.32) was not significantly ($p > 0.05$) different from one another, i.e., the counts were similar to each other.

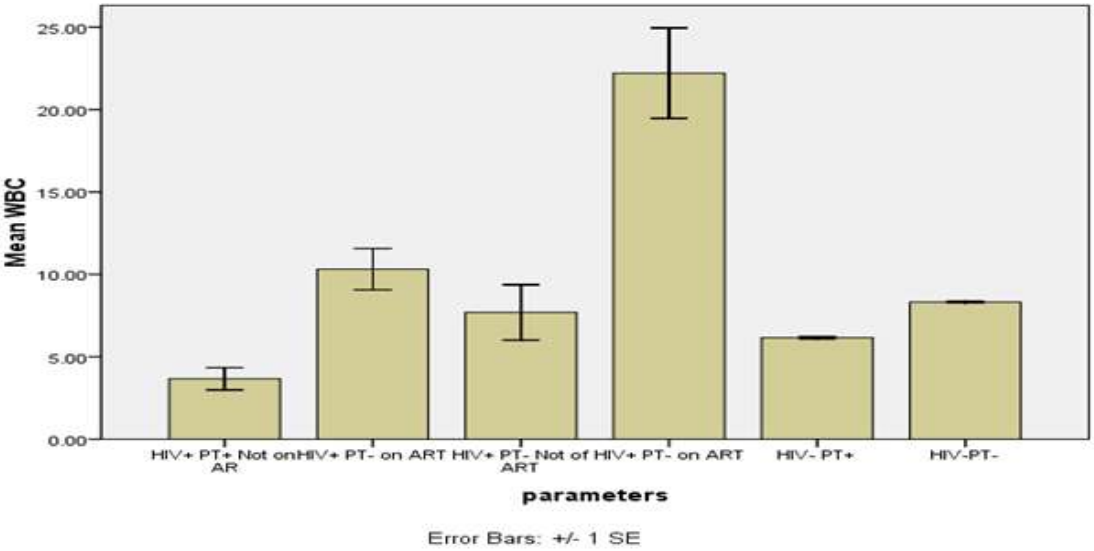

Figure 3.3: HIV/pregnancy status and WBC (x10^9/L)

HIV+ PT+ Not on ART – HIV positive pregnant women not on Antiretroviral Therapy; HIV+ PT- Not on ART – HIV positive non-pregnant women not on Antiretroviral Therapy; HIV+ PT+ on ART – HIV positive pregnant women on Antiretroviral Therapy; HIV+ PT- on ART – HIV positive non-pregnant women on Antiretroviral Therapy; HIV- PT+ - HIV negative pregnant women; HIV- PT- - HIV negative non-pregnant women.

3.2 Discussion

The 18.4% prevalence observed in this study (Table 3.1) is higher than the 12.1% reported for similar studies for Uyo, Akwa Ibom Nigeria, by Etok *et al.* [9]. The authors sampled women registered for antenatal clinic at St. Luke's Hospital, Aura – Uyo. An even lower prevalence, 5.93 %, was reported by Obi *et al.* [10] who carried out similar study on pregnant women participating in antenatal clinics in Port Harcourt, Nigeria. These (other) states are places where non-governmental organizations and the state government have invested time, energy and resources heavily in HIV counseling and testing, therefore the lower prevalence. United State Agency for International Development (USAID), Friends in Global Health (FGH), and Management Scientist for Health (MSH) have all exerted eradicative pressures on the virus between 1999 and 2015, explaining the reduced prevalence of the disease. Results higher than those of the present study have however been reported in other parts of the country; for example, Edet *et al.* [11] reported a 55.33 % prevalence among women resident in Kaduna South, North Western Nigeria.

The study showed significant increase ($p < 0.05$) in the mean CD4$^+$ count of ART HIV patients compared to the mean values of CD4$^+$ count of non-ART HIV patients. The study showed significant improvement in the immune system of the HIV patient placed on ART. Furthermore, the study showed that antiretroviral therapy plays a significant role in the general well-being of those infected with HIV, which is the same with Obeagu *et al.* [13].

The study showed that the hemoglobin count of women void of HIV and pregnancy was significantly ($p < 0.05$) higher (11.90) than the count of subjects who were HIV positive and pregnant but not on ART (7.95). Those positive of HIV, pregnant but on ART (9.08) and those not pregnant but HIV positive but not on ART (8.07) had hemoglobin counts not significantly ($p > 0.05$) different from one another, i.e., the counts were similar to each other. Based on WHO classification, ($Hb \leq 11$ g/dl), the hemoglobin levels were significantly different among the HIV infected and non-infected women with the infected women recording lower levels. This result agrees with a previous report [16].

However, the number of white blood cell count (leukocyte) in the blood is usually measured as part of the Complete Blood Count (CBC). White blood cells are the infection - fighting cells in the blood and are different from the red blood cells (oxygen-carrying) known as erythrocytes. The normal range for the white blood cell count varies from one laboratory to the other

although is usually between 4,300 - 10,800 cells per cubic milliliter of blood and can be expressed in international units as 4.3 - 10.8 × 10^9 cells per liter. The result obtained from the present study for HIV positive women (3.67±0.68) was slightly lower than that reported by Victor et al. [17] (4.85±0.11), while it was higher for HIV negative women (8.3±0.05) when compared to the previously reported value (5.707±0.10) [17].

4. Conclusion

This study has established that the prevalence of HIV among women in Minna was 18.4%. HIV negative, non-pregnant women had highest $CD4^+$ count (cell/µL). The same applied to hemoglobin. While positive non-pregnant women on ART have highest WBC. The relatively high prevalence makes it pertinent that government and non-governmental organizations step into the scene to curb the trend by increasing their effort in public education and legislature.

Compliance with ethical standards

Acknowledgments

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Disclosure of Conflict of Interest

There was no conflict of interest among the authors.

Statement of Ethical Approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the Federal University of Technology, Minna Committee on Ethics for Medical and Scientific Research and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study.

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