

HIV p24 Antigen Antibodies to HIV1 HIV2 and TNF- α Level in the Plasma of Unbooked Teenage Pregnant Women

Mathew Folaranmi Olaniyan^{1*}, Tolulope Busayo Ojediran¹, Gbenga Shedrack Olayinka²

¹Department of Medical Laboratory Science, Edo University Iyamho, Nigeria

²Department of Medical Laboratory Science, Achievers University, Owo, Nigeria

ABSTRACT

Introduction: Teenage pregnancy can occur out of wedlock which is often associated with a social stigma or within marriage. It is associated with poor healthcare as many may not be unbooked, medical problems such as infections/inflammatory responses, social issues, including lower educational levels and poverty.

Aim and objective: This work was designed to determine HIV p24 antigen - antibodies to HIV-1/HIV-2 and TNF- α level in the plasma of unbooked teenage pregnant women to provide useful information for successful teenage pregnancy outcome.

Materials and methods: Thirty one (31) unbooked teenage pregnant women (15–19 years); 23 unbooked pregnant women aged ≥ 20 years; 20 booked teenage pregnant women (15–19 years) and 50 non-pregnant women (15–41 years; Control) who were negative to Ziehl Neelsen Staining for Acid Fast Bacilli, Giemsa Thick Blood Film for Plasmodium, HBsAg and Anti-HCV assays were recruited for the work. HIV p24 antigen-antibodies and TNF- α were determined in the women by ELISA.

Results: The frequency of HIV p24 antigen - antibodies to HIV-1/HIV-2 (HIV p24Ag-Ab) obtained in the subjects include 3.2% (1) Unbooked teenage pregnant women; 8.7% (2) Unbooked pregnant women aged ≥ 20 years; 0% (0) Booked teenage pregnant women; 4% (2) Non-pregnant women and 2% (1) Booked and unbooked teenage pregnant women. The results obtained showed a significant increase in plasma TNF- α in unbooked teenage pregnant women compared with the value obtained in non-pregnant women ($p < 0.05$). There was a significantly lower plasma TNF- α in unbooked teenage pregnant women than the value obtained in HIVp24Ag-Ab positive teenage pregnant women ($p < 0.05$). There was a significantly higher plasma TNF- α unbooked pregnant women aged ≥ 20 years than in non-pregnant women ($p < 0.05$). There was a significantly higher plasma TNF- α in booked teenage pregnant women than the results obtained in non-pregnant women ($p < 0.05$). There was a significantly higher plasma TNF- α in HIVp24Ag-Ab positive teenage pregnant women than in HIVp24Ag-Ab negative teenage pregnant women ($p < 0.05$).

Conclusion: The frequency of HIV p24Ag-Ab was higher in unbooked pregnant women aged ≥ 20 years than in teenage pregnant and non-pregnant women; in unbook than the book teenage pregnant women and also in non-pregnant women than the teenage pregnant women while plasma TNF- α was significantly increased in unbook teenage pregnant women including pregnant women aged 20 years and above and HIV p24Ag-Ab positive teenage pregnant women.

Key words: HIV p24 antigen, HIV antibodies, TNF- α , Unbooked teenage pregnant women

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Corresponding author: Mathew Folaranmi Olaniyan

e-mail✉: olaniyanmat@yahoo.com

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INTRODUCTION

Teenage or adolescent pregnancy occurs in a female within the age of 13–19 years following sexual coitus at the start of ovulation especially before the first menstrual period but usually occurs after the onset of menstruation. In well-nourished females, the first menstruation

usually takes place around the age of 12 or 13 years. Though, teenage pregnant women also face the some pregnancy related problems like other women but teenage pregnant women are less likely to be physically developed to sustain a healthy pregnancy or to deliver baby [1-4]. They are in most cases faced with socioeconomic factors than with the effects of age. An additional risk is including low birth weight, premature labour, anemia, and pre-eclampsia [1-5].

Teenage pregnancies are linked with social issues, lower educational levels and poverty.

Teenage pregnancy may occur out of wedlock often associated with a social stigma, within marriage and unplanned [1-4]. Teenage pregnancy is an early pregnancy associated with malnutrition and poor health care that may bring about medical problems. Teenage pregnancy requires educational interventions and improved access to birth control to reduce unplanned pregnancies [1-5]. Adolescents are especially vulnerable due to increased biological, social and economic risks associated with early pregnancy and childbirth, but most pregnancy and childbirth-related complications can be prevented through proven, cost-effective clinical interventions and timely antenatal care [6,7].

