

The effects of HIV infection on pregnancy hormones within 28 weeks of pregnancy

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ABSTRACT

Introduction: Pregnancy in HIV-positive women might be associated with at least small increases in risk of adverse maternal outcomes that include spontaneous abortion, stillbirth, foetal abnormality, perinatal mortality, low birth weight and pre-term delivery. These adverse effects might be the result of endocrine abnormalities in HIV patients. This study was carried out to investigate the possible changes in pregnancy hormones of HIV-positive women within the few weeks of pregnancy prior to antiretroviral therapy. **Materials and Methods:** A total of 120 pregnant women with 28 weeks of pregnancy participated in the study. Sixty were HIV sero-positive and the remaining 60 were HIV sero-negative. None of the sero-positive subjects had been commenced anti-retroviral therapy before the sample collection. Serum prolactin, oestradiol, progesterone and beta-human chorionic gonadotropin were measured using the Enzyme Linked Immunosorbent Assay (ELISA) method. **Result:** It was observed that the serum prolactin and oestradiol levels of HIV sero-negative pregnant women were significantly higher ($p < 0.05$) than their sero-positive counterparts. Serum human chorionic gonadotropin and progesterone of the two groups showed no significant difference ($p > 0.05$). **Conclusion:** HIV infection has no effect on the serum human chorionic gonadotropin and progesterone levels but has reducing effect on serum oestradiol and prolactin production/metabolism in infected pregnant women. This effect may affect development of the foetus or breast milk production in these women if commencement of antiretroviral therapy is delayed.

Keywords: Hormones, Human immune deficiency virus, pregnancy, endocrine

INTRODUCTION

The Human Immune-Deficiency Virus (HIV) is

a lentivirus that causes immunodeficiency in humans which may eventually lead to the Acquired Immunodeficiency Syndrome (AIDS). There are two immunological types of HIV; HIV-1 and HIV-2. These are further subdivided into different phylogenetic groups. It

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is transmitted through contacts with blood and other bodily fluids such as semen, vaginal fluid and breast milk. HIV is present as both free virus particles and virus within infected immune cells. The transmission is by blood-borne through transfusion of infected blood, contaminated syringes, and contaminated sharp objects, oral, anal or vaginal sexual intercourse, mother-to-child transmission (MTCT) which can occur in-utero during pregnancy and intra partum at child birth, and during breast feeding. The virus has been found at low concentrations in the saliva, tears and urine of infected individuals; HIV is not transmitted by these secretions. (Lifson 1988).

Human pregnancy is arbitrarily divided into three trimester periods under the influence of reproductive hormones (which are oestradiol, progesterone, human chorionic gonadotropin, prolactin, placental lactogen and relaxin). This prenatal development has three different stages which are first trimester (a period of first three months or from week one to week 12), second trimester (a period of second three months or from week 13 to week 28) and third trimester (a period from week 28 till birth). These hormones play different roles during these developmental stages to ensure maintenance and successful delivery of the baby.

HIV infection that affects the whole body can interfere with proper endocrine functions, and hormone in turn, can affect HIV disease progression. (Highleyman 2004). Garcia *et al.* (2002) reported that studies had shown that HIV itself could affect the body's ability to produce and maintain hormone levels. Changes in the balance of oestrogen,

progesterone or testosterone can affects HIV positive women in many ways. Patients with AIDS have been reported to have abnormalities of endocrine organs (Fontes *et al* 2003, Villete *et al* 1990, and Membreno *et al* 1987).

Gross *et al.* (2003) observed elevated serum hCG levels in HIV infected pregnant women and the hormone increase correlated with the increasing viral load and decreasing CD4 count. This elevation of hCG was also reported by Yudin *et al.* (2003), and this increase was significantly higher among HIV-infected pregnant women than non-infected pregnant women. Cu-Uvin *et al.* (2000) observed no significant change in progesterone and oestradiol in HIV-infected women compared to their HIV sero-negative counterparts. In the study done by Merenich *et al.* (1990) on non-pregnant women, there was no significant change in level of prolactin, oestradiol and other hormones estimated among HIV-infected subjects compared with HIV-sero-negative subjects.

The effect of HIV on endocrine secretion and immune status prompted this study to investigate the effect of this virus on the pregnancy hormones among pregnant women within 28 weeks of gestational period. This is to determine the possible outcome of the pregnancy among these women.

