Serological screening for sexually transmitted infections in pregnancy: is there any value in re-screening for HIV and syphilis at the time of delivery?

D C Qolohle, A A Hoosen, J Moodley, A N Smith, K P Mlisana

Abstract

Objective—The aim of this study was to assess the prevalence of syphilis, human immunodeficiency virus (HIV), and hepatitis B virus (HBV) infections in women at the time of delivery, and to determine the seroconversion rates for syphilis and HIV infections from initial booking visit to delivery.

Setting—The labour ward of a typical tertiary hospital in a developing country and serving an indigent African population.

Method—Four hundred and eighteen women presenting in labour were randomly selected and informed consent obtained for serological testing for syphilis and HBV infections in umbilical cord blood samples. The specimens were then given a study number, the gestational ages recorded and anonymously tested for HIV infection.

Results—Of the 191 women who had antenatal care, 13 (6.8%) were HIV antibody positive at the initial "booking" visit. An additional 4 were found to be HIV antibody positive at the time of delivery resulting in a seroconversion rate of 2.2%. The seroconversion rate for syphilis at the time of delivery was 2.7%. Hepatitis B surface antigens were detected in only 2 women, one of whom was antigen positive.

Conclusion—The high seroconversion rates for both syphilis and HIV infection in pregnancy justifies re-screening for these conditions in endemic areas such as ours.

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Introduction

The practice of screening for medical disorders and infectious diseases at the first antenatal visit is well established. At King Edward VIII Hospital (KEH), Durban, a large referral centre serving mainly an indigent population, serological screening for syphilis and human immunodeficiency virus (HIV) infection is performed at the initial antenatal visit. It has been recommended, however, that in high prevalence areas, screening for syphilis be repeated in late pregnancy and at the time of delivery to reduce the incidence of congenital syphilis.¹

Opai-Tetteh *et al*, working at KEH, have

reported a seroconversion rate of 3% for syphilis at the time of delivery.² This finding is highly relevant for a condition which is eminently detectable and curable. Furthermore, Mlisana *et al* have shown that the "unbooked mother" has a much higher prevalence of syphilis than regular antenatal attenders.³ The prevalence of HIV infection in women attending antenatal care in the Natal-Kwa Zulu has been shown to be steadily increasing and was approximately 5% for 1992.⁴ The prevalence of HIV infection, however, at the time of delivery is not known.

As far as we are aware, screening for hepatitis B virus (HBV) infection in pregnancy is not routinely performed in South Africa.^{5,6} Hepatitis B virus screening in pregnancy has advantages; vertical transmission is a possibility in mothers who are hepatitis B (HB_e) antigen positive. Consequently, screening may identify such mothers for further investigation, and prevalence rates in antenatal populations may help to prioritise groups for HBV vaccination.

The aim of this study, therefore, was to assess the prevalence of syphilis, HIV and HBV infections in umbilical cord blood samples at the time of delivery, and to evaluate the seroconversion rate of syphilis and HIV infections from initial booking visit to delivery.

Patients and methods

The study was conducted in the labour ward, KEH over a 2 month period in May and June 1993. Four hundred and eighteen women were randomly selected and informed consent obtained for serological testing for syphilis and HBV infections in umbilical cord blood. The samples were then allocated a study number, the gestational ages recorded and anonymously tested for HIV infection by categorising them into three groups: Group A consisted of *booked* women who had at least two antenatal visits and records of serological screening for syphilis and HIV; Group B consisted of women who were referred following booking visits at community clinics and regional hospitals; Group C consisted of *unbooked* women who had no antenatal care.