A booked pregnant woman is one who attends at least one antenatal clinic session with a trained personnel like clinicians, midwives while an unbooked pregnant woman is one who has not attended any antenatal clinic session with a trained personnel before presentation in labour. Pregnant women in lower social class constituted the majority of the unbooked pregnancy. The challenges of unbooked pregnancy include poor pregnancy outcome [8,9].

P24 is a capsid protein which is a component of the HIV particle capsid. Increased p24 in the blood is a reflection of the onset of signs/symptoms of Acquired Immunodeficiency Syndrome and a reduction in CD4+ T-cells count. The p24 Ag/Ab ELISA is used for the diagnosis of HIV infection earlier than antibody assays. Fourth-generation HIV immunoassays detect both viral p24 protein and HIV antibodies produced by the patient against HIV compared to the previous generation methods that relied on only HIV antibodies detection. The p24 protein can be detected in patient blood as early as 2 weeks after HIV infection as against about 3–4 weeks for the earliest seroconversion which further reduced the window period necessary to accurately determine the HIV status in a patient [10]. Tumor necrosis factor- α (TNF- α) is a pro-inflammatory cytokine, TNF- α has also been associated with inflammatory mechanisms related to implantation, placentation, and pregnancy outcome [11]. This work was planned to determine HIV p24 antigen - antibodies to HIV-1/HIV-2 and TNF- α level in the plasma of unbooked teenage pregnant women.

MATERIALS AND METHODS

Study area

This work was carried out in Saki-West Local government headquarters located at the Northern part of Oyo State in Nigeria. It is the resident of Oke-Ogun Polytechnic, 244 Racee battalion of Nigerian army, Baptist Medical Center, Baptist College of Nursing and Midwifery, School of Medical Laboratory Technology, Oyo State Hospital, Muslim Hospital and School of Basic Midwifery. It is a major city in Oyo state that shares border with Kwara state and Burkina Fasso.

Study population

Thirty one (31) unbooked teenage pregnant women (15–19 years); 23 unbooked pregnant women aged \geq 20 years; 20 booked teenage pregnant women (15–19 years) and 50 non-pregnant women (15–41 years; Control) who were negative to Ziehl Neelsen Staining for Acid Fast Bacilli, Giemsa Thick Blood Film for Plasmodium, HBsAg and Anti-HCV assays were recruited for the work.

Analysis of biochemical and immunological parameters

HIVp24 antigen and antibodies to HIV-1 (groups M and O) and HIV-2 in human serum: These were determined in the subjects using Bio-Rad Genscreen™ ULTRA HIV Ag-Ab which is a qualitative ELISA kit used for the detection of HIV p24 antigen and antibodies to HIV-1 and HIV-2 in human serum/plasma.

Anti-HCV ELISA: Antibody to HCV (Anti-HCV) was tested in the subjects by using Bio-Rad Monolisa™ Anti-HCV PLUS Version 3 kit by ELISA technique.

Detection of HBsAg by ELISA: Hepatitis B surface antigen (HBsAg) test was tested in the test and control subjects by a one-step MONOLISA AgHBs sandwich ELISA technique for the detection of HBsAg in serum or plasma using BIO –RAD reagent kit (Raymond Poincare, Marnes La Coquette).

TNF alpha ELISA: Plasma TNF alpha was measured in the subjects using Abcam's kit.

Detection of acid fast bacilli in sputum and identification of Plasmodium in blood: Acid Fast Bacilli and Identification of Plasmodium tests using sputum and blood samples respectively were carried out by the method described by [12].

Ethical considerations

This work was reviewed and approved by ethical

and research committee of Baptist Medical center Saki-Nigeria. Informed consent was also obtained from each of the subjects.

Method of statistical analysis

Mean, Standard Deviation, Probability and student “t” test at 0.05 level of significance were determined using IBM SPSS 18.0.

RESULTS

The frequency of HIV p24 antigen - antibodies to HIV-1/HIV-2 (HIV p24Ag-Ab) obtained in the

subjects include 3.2% (1) Unbooked teenage pregnant women; 8.7% (2) Unbooked pregnant women aged ≥ 20 years; 0% (0) Booked teenage pregnant; women; 4% (2) Non-pregnant women and 2% (1) Booked and unbooked teenage pregnant women.

The results obtained showed a significant increase in plasma TNF-α in unbooked teenage pregnant women compared with the value obtained in non-pregnant women (p<0.05; Tables 1 and 2, Figure 1). There was a significantly lower plasma TNF-α in unbooked teenage pregnant women

Table 1: Results of HIV p24 Ag-Ab and plasma TNF-α in the subjects.

