

Sexually Transmitted Infections (STIs) Among Antenatal Women at Five Tertiary Level Hospitals in India. (An ICMR Task Force study)

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Objectives – To obtain information on current prevalence of some of the major sexually transmitted infection (syphilis, HIV, chlamydia, gonorrhoea and hepatitis B) in pregnant women and to study the inter-relationship, if any between clinical presentations and laboratory results. **Methods** – A total of 3000 pregnant women (60 consecutive women attending the antenatal clinic at each of the five tertiary level hospitals in the different parts of the country) were enrolled in the study for unlinked anonymous testing. Information was obtained on demographic and obstetric profile, a routine gynecological examination was carried out and endocervical swab sample collected for Gram staining and culture for detection of N. gonorrhoea and antigen testing for C. trachomatis. Blood sample was collected and tests performed for confirmation of syphilis, HIV and hepatitis B. **Results** – On the whole 7.4 percent of the pregnant women were found to be positive with at least one out of the five infections studied ranging from 2.7 percent in Chandigarh to 13.7 percent in Mumbai. When compared with the other centers, a significantly higher and lower prevalence of infections was observed at Mumbai and Chandigarh respectively. No statistically significant difference was observed between the centers at Pondicherry, Calcutta and Pune. Prevalence of Hepatitis B (3.4%) was highest among the STIs studied. The overall prevalence of syphilis was 1.0 percent and that of chlamydia 2.1 percent. The prevalence of HIV was 1.2% and it was 4.5% at Mumbai as compared to less than 1% at the other centers; no case of HIV was reported from Chandigarh. Prevalence of gonococcal infection was found to be negligible as only one case out of the 3000 women studied was found to be positive. High risk sexual behavior of self or husband, history of STD in husband and literacy status of women were the factors associated with increased prevalence of STI in our study. There was no association between the clinical signs and any of the infections studied. More than one infection was observed in 4.5% of the cases. **Conclusion** – In view of the high prevalence of hepatitis B in pregnant women observed in this study, there is need to assess the cost-benefit of routine prenatal screening and immunisation of risk babies against universal infant immunisation. Urgent targeted interventions like education and counseling are required to curtail the HIV epidemic in areas such as Mumbai where prevalence is more than one percent. No association was observed between clinical and laboratory diagnosis indicating the need to develop simple, low-cost diagnostic kits for screening pregnant women for the major STIs.

Key words : sexually transmitted infections, antenatal screening

Introduction

The worldwide burden of STIs is estimated at over 350 million cases yearly, most of which occurs in less developed countries¹. The annual incidence rate of STIs in India is five percent and 40 million new cases are reported every year². The high prevalence of STIs, their complication and sequelae, socio-economic impact and role in enhancing the spread of HIV virus contribute towards their becoming a major public health problem and the second most important cause of loss of healthy life years in women of child bearing

age³. It is also well known that failure to diagnose or treat these infections results in serious complications and sequelae including infertility, fetal wastage, neonatal deaths, ectopic pregnancy, chronic illness and malignancies. There are scattered reports in our country about the prevalence of these infections and no reliable data on the magnitude of the problem. Information on different population groups in geographically disparate regions is not available. This information is necessary for the identification of needs, setting priorities, design and evaluation of control programmes. As women and their offsprings carry the major burden of complications and serious sequelae, the development of STI control measures for this segment of the population is of particular importance. The present study was conducted to obtain information on current prevalence of some of the

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major STIs (syphilis, HIV, chlamydia, gonorrhoea and hepatitis B) in pregnant women and to study the inter-relationship between the clinical presentation and laboratory results.

Methodology

The study was carried out in 1996 – 1997 by the Indian Council of Medical Research at five tertiary level hospitals. These were PGIMER, Chandigarh; KEM hospital Mumbai; KEM hospital research center, Pune; Madan hospital, Calcutta and JIPMER, Pondicherry. Unlinked anonymous testing of 600 consecutive women attending the antenatal clinic of each hospital was carried out. Information on demographic, social and behavioral characteristics, obstetric history and history of current contraceptive use were obtained. A routine gynecological examination including speculum examination was performed and endocervical swab collected. Smear was prepared and Gram stained for detection of intracellular diplococci and culture prepared on Thayer Martin medium for detection of *N. gonorrhoea*. The chlamydiazyme –EIA (Abbott Laboratories) was utilized for antigen testing of *C. trachomatis*. Five milliliter of venous blood was also collected for carrying out the other tests. Serological testing for syphilis was done by VDRL and positive was confirmed by TPHA; hepatitis B surface antigen testing was done using Auszyme monoclonal third generation EIA (Abbott Laboratories) and HIV

testing was carried out using Abbott HIV 1/HIV 2 – 3rd generation plus EIA. The Govt. of India guidelines were adopted for confirmation of HIV infection (to be confirmed by repeat ELISA and if results are at variance, the third test to be performed with different kit). All centers also participated in external quality control, which was carried out at Christian Medical College, Vellore. Confidentiality was ensured while questioning the women. Standard statistical tests like chi square and Fishers exact test were used to test statistical significance. EPI-INFO software package provided by World Health Organisation was used for statistical analysis.

