

EVALUATION OF HUMAN IMMUNODEFICIENCY VIRUS AND MALARIA PARASITAEMIA AMONG PREGNANT WOMEN IN ABEOKUTA, OGUN STATE, SOUTH WESTERN NIGERIA

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ABSTRACT

Investigations were conducted on aspects of Human Immunodeficiency virus (HIV) and malaria parasitaemia among the pregnant women attending antenatal clinic in Abeokuta, the capital city of Ogun State, southwestern Nigeria. Of 201 blood samples examined, the overall prevalence of HIV infection and malaria parasitaemia was 10.9% and 48.8% respectively and there was significant difference between the age group and HIV infection ($P = 0.011$). However, there was no significant difference between the age group and malaria parasitaemia ($P = 0.764$). Also HIV and malaria infections were significantly higher among the pregnant women with severe anaemia ($P < 0.0001$). Of the HIV infected pregnant women, 10% had significantly elevated ESR (> 51 mm/hr) ($P < 0.0001$) while 36.8% of malaria parasite infection had slight significantly elevated ESR (9 - 15 mm/hr) ($P = 0.002$).

Key words: HIV, Malaria parasitaemia, pregnant women, South Western Nigeria.

INTRODUCTION

The discovery of Human Immunodeficiency virus (HIV) in 1983 has since become major worldwide epidemic infections (WHO, 1984, Blokziji, 1988). It has been reported that one in every 100 adults aged 15 to 19 years are infected with HIV (WHO 1997). There are two main serological types, HIV-1 and HIV-2 that are associated with Acquired Immunodeficiency Syndrome (AIDS). HIV-1 is more predominant worldwide and causes more severe morbidity with increased mortality (Harries, 1996).

The commonest mode of transmission of HIV is by sexual intercourse. Other methods are blood transfusion, organ or tissue transplant and use of contaminated needles. An estimated 10 – 20% of people infected with HIV have AIDS and women are biologically, socio-economically and socio-culturally more at risk of HIV infection than men (Tropouzis, 2000). Women can transmit HIV

to their babies in-utero or birth. If suspected HIV infected women are given anti-retroviral drug during pregnancy and if delivery is by cesarean section, the chances of the baby being infected can be reduced to a rate of 1% (Obiechina *et al.*, 2001).

Plasmodium falciparum malaria is one of the major health problems that require concerted attention and control measures. Malaria infection as the most commonly reported disease in Nigeria had been established among pregnant women (Okoyeh *et al.*, 1993). It is estimated that the prevalence of malaria parasitaemia among Africans is about 80 percent. Nigeria being a tropical country experiences a high degree of such parasitaemia and malaria consistently ranks among the five most common cause of death (Eneanya, 1998).

In view of these, the study seeks to assess and quantify the prevalence of HIV and malaria parasites among pregnant women in Abeokuta, Ogun State, Nigeria.

MATERIALS AND METHODS

Study area

The study was conducted in Abeokuta, the capital city of Ogun State, Nigeria from January 2005 to July 2005 among the pregnant women attending antenatal care unit at Sacred Heart Hospital, Lantoro, Oba-Ademola Maternity Hospital and State General Hospital at Ijaiye.

Blood collection

Two hundred and one (201) various blood were obtained from individual into ethylene diamine tetra acetate (EDTA) anticoagulated and non-anticoagulated tubes. The non-anticoagulated tubes were centrifuged at 2000 revolution per minute (rpm) for 5 minutes to separate the serum for serological assay.

Haematocrit determination

The haematocrit (Hct) which is known as the packed cell volume (PCV) of each individual was determined by centrifugation of EDTA anticoagulated blood in heparinized capillary tube (with one end sealed) using Hawkskey haematocrit centrifuge.

Erythrocyte sedimentation rate (esr)

The erythrocyte sedimentation rate was performed with Westergreen – macro method using EDTA anticoagulated blood and the readings were taken at the end of one hour.

Blood smears for malaria parasites

Thick and thin smears were made for each

subject fixed in absolute methanol, stained with Giemsa solution and examined for malaria parasites (WHO, 1980).