	Unbooked teenage pregnant women (15 – 19 years)	Unbooked pregnant women aged ≥ 20 YEARS	Booked teenage pregnant women (15 – 19 years)	Non-Pregnant women (15 – 41 years)	HIVp24Ag-Ab Positive teenage pregnant women (Booked and unbooked)	HIVp24Ag-Ab Negative teenage pregnant women (Booked and unbooked)
Frequency	31	23	20	50	1	50
HIVp24Ag-Ab	3.2% (1)	8.7% (2)	0% (0)	4% (2)	2% (1)	96.1%(49)
TNF-α (pg/ml)	4.0 ± 0.1	4.3 ± 0.2	3.8 ± 0.1	3.0± 0.2	5.6 ± 0.1	4.1 ± 0.1
AFB by ZIEHL NELSEEN STAINING	Negative	Negative	Negative	Negative	Negative	Negative
Plasmodium test by Giemsa Thick Blood Film	Negative	Negative	Negative	Negative	Negative	Negative
HBsAg	Negative	Negative	Negative	Negative	Negative	Negative
Anti-HCV	Negative	Negative	Negative	Negative	Negative	Negative

Table 2: Results of the comparative analysis of plasma TNF-α in unbooked and booked pregnant and non-pregnant women.

	Unbooked teenage Pregnant WOMEN (15–19 years) Vs. Unbooked pregnant women aged ≥ 20 years	Unbooked teenage pregnant women (15–19 years) Vs. booked teenage pregnant women (15–19 years)	Unbooked teenage pregnant women (15–19 years) Vs. Non-pregnant women (15–41 years)	Unbooked teenage pregnant women (15 – 19 years) Vs. HIVp24Ag-Ab positive teenage pregnant women	Unbooked teenage pregnant women (15–19 years) Vs. HIVp24Ag-Ab negative teenage pregnant women	Unbooked pregnant women aged ≥ 20 years Vs. Booked teenage pregnant women (15–19 years)	Unbooked pregnant women aged ≥ 20 years Vs. non-pregnant women (15–41 years)	Booked teenage pregnant women (15 – 19 years) Vs. non-pregnant women (15–41 years)	HIVp24Ag-Ab positive teenage pregnant women vs. HIVp24Ag-Ab Negative teenage pregnant women
TNF-α t-value	-1.34164	1.41421	4.47214	-11.31371	-0.70711	2.23607	4.59619	3.57771	10.6066
(pg/ml) p-value	0.155876	0.146447	0.02*	0.004**	0.276393	0.077423	0.02*	0.04*	0.004**

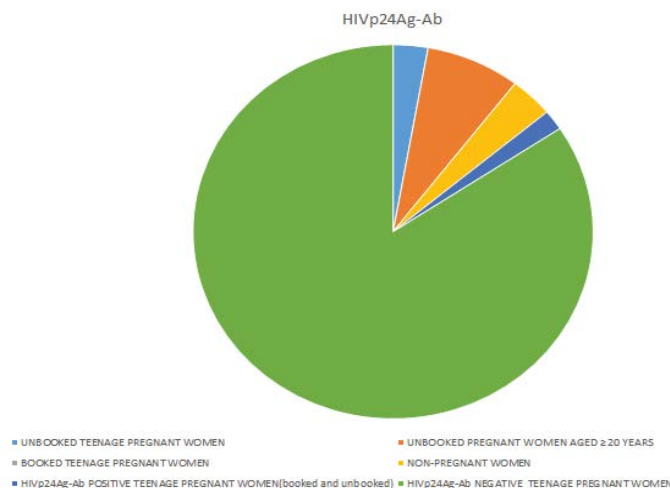


Figure 1: Comparative description of HIVp24Ag-Ab in the subjects.

than the value obtained in HIVp24Ag-Ab positive teenage pregnant women ($p < 0.05$; Tables 1 and 2, Figure 1). There was a significantly higher plasma TNF- α unbooked pregnant women aged ≥ 20 years than in non-pregnant women ($p < 0.05$). There was a significantly higher plasma TNF- α in booked teenage pregnant women than the results obtained in non-pregnant women ($p < 0.05$; Tables 1 and 2). There was a significantly higher plasma TNF- α in HIVp24Ag-Ab positive teenage pregnant women than in HIVp24Ag-Ab negative teenage pregnant women ($p < 0.05$; Tables 1 and 2, Figure 1).

DISCUSSION

The frequency of HIV p24 antigen-antibodies to HIV-1/HIV-2 (HIV p24Ag-Ab) obtained in the subjects include 3.2% (1) Unbooked teenage pregnant women; 8.7% (2) Unbooked pregnant women aged ≥ 20 years; 0% (0) Booked teenage pregnant women; 4% (2) Non-pregnant women and 2% (1) booked and unbooked teenage pregnant women.