Observations

The mean age of the women was 24.2 ± 4.0 yrs. In about 40% of the women it was their first pregnancy, nearly seven percent of the women gave a previous history of still birth and in 16.7 percent there was a previous history of induced or spontaneous abortion. About 39% of the women were either illiterate (18.2%) or had only received education up to primary level (20.4%) whereas 24.2% of their husbands were either illiterate (11.5%) or educated up to primary level (12.7%). Majority 81% of the women were housewives. Only three percent of the women represented high risk sex behavior for either themselves (0.9%) or their husband /partner (2.1%). Around 1.2 % of the women reported that their husband /partner was a known case of STD.

Table I : Prevalence of Sexually Transmitted Infections in Pregnant Women

	No. of women +ve cases % +ve	Syphilis +ve cases % +ve	Hepatitis B +ve cases % +ve	HIV +ve cases % +ve	Gonococcus +ve cases % +ve	Chlamydia +ve cases %+ve	Any of these +ve cases %+ve
Chandigarh	600	2 0.3	8 1.3	0 0.0	0 0.0	6 1.0	16 2.7
Pondicherry	600	4 0.7	18 3.0	2 0.3	1 0.2	18 3.0	43 7.2
Calcutta	600	2 0.3	26 4.3	3 0.5	0 0.0	21 3.5	48 8.0
Mumbai	600	17 2.8	36 6.0	27 4.5	0 0.0	7 1.2	82 13.7
Pune	600	5 0.8	14 2.3	3 0.5	0 0.0	11 1.8	32 5.3
All centers	3000	30 1.0	102 3.4	35 1.2	1 0.0	63 2.1	221 7.4

In the whole 7.4 % of the pregnant women were found to be positive for at least one of the five infections studied ranging from 2.7% in Chandigarh to 13.7 % in Mumbai ($X^2_4 = 58.34, p < 0.001$). Significantly higher

prevalence of these infections was seen in Mumbai as compared to other centers. Chandigarh center reported significantly lower prevalence when compared with other centers. No statistically

significant difference was observed between the centers at Pondicherry, Calcutta and Pune.

A total of 102 women were found to be positive with hepatitis B giving it a highest prevalence (3.4%) among the STI studied. There was significantly variation between the centers ranging from 1.3% at Chandigarh to 6.0 percent at Mumbai ($X^2 = 24.1$, $p=0.0008$). The centers at Chandigarh, Pondicherry and Pune reported lower prevalence when compared with the centers at Calcutta and Mumbai (Table I).

The overall prevalence of syphilis was 1.0 % and that of HIV was 1.2%, Mumbai centre reported significantly

higher prevalence of syphilis (2.8%) and HIV (4.5%); there was no difference in the prevalence of these two infections between the other four centers ($p>0.05$). No case of HIV was reported among 600 pregnant women tested at Chandigarh.

Chlamydia trachomatis was more prevalent in Calcutta (3.5%) and Pondicherry (3.0%) when compared to Chandigarh (1.0%) and Mumbai (1.2%), ($X^2 = 14.4$, $p=0.006$). The prevalence of chlamydia was reported to be 2.1% in these five centers. Gonococcal infection appeared to be rare as only one case out of 3000 pregnant women was found to be positive.

Table II – Prevalence in relation to different factors

Variable	Number of women	Syphilis	Hepatitis B	HIV	Gonococcus	Chlamydia	Any one of these
Age (years)							
< 25	1682	1.0	3.4	1.3	0.1	2.1	7.6
>= 25	1318	1.1	3.3	1.0	0.0	2.0	7.1
Gravida							
Multi	1770	1.2	2.8	1.0	0.1	2.0	6.9
Primi	1230	0.7	4.3*	1.4	0.0	2.2	8.1
H/O Still birth							
Yes	210	2.9	1.4	0.5	0.0	1.4	5.7
No	2790	0.9	3.5	1.2	0.0	2.2	7.5
H/O Abortion							
Yes	500	0.8	3.4	0.6	0.0	1.8	6.6
No	2500	1.0	3.4	1.3	0.0	2.2	7.5
Education of woman							
≤= Primary	1157	1.1	3.8	1.1	0.0	3.0	8.6
> Primary	1843	0.9	3.1	1.2	0.1	1.5**	6.6*
Education of husband							
≤= Primary	725	1.4	3.9	0.8	0.0	2.8	8.6
> Primary	2275	0.9	3.3	1.3	0.0	1.9	7.0
High risk sexual behavior of self or partner							
Yes	90	4.4	6.7	1.1	0.0	4.4	16.7
No	2910	0.9**	3.3	1.2	0.0	2.0	7.1***
H/O STD in husband							
Yes	37	5.4	2.7	5.4	0.0	0.0	13.5
No	2963	0.9*	3.4	1.1	0.0	2.1	7.3