Serological analysis

The HIV-1 and HIV-2 screening kit used in this study was SD BIOLINE STANDARD DIAGNOSTIC INC. (KOREA). This is immunochromatographic (rapid) method for quantitative detection of antibodies of all isotypes (IgG, IgM, IgA) specific to HIV-1 and HIV-2 simultaneously in human serum, plasma or whole blood. The method is highly sensitive and specific.

Data analysis

The investigation was carried out and the proportion of individuals infected with human immunodeficiency virus and malaria parasite were calculated. The malaria and human immunodeficiency virus status among the sample were cross tabulated with age, packed cell volume and erythrocyte sedimentation rate using SPSS 11.0 for windows packages. Relevant chi-square statistics were computed to accompany each cross tabulation.

Results

Two hundred and one (201) pregnant women aged 20 – 44 years attending antenatal hospital were examined between January 2005 and July 2005. The pregnant women aged 20 – 24 years were 4.0% of the sample while those aged 25 – 29 years, 30 – 34 years, 35 – 39 years and 40 – 44 years were 43.3%, 29.9%, 18.4% and 4.5% respectively (Table -1). The table shows that 0.5%,

Table - 1: Age prevalence of human immunodeficiency virus and malaria parasites

Age group	HIV		MP		Row total
	Positive	Negative	Positive	Negative	
20 – 24	1 (0.5)	7 (3.5)	3 (1.5)	5 (2.5)	8 (4.0)
25 – 29	17 (8.5)	70 (80.5)	50 (24.9)	37 (18.4)	87 (43.3)
30 – 34	1 (0.5)	59 (29.4)	25 (12.5)	35 (17.4)	60 (29.9)
35 – 39	2 (1.0)	35 (17.4)	16 (8.0)	21 (10.4)	37 (18.4)
40 – 44	1 (0.5)	8 (4.0)	4 (2.0)	5 (2.5)	9 (4.5)
Column total	22 (10.9)	179 (89.1)	98 (48.8)	103 (51.2)	201 (100)

Note: Figures in brackets refer to percentages

Table - 2: Immunodeficiency virus in relation to the packed cell volume (PCV) level

HIV	PCV (%)			RowTotal
	< 25	26 - 36	37 - 54	
Positive	9 (4.5)	10 (5.0)	3 (1.5)	22 (10.9)
Negative	4 (2.0)	97 (48.3)	78 (38.8)	179 (89.1)
Column total	13 (6.5)	107 (53.2)	81 (40.3)	201 (100)

Note: Figures in brackets refer to percentages

8.5%, 0.5%, 1.0% and 0.5% of the sample were positive to human immunodeficiency virus (HIV) while 1.5%, 24.9%, 12.5%, 8.0% and 2.0% were positive to malaria parasite (MP) in these same age groups. The computed chi-square statistic for the test of no association between age and HIV gave a value of 14.849 and statistically significant at less than 1% level and thus the null hypothesis of no association is rejected. Also the chi-square statistic computed for the test of no association between age and malaria parasite gave a value of 4.4 and statistically insignificant leading to the acceptance of the null hypothesis of no association.

In Table -2, 4.5% of the sample with HIV positive had severe anaemia (PCV < 25%), 5.0% had moderate anaemia (PCV = 26 – 35%) and 1.5% had normal value. Also Table 3 shows that 6.0% of sample with malaria parasite positive had severe anaemia, 37.3% had moderate anaemia and 5.5% had normal value. The computerized chi-square statistic for the test of no association between HIV

and anaemia, and MP and anaemia had a value of 49.947 and 98.728 and significant at less than 1% respectively. Thus the null hypothesis of no association is rejected in each case.