The results indicate that the frequency of HIV p24Ag-Ab was higher in unbooked pregnant women aged ≥ 20 years than in teenage pregnant and non-pregnant women; in unbook than the book teenage pregnant women and also in non-pregnant women than the teenage pregnant women. P24 is a capsid protein of HIV, expression of which is an indication of the onset of symptoms of AIDS and a reduction in of CD4+ T-cells count. Expression of p24 Ag/Ab in the serum indicates HIV infection. p24 protein is incorporated into fourth-generation HIV immunoassays for early detection of HIV [10].

Early detection by characterizing HIV p24 Ag/Ab in the serum or plasma is very important as Human Immunodeficiency Virus to prevent transmission of the infection to child in-utero, during childbirth and during breastfeeding, in addition to the reduction in the risk of mother-to-child HIV transmission by antiretroviral therapy [13]. The Centers for Disease Control and Prevention (CDC) has recommended HIV testing as a routine prenatal care specifically during the first trimester to prevent mother to child transmission [13].

High frequency of HIV infection in unbook pregnancy may be due to the report that lack of proper antenatal care and poor pregnancy

outcome are associated with unbooked than booked pregnant women [14]. The report of this work is consistent with the report of Okeudo et al. [15] that reported HIV mother-to-child transmission rate of 13.6%. As mothers of all the HIV positive babies were unbooked and had no form of antenatal care.

Lower frequency of HIV in teenage pregnant women in this study is also consistent with the report of Christofides, et al. [16]. Those pregnant women within the age of 16 and 19 years of age did not have a higher incidence of HIV as they associated the higher risk of HIV infection with sexual risk behaviour such as higher partner numbers and a greater age difference with partners. In addition, HIV-infected pregnant and breastfeeding teenagers are especially vulnerable group of pregnant women that need special attention and enhanced support for optimal maternal and infant outcomes [17]. It has also been reported that the prevalence of HIV was significantly higher among unbooked pregnant women with less formal education in an unbooked obstetric population in the Niger Delta [18].

The results obtained showed a significant increase in plasma TNF- α in unbooked teenage pregnant women compared with the value obtained in non-pregnant women. There was significantly lower plasma TNF- α in unbooked teenage pregnant women than the value obtained in HIVp24Ag-Ab positive teenage pregnant women. There was significantly higher plasma TNF- α unbooked pregnant women aged ≥ 20 years than in non-pregnant women. There was significantly higher plasma TNF- α in booked teenage pregnant women than the results obtained in non-pregnant women. There was significantly higher plasma TNF- α in HIVp24Ag-Ab positive teenage pregnant women than in HIVp24Ag-Ab negative teenage pregnant women.

Tumor necrosis factor (TNF α) is an inflammatory cytokine involved in systemic inflammation and a constituent of the acute phase reaction. Higher plasma levels of TNF- α seem to play a role in pregnancy complications [19,20]. Tumor necrosis factor- α (TNF- α) has also been associated with inflammatory mechanisms related to implantation, placentation, and pregnancy outcome [11]. Increased in plasma

levels of TNF- α can be triggered by infections such as HIV [20] TNF- α was significantly increased in unbook teenage pregnant women including pregnant women aged 20 years and above and HIV p24Ag-Ab positive teenage pregnant women. This can be associated with age differences as ageing is associated with increased inflammatory activity in the blood [21].

CONCLUSION

The frequency of HIV p24Ag-Ab was higher in unbooked pregnant women aged ≥ 20 years than in teenage pregnant and non-pregnant women; in unbook than the book teenage pregnant women and also in non-pregnant women than the teenage pregnant women while plasma TNF- α was significantly increased in unbook teenage pregnant women including pregnant women aged 20 years and above and HIV p24Ag-Ab positive teenage pregnant women.

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CONFLICT OF INTEREST

Authors declare clearly that there is no conflict of interest.

AUTHOR'S CONTRIBUTION

Mathew Folaranmi OLANIYAN: research design, recruitment of subjects, literature search and review, data analysis and interpretation and manuscript preparation; Tolulope Busayo OJEDIRAN, recruitment of subjects, literature search and review and Gbenga Shedrack OLAYINKA: recruitment of subjects and data analysis.

ETHICS STATEMENT

The proposal of this work was reviewed and approved by the Ethical and Research committee of Baptist Medical Centre, Saki-Nigeria (BMCER/SHK/VII/143). The consent of each participants was obtained.

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