* $P<0.05$

** $P<0.01$

*** $P<0.001$

More than one infection was observed in 10 out of the 21 positive cases (4.5%). Eight women out of 102 (7.8%) positive with hepatitis B; 3 out of 30 (10%) positive for syphilis; 5 out of 35 (14%) positive for HIV and 4 out of 63 (6.3%) chlamydia positive cases were found to have more than one STI.

The prevalence of these infections was studied in relation to various factors like age, parity, high risk sexual behavior etc. (Table II) Age of women was not found to be related to the presence of any of these infections. None of the infections were associated with history of previous pregnancy. Similarly, there was no association between either history of still birth or abortion with any of these infections. Women who were either illiterate or received education up to primary were at higher risk (8.6%) of having one of these infections as compared to those having education above primary level and the difference was statistically significant ($p=0.04$; RR = 1.32; CI 1.02 – 1.70). A higher prevalence of chlamydial infection was also seen in women with education up to primary level (3%) as compared to those who had received education higher (1.5%) than that ($P=0.005$; RR = 1.99; CI 1.22 – 3.25). The prevalence of syphilis and hepatitis B was also seen to be higher in less educated women. However, the difference was not found to be statistically significant. Education of the husband / partner had no relationship with the prevalence of any of these infections.

Very few women (3%) reported high risk behavior of self or partner or gave a history of sexually transmitted

disease in partner. Nevertheless, these factors contributed significantly to the prevalence of STIs. The prevalence of having any one of these infections was 16.7 % in women reporting high risk sexual behavior of self or husband as compared to 7.1 % in those who did not report it ($p=0.001$; RR=2.35; CI 1.46-3.81). In the high-risk group, the prevalence of syphilis, hepatitis B and clamydia was higher. However, in this sample, statistical significance could only be detected in infection with syphilis. Significantly higher proportion of women giving a history of sexually transmitted disease in husband / partner were found to be infected with syphilis (RR=5.72; CI 1.41-23.14) and HIV (RR=4.85; CI 1.21-19.49) as compared to those who did not give this history.

One of the objectives of the study was to see the correlation between these infections and the clinical presentation. The women were examined for any sign of lower genital tract infection like genital ulcer, vulvitis, vaginitis or cervicitis. It was observed that in 477 (15.9%) women there were clinical signs of lower genital tract infection and 35 (7.3%) of these women tested positive for at least one of the STIs studied. This percentage was similar in those women who did not present with any clinical signs of lower genital tract infection. Conversely only 1 out of 30 cases of syphilis, 14 out of 102 cases of hepatitis B, 7 out of 35 cases of HIV and 13 out of 63 cases of chlamydia had clinical signs. Overall there was no association between the clinical signs and any of the infections studied. (Table III).

Table III – Prevalence of RTI/STD in relation to clinical signs of infection.

Signs of lower RTI	Number of women	Syphilis	Hepatitis B	HIV	Gonorrhoea	Chlamydia	Any one of these
Present	447	0.2	2.9	1.5	0.2	2.7	7.3
Absent	2499	1.2	3.5	1.1	0.0	2.0	7.4

Discussion

The study has provided the prevalence of sexually transmitted infections (syphilis, HIV, chlamydia, gonorrhoea and hepatitis B) in 3000 pregnant women attending the antenatal clinic in five tertiary level hospitals located in different parts of the country. Even though pregnant women are considered a sentinel population because they are a relatively unselected population whose prevalence data may be extended to the general population yet there are inherent biases

present. Pregnant women are more likely to be younger, sexually active and less likely to be using barrier contraceptives. On the other hand, pregnant women may be less likely to have STI because infertility is a sequel of it. Further research is needed to define the relation of STI rates among pregnant women to rates among women in the general population. Overall prevalence of having any one of the five infections was 7.4% in our series. A significantly higher prevalence was observed from the center at

Mumbai (13.7%). Mumbai is the industrial, commercial and financial capital of India and over the last 20 years urbanisation and industrialisation have led to its rapid growth with high migratory population. Mumbai center also had higher number of women reporting high risk sex behavior