The cross-tabulation between human immunodeficiency virus and erythrocyte sedimentation rate of the pregnant women examined in Table 4 shows none of sample with HIV positive had normal erythrocyte sedimentation rate (3 – 8 mm/hr) and 10.0% had extremely high value (751 mm/hr). The computed statistic chi-square between human immunodeficiency virus and erythrocyte sedimentation rate gave a value of 178.407 and statistically significant at less than 1% which showed that the null hypothesis of no association is rejected. Also Table 5 shows 36.8% of sample with malaria parasite positive had slightly elevated erythrocyte sedimentation rate (9 – 15 mm/hr) and none within the normal value (3 – 8 mm/hr). The chi-square statistic computed for the test of no association between malaria parasitaemia and

Table - 3: Malaria parasitaemia in relation to the packed cell volume

HIV	PCV (%)			RowTotal
	< 25	26 - 36	37 - 54	
Positive	12 (6.0)	75 (37.3)	11 (5.5)	98 (48.8)
Negative	1 (0.5)	32 (15.9)	70 (34.8)	103 (51.2)
Column total	13 (6.5)	107 (53.2)	81 (40.3)	201 (100)

Note: Figures in brackets refer to percentages

Table - 4: Prevalence of human immunodeficiency virus in relation to erythrocyte sedimentation rate (ESR)

HIV	ESR (mm/hr)				Row total
	3 - 8	9 - 15	16 - 50	50 - 130	
Positive	0 (0.0)	1 (0.5)	1 (0.5)	20 (10.0)	22 (10.9)
Negative	6 (3.0)	171 (85.1)	2 (1.0)	0 (0.0)	179 (89.1)
Column total	6 (3.0)	172 (85.6)	3 (1.5)	20 (10.0)	201 (100.0)

Note: Figures in brackets refer to percentages

Table - 5: Frequency distribution of malaria parasites and erythrocyte sedimentation rate

HIV	ESR (mm/hr)				Row total
	3 - 8	9 - 15	16 - 50	50 - 130	
Positive	0 (0.0)	74 (36.8)	3 (1.5)	16 (8.0)	93 (46.3)
Negative	6 (3.0)	98 (48.8)	0 (0.0)	4 (2.0)	108 (53.7)
Column total	6 (3.0)	172 (85.6)	3 (1.5)	20 (10.0)	201 (100.0)

Note: Figures in brackets refer to percentages

erythrocyte sedimentation rate had a value of 16.574 and statistically significant at less than 1% level and therefore the null hypothesis of no association is rejected.

Discussion

This study showed an overall prevalence of 10.9% human immunodeficiency virus (HIV) infection and 48.8% malaria parasitaemia among the pregnant women in Abeokuta with only HIV-1 recorded for the positive HIV infection and *Plasmodium falciparum* for the positive malaria parasites. In Kaduna, Northern Nigeria, Omekra (2001) reported HIV prevalence of 6% while Etuk and Ekure (2001) recorded prevalence rate of 2.7% among antenatal women in Calabar, Eastern Nigeria. In this study higher prevalence recorded is in support of Inem *et al.* (2003) report in Lagos women attending antenatal clinics with steady increase of HIV infections from 1.8% in 1993, 4.5% in 1995 to 5.4% in 1999 and 5.8% in 2001. The high prevalence of malaria parasitaemia among

pregnant women might due to low immunity (Okeyeh *et al.*, 1993) and explains adverse health effects of *Plasmodium falciparum* malaria infection in pregnancy as have been documented by others (Brabin, 1983; McGregor, 1984; Okoyeh *et al.*, 1993 and Steketere *et al.*, 1996).

In the report of Steketee *et al.* (1996) which is similar to the findings in this study, malaria parasitaemia significantly caused more maternal severe anaemia (packed cell volume < 25%) compared to HIV infection. This observation also supports the results obtained in Kenya (Zucker *et al.*, 1994), New Guinea (Brabin *et al.*, 1990) and Nigeria (Fleming, 1989). The evaluation of the level of ESR is useful indicator for the level of inflammatory reaction (Erickson *et al.*, 1989). In this study HIV infection significantly caused extreme elevation of ESR while malaria parasitaemia caused slight significantly high ESR in pregnant women. This indicates that the level of inflammation reaction is significantly higher in the HIV positive

than malaria parasitaemic pregnant women although C Reactive Protein (CPR) level which was not performed in this study appears to be excellent

predictive value for the level of inflammation reaction than erythrocyte sedimentation rate level.