MATERIALS AND METHODS

Hundred and twenty (120) pregnant subjects consented to participated in this study. Sixty (n=60) of them were regarded as test group and were HIV sero-positive pregnant women who had not commenced antiretroviral drug therapy. The remaining sixty (n=60) were regarded as control group and were HIV sero-

negative pregnant women. The subjects' morning blood samples were collected within 28 week of pregnancy after obtaining informed consent from the participants. The serum oestradiol, progesterone, prolactin and beta-hCG levels were estimated quantitatively using Enzyme Linked Immunosorbent Assay (ELISA) method.

Statistical analysis: The data collated were subjected to statistical analysis using Megastat software. Analysis of variance was done and the parameter's mean values, standard error of mean, and p-values were obtained. P-value less than or equal to 0.05 ($p \leq 0.05$) was regarded statistically significant.

RESULTS

It was observed that sero-negative pregnant women had significantly higher levels ($p < 0.05$) of mean serum oestradiol and prolactin levels compared to their sero-positive counterparts. However, there were no significant differences between the progesterone and beta-hCG levels between the two groups. These are shown in Table.

DISCUSSION

Pregnancy in normal women is characterised by increasing levels of oestrogen and progesterone, which generally plateau during the third trimester. The available literature on

on whether there are any impact of pregnancy with HIV disease progression and vice versa is somewhat conflicting. However available data suggest no substantial association (French and Brocklehurst 1998).

In this study, it was observed that HIV infection among pregnant women within 28 weeks of gestation had a significant reduction of the oestradiol and prolactin levels but no significant alteration in levels of progesterone and beta-hCG. In the study carried out by Cu-Uvin et al (2000) and Merenich et al (1990) on non-pregnant women, they stated that HIV infection does not significantly change estradiol level. Lower level of oestradiol among HIV sero-positive women indicates that HIV infection may cause inhibitory effect on oestradiol synthesis or secretion. This inhibition may be in the corpus luteum or liver via cholesterol which is oestradiol precursor as HIV infection can lead to degeneration of some organs and glands. Highleyman (2004) stated that some disease like HIV that affect the whole body can interfere with proper endocrine function. Garcia et al (2002) reported that studies had shown that HIV itself could affect the body's ability to produce and maintain hormone levels. The reduction in level of oestradiol could lead to under-developement of the foetus because normal oestradiol level is responsible for normal development of the foetus.

Table: Comparisons between sero-negative and sero-positive cases.

	Sero-negative (n=60)	Sero-positive (n=60)	P value
CD4 counts (cells/ μ L)	835.02 $\pm$ 36.50	425.10 $\pm$ 34.00	<0.05
Oestrodial (pg/ml)	8,812.85 $\pm$ 415.93	5,359.82 $\pm$ 260.79	<0.05
Progesterone (ng/ml)	222.27 $\pm$ 6.24	210.94 $\pm$ 7.04	>0.05
Prolactin (ng/ml)	104.71 $\pm$ 7.68	58.72 $\pm$ 5.28	<0.05
Beta-HCG (miu/ml)	13,204.53 $\pm$ 1,076.88	15,072.60 $\pm$ 699.78	>0.05

It was also observed in this study that the HIV infection significantly reduced prolactin level among HIV positive pregnant women within 28 weeks of gestation. This reduction indicates that HIV infection may have a direct or indirect effect on prolactin metabolism. It may be that the HIV infection play a role in inhibiting the release of prolactin from specialized cells in the pituitary or other prolactin releasing organs among HIV positive pregnant women.

Ram *et al* (2004) in their study observed lower free prolactin level in HIV infected subjects. They clearly stated that high level of prolactin in HIV patients was as a result of low biologic active macroprolactin in the circulation. Montero *et al.* stated that the increase in prolactin in HIV infected patients does not correlate with plasmic viral (HIV) burden.

Beta hCG and progesterone showed no significant change in this study, though there was higher level of beta-hCG in HIV infected pregnant women than that of the non-infected pregnant women within 28 weeks of gestation. The elevation was also observed by Gross *et al.* and they stated that the increase in hCG hormone correlated with the increasing viral load and decreasing CD4 count. Yudin *et al.* reported a significant increase in hCG among HIV infected pregnant women. Cu-Uvin *et al.* observed no significant change in progesterone and oestradiol in HIV infected women compared to their HIV sero-negative counterpart. The finding in this study agrees with their observation though the subjects in this study were HIV infected pregnant women while theirs were on HIV infected non-pregnant women.

In conclusion, the reduction in level of oestradiol and prolactin within 28 weeks of gestation may result to underdevelopment of the foetus, and reduction in breast milk production after birth if the mothers are not subjected to therapy and good antenatal care.

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