Following hepatitis B virus infection, about five percent remain positive for hepatitis B surface antigen (HbsAg) and act as carriers. Vertical transmission occurs in about ten per cent of surface antigen positive mothers⁴ whereas most infected babies contract infection as a result of swallowing infected fluid during delivery and maternal-foetal transmission in labour. Presence of HbsAg in pregnant women does not pose an additional risk for the pregnancy⁵ but the infected infants are a reservoir of infection throughout their lives. Therefore, it is recommended that all infants born to HbsAg seropositive mothers should be routinely vaccinated with a recombinant vaccine. In our series, 3.4% of the pregnant women tested positive for HbsAg. This percentage ranged from 6% at Mumbai centre to 1.3% at the centre at Chandigarh. Similar findings have been reported in other studies. In a series of 7000 pregnant women screened in Delhi, 3.9% were found to be carriers⁶. However, in another study carried out in pregnant women from four regions of North India, an average HbsAg carrier rate of 9.5% was observed⁷. Economic analysis using current surveillance data is required to assess the cost-benefit of routine prenatal screening and immunisation of risk babies against universal infant immunisation.

It is estimated that about 4 million people in India are living with HIV and migration and mobility has increased the chances of the disease spreading to other areas / persons. Studies indicate that more women attending antenatal clinics are testing HIV positive leading to the public health problem of pediatric AIDS as the risk of perinatal transmission is 30% with an additional 10% risk of transmission by breast feeding². This also clearly indicates the spread of HIV to general population from high risk group. The overall prevalence of HIV in our study was 1.2% with Mumbai centre reporting significantly higher prevalence of 4.5%. No case of HIV was reported from Chandigarh centre indicating that there are still areas of low level epidemic. Similar findings were observed in a study carried out on 2780 pregnant women in Chandigarh where only one woman tested positive for HIV⁸. The other three centres in our study including Pune reported prevalence of less than one percent. However, HIV sentinel surveillance carried out by NACO during the period '94-'97 indicate increase in sero positivity in both Mumbai (3.00%) and Pune (3.62%)². A higher prevalence of HIV sero positivity

in pregnant women has been reported from other developing countries^{9,10}. Urgent and priority targeted intervention measures to curtail the epidemic of HIV are called for especially in areas like Mumbai where the prevalence in pregnant women is greater than one per cent or else we may reach the same epidemic proportions as are currently observed in some parts of Sub-Saharan Africa where the sero-prevalence may be as high as 30% among antenatal clinic attendance

Based on the available evidence, approximately 20% of women with chlamydial lower genital tract infection with develop PID, approximately four percent develop chronic pelvic pain, three percent infertility and two percent adverse pregnancy outcome¹¹. Infection in pregnancy can cause neonatal chorioamnionitis, prematurity, conjunctivitis and pneumonia. Low levels of chlamydial infection (2.1%) in pregnant women observed in our series contrasts with the findings of other studies carried out in India reporting a higher prevalence¹². The difference could be due to the fact that techniques for determining infection in all these studies were not similar.

The overall prevalence of syphilis, in our series was one percent with a significantly higher prevalence reported from Mumbai (2.8%). In a study carried out in Malaysia, 14,841 pregnant women were serologically tested for syphilis and 1.05% were found to be TPHA positives¹³. The prevalence of Syphilis in pregnant women ranges from less than one percent to over 10 percent reported from other developing countries^{13,9,10}.

High risk sexual behavior of self or husband, history of STD in husband and literacy status of woman were the factors associated with increased prevalence of STI in our study. Other studies have also indicated that high-risk behavior of self or husband and previous history of sexually transmitted disease in husband is an important factor associated with the prevalence of these infections¹⁴. Risk Factors may not accurately identify persons at risk for STI within a community. In addition, such indicators may not be culturally appropriate and could contribute to stigmatisation by labeling persons at high risk. These intensely personal questions must be asked in a non-threatening and non-stigmatizing manner. Mayoud et al,¹⁵ also observed that among the antenatal setting very few pregnant women gave an affirmative response to the question on sexual partners. Cultural norms in India are conservative and women are not expected to have extra marital relations. The results of our study corroborate that many women adhere to these values and do not adopt a lifestyle that makes them more vulnerable to STIs. This might be the reason for low

prevalence of STIs in Indian women as compared to those seen from other Western and African countries.

In our study there was no association between the clinical signs and any of the infections studied indicating a real constraint in the development of a suitable tool for STI screening. These findings also imply that syndromic management would not be effective in screening these pregnant women. In India, VDRL for detection of syphilis is the only test done routinely in pregnant woman. Hence, most of the other infections would have remained undetected, as even in tertiary level hospitals there are no screening programs for the detection of STIs in asymptomatic pregnant woman. This may lead to serious long-term sequelae in pregnant women and their partners besides transmission of these infections within the broader community will continue unchecked and an important opportunity for controlling these infections will be lost. Further studies are needed to develop suitable screening strategies for asymptomatic women in developing countries. In addition to improved laboratory facilities and innovative approaches to case finding, there should be widespread availability of good quality clinical STI services and a focus on prevention through information, education and the promotion of women's rights.

Collaborators

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