Human immunodeficiency virus antibody testing was performed using a recombinant HIV₁/HIV₂ Elisa kit (Abbott Laboratories, Wiesbaden, Germany) for screening at first antenatal visit and delivery. All positive sera were confirmed by Western blot (Diagnostic biotechnology, Singapore). Hepatitis B sur-

The MRC/UN
Pregnancy
Hypertension Unit,
Department of
Obstetrics and
Gynaecology
D C Qolohle
J Moodley

Department of
Medical Microbiology
A A Hoosen
K P Mlisana

Department of
Virology
A N Smith

University of Natal,
Durban, South Africa

Address correspondence to:
Prof J Moodley, Department
of Obstetrics and
Gynaecology, MRC/UN
Pregnancy Hypertension
Unit, Faculty of Medicine,
University of Natal, P.O.
Box 17039, CONGELLA
4013, South Africa.

face antigen (HB_sAg), e antigen and core IgM antibody were tested for by radioimmunoassay (Abbott Laboratories, North Chicago, USA). The rapid plasma reagin (RPR) test (RPR Becton Dickenson BBL Microbiology, Maryland, USA) was used to screen for syphilis and positive sera confirmed by *Treponema pallidum* haemagglutination (TPHA) test (Fujirebio, Tokyo, Japan) or the fluorescent treponemal antibody absorption (FTA-ABS) test (Behring Diagnostics, Marburg, Germany). Serological testing for antenatal screening has been centralised and performed at one laboratory serving the greater Durban area. Hence the same tests (serological kits) are used for all specimens.

Statistics

Prevalence of HIV and syphilis in the three groups were compared using McNemar’s chi square test. Fishers exact test was used for pairwise comparisons where expected cell sizes were less than 5. A *p* value ≤ 0.05 was regarded as statistically significant.

Results

Laboratory results for HIV antibody, syphilis serology and HB_s antigen at the time of delivery for the 418 women are shown in table 1. One hundred and ninety one (45.7%) women were *booked*, Group A; 172 (41.2%) were referred, Group B; and 55 (13.2%) were *unbooked*, Group C. Overall, 32 (7.7%) women of the study population were HIV-positive at the time of delivery (95% CI: 5.1–10.3). Seventeen (8.9%) women in group A were HIV positive (95% CI: 4.8–13.0). This group consisted of 13 women who were HIV positive at the initial booking visit and an additional four who seroconverted during the prenatal period, giving a seroconversion rate of 2.2%, that is, 4 of 178 (95% CI: 0.0–4.4). These women had booked at 17, 23, 24 and 28 weeks gestation and all delivered at term.

The HIV seroprevalence for groups B and C were 4.1% (95% CI: 1.1–7.1) and 14.6% (95% CI: 5.2–23.9) respectively. This was a

significant difference (*p* = 0.011). However, there were no statistically significant differences between groups A and C (8.9% vs 14.6%) or groups A and B (8.9% vs 4.1%). Positive syphilis serology at delivery ranged from 7.6% to 18.2% for the different groups. Hepatitis B surface antigens were detected in only two women, one *booked* and one referred. One of these was also e antigen positive. None of the other samples demonstrated evidence of HB_sAg, e antigen and core IgM antibody.

Results for syphilis serology at initial visit and at delivery are shown in table 2. Thirty nine of 418 (9.3%) women of the study population had reactive syphilis serology at delivery (95% CI: 6.5–12.1), whilst 34 of 363 (9.4%) tested positive for syphilis at the first antenatal visit. Nine of 329 women who had negative serological tests for syphilis at initial booking were found to have reactive syphilis serology at delivery, giving a seroconversion rate of 2.7% (95% CI: 0.1–4.5). The time interval for seroconversion in these 9 women ranged from 2 to 15 weeks. Eighteen (5.0%) women with reactive sera at booking became non-reactive at delivery. The period from booking to delivery ranged from 4 to 17 weeks for this group.

Syphilis sero-prevalence at delivery was 8.4% for Group A (95% CI: 4.5–12.3); 7.6% for group B (95% CI: 3.6–11.6) and 18.2% for group C (95% CI: 4.1–28.4). There was a significant difference between groups A and C (*p* = 0.037) as well as groups B and C (*p* = 0.023). However, there was no significant difference in the prevalence between groups A and B (8.4% vs 7.6%). A further fifty (12.0%) women had evidence of previous exposure to syphilis as judged from the fact that their RPR tests were non-reactive, whereas their confirmatory tests (TPHA or FTA-ABS) were positive.