REFERENCES

1. Blokziji, M.L. Human Immunodeficiency Infection in childhood. *Annals Tropical Paediatrics*. **8**: 1-17 (1988)
2. Brabin, B.J. An analysis of malaria in pregnancy in Africa. *Bulletin of World Health Organization*. **61**: 1005-1016 (1983)
3. Brabin, B.J., Ginny, M., Sapan, J., Galme, K. and Paino, J. Consequences of maternal anaemia on outcome of pregnancy in malaria endemic area in Papua New Guinea. *Annals Tropical of Medical Parasitology*. **84**: 11-24 (1990)
4. Eneanya, C.I. Seasonal variation in malaria episodes among resident in semi-urban community in southeast Nigeria. *Nigerian Journal of Parasitology*. **19**: 39-43 (1998)
5. Erikson, B., Hellgren, U. and Rombo, L. Changes in erythrocyte sedimentation rate, c reactive protein and hematological parameters in patients with acute malaria. *Scandinavian Journal of Infectious Diseases*. **21**: 435-441 (1989)
6. Etuk, S.J. and Ekure, E.N. Factors affecting HIV seroprevalence among pregnant women in Calabar, Nigeria. *Tropical Journal of Obstetrics and Gynaecology*. **18**(1) (2001)
7. Fleming, A.F. Tropical obstetric and gynaecology. Anaemia in pregnancy in tropical Africa. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. **83**: 441-448 (1989)
8. Harries, A.D. AIDS: An update. *African Health*. **18**: 17-19 (1996)
9. Inem, A.V., AdedokuN, A.O., Ayankogbe, O.O. A voluntary counseling and confidential testing program for preventing of mother-to-child transmission of HIV in a Practice Based Research Network (PBRN) Hospital in Lagos, Nigeria. *Nigerian Medical Practitioner*. 135-138 (2003)
10. McGregor, I.A. Epidemiology, malaria and pregnancy. *American Journal of Tropical Medicine and Hygiene*. **33**: 517-525 (1984)
11. Obienchina, N.J.A., Okafor, C.I., Udigwe, G.O. and Udegbe, C.B. Caesarean section in HIV positive women at St. Charles Borromeo Hospital, Onisha, Nigeria. A five year review. *Tropical Journal of Obstetric & Gynaecology*. **18**: 4-5 (2001)
12. Okoyeh, J.N., Lege-Oguntoye, L. Emembohi, J.O., Sarki, U. and Slotboom, A.B. Sensitivity of *Plasmodium falciparum* to chloroquine in pregnant women in Zaria, northern Nigeria. *Tropical Geographical Medicine*. **45**: 56-58 (1993)
13. Omekara, J.D. HIV diseases among antenatal patients in Nigerian Army Reference Hospital, Kaduna: A five year review prospective study. *Tropical Journal of Obstetric & Gynaecology*. **18**: 1-2 (2001)
14. Steketee, R.W., Wirima, J.J., Slutsker, L., Khoromana, C.O., Heymann, D.L., Breman, J.G. Malaria treatment and prevention in pregnancy: indication for use and adverse events associated with use of chloroquine or mefloquine. *American Journal of Tropical Medicine and Hygiene*. **55**: 50-56 (1996)
15. Topouzis, D. Measuring the impact of HIV/AIDS on agricultural sector in Africa. UNAIDS. Geneva (2000)
16. World Health Organization. Identification of four species of malaria parasites in blood films in W-10 ed. Manual of basic techniques for a health laboratory. Geneva. Chapter **21**: 196-203 (1980)
17. World Health Organization. Acquired Immune Deficiency Syndrome (AIDS). Weekly Epidemic Records. **59**: 128-129 (1984)

18. World Health Organization/United Nation Acquired Immune Deficiency Syndrome (1997). Report in the Global HIV/AIDS Epidemic, Geneva.
19. Zucker, J.R., Lackritz, E.M., Ruebush, T.K., Hightower, A.W., Adingoci, J.E., Were, B. and Campbell, C.C. Anaemia, blood transfusion practices, HIV and mortality among women of reproductive age in western Kenya. *Transaction of the Royal Society of Tropical Medicine and Hygiene*. **88**: 173-176 (1994)