Discussion

Recently Opai-Tetteh *et al*² and Delpont *et al*⁷ have recommended rescreening for syphilis at the time of delivery in an attempt to decrease the morbidity and mortality associated with congenital syphilis. This suggestion stems from the belief that congenital syphilis can be prevented by effective maternal screening and treatment during the antenatal period. Our finding of a significantly higher prevalence of syphilis in “unbooked” women than women who have had antenatal care (18.2% vs 8.4%), a high level of past exposure to syphilis (RPR-negative and confirmatory tests positive 12.0%), as well as a seroconversion rate of 3% in women who have had antenatal care confirm the findings of Opai-Tetteh *et al*² and Mlisana *et al*.³ Furthermore these findings demonstrate that syphilis is endemic in the Natal-KwaZulu region.

Although Bam *et al*⁸ found positive syphilis serology in 15% of pregnant women at the time of first testing and only 8% in cord blood, our experience has shown a good correlation between maternal sera and cord blood testing.^{2,3}

Table 1 Laboratory results of all serological tests at delivery

Group	HIV antibody No. positive (%)	Syphilis No. positive (%)	HB _s Ag No. positive (%)
A (n = 191)	17 (8.9)	16 (8.4)	1 (0.5)
B (n = 172)	7 (4.1)	13 (7.6)	1 (0.6)
C (n = 55)	8 (14.6)	10 (18.2)	0 (0.0)
Total 418	32 (7.7)	39 (9.3)	2 (0.5)

HIV = Human immunodeficiency virus
HB_sAg = Hepatitis B surface antigen

Table 2 Results of serological tests for syphilis

Group	At first visit RPR positive TPHA + /FTA ABS +	At delivery	
		RPR positive TPHA + /FTA ABS+	RPR negative TPHA + /FTA ABS+
A (n = 191)	18 (9.4)	16 (8.4)	17
B (n = 172)	16 (9.3)	13 (7.6)	22
C (n = 55)		10 (18.2)	11
Total	34 (9.4)	39 (9.3)	50 (12.0)

RPR = Rapid Plasma Reagin test
TPHA = *Treponema pallidum* Haemagglutination Test
FTA-ABS = Fluorescent Treponemal Antibody Absorption Test
% = in brackets

Rescreening in pregnancy for infectious diseases should be the ideal in areas of high prevalence. In the Natal-KwaZulu region prevalence figures for HIV infection amongst antenatal attenders have been increasing in a stepwise manner from 1.6% in 1990, 2.9% in 1991 and 4.8% in 1992.⁴ Our finding of 7.7% at the time of delivery confirms this increasing trend. More importantly, the prevalence was higher in "unbooked" pregnant women (14.6%). Furthermore the seroconversion rate for HIV-negative women from the time of initial testing to delivery was 2.2%. To our knowledge such a finding has not been reported at any other centre. These findings are indicative of endemic HIV and argue strongly for rescreening for both HIV and syphilis at the time of delivery in areas such as ours.

It is of interest that there was a higher prevalence of HIV antibody in women who booked at KEH than those referred from community clinics and district hospitals (8.9% vs 4.1%). However, this was not the case for women who had positive syphilis serology. We cannot explain this difference and further analyses may be of value.

A number of studies have shown that the route of transmission for HBV infection in the neonate in Africa is horizontal rather than vertical.^{6,7} In contrast, HBV neonatal infection in South-East Asia is predominantly vertical. Our findings in cord blood of 0.5% (2 of 418 women) surface antigen positivity not only confirms this low prevalence amongst pregnant African women but also suggests that the mode of HBV transmission locally is usually horizontal.

In conclusion, this study like previous reports from KEH has established that Natal-KwaZulu is an area of high prevalence for both syphilis and HIV infection. It is well recognised that screening for HIV infection during pregnancy is of value because it enables appropriate counselling, early termination of pregnancy if indicated, advice on breast feeding, education on the value of protective intercourse and follow-up of the infant. Consequently in areas of high seroprevalence of both syphilis and HIV disease our findings justify rescreening for both these conditions at the time of delivery. On these grounds we strongly recommend re-screening for both syphilis and HIV disease in pregnancy.

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