



Original Research Article

Seroprevalence of Hepatitis B, Hepatitis C, Syphilis and HIV in Pregnant Women in a Tertiary Care Hospital, Gujarat, India

Neeta Khokhar*, Dipal Jethwa, Rahul Lunagaria, Nikul Panchal,
Sonali Badrakiya and Gunjan Badrakiya

15, Jay Bhavani Society, Opp- Gurunagar Society, Near Baroda Pristage, Varachha Road,
Surat- 395006, Gujarat, India

*Corresponding author

ABSTRACT

Keywords

Antenatal women, HIV, Hepatitis B, Hepatitis C, Syphilis, Seroprevalence

The epidemiology of infections during pregnancy was important for health planners and program managers. Little information was available for prevalence of HBV, HCV, syphilis and HIV by vertical transmission. These infections were major public health problem during pregnancy as associated with high risk of maternal complications. The purpose of this study was to determine prevalence and to re-evaluate the need for routine antenatal care screening for these infections among obstetric patients. The study was conducted at tertiary care hospitals in Gujarat from June to September 2011. Consecutively patients were enrolled for study after taking informed consent. All samples were tested for HBsAg, anti-HCV by ELISA, *Treponema pallidum* by RPR, antibodies to HIV by three different methods as per Strategy III of the National AIDS Control Organization by using different systems of testing to establish a diagnosis of HIV. Seropositivity of HBV (3.03%), HCV (0.19%), syphilis (0.49%), and HIV was 0.39%. Co-infection with syphilis and HIV was found in (0.29%) of patients. This study can help gynecologist for the treatment of antenatal patients more effectively. The data reinforces the need for establishing effective prevention programs, which could lead to reduction in the prevalence of these infections.

Introduction

Testing for hepatitis B surface antigen (HBsAg), syphilis, human immunodeficiency virus (HIV) in pregnancy and labour is medically indicated to prevent vertical transmission. Viral hepatitis during pregnancy is associated with a high risk of maternal complications, has a high rate of vertical transmission causing fetal and neonatal hepatitis and has been reported as a

leading cause of maternal mortality (Ornoy and Tenenbaum, 2006). Three major routes spread HBV: perinatal, horizontal, and sexual transmission (Edmunds *et al.*, 1996). The significance of HBV infection during pregnancy derives through its potential to be transmitted vertically. In developing countries, the main routes of transmission are: neonatal with HBV carrier mother

infecting her infant usually during birth or soon after birth (Cheesbrough, 2000). Ten percent of infants born to women with acute HBV infection during the first trimester of pregnancy are HBsAg-positive at birth and 80 to 90% of neonates become HBsAg-positive without prophylactic therapy if acute maternal infection develops during the third trimester of pregnancy (Sweet *et al.*, 1990). According to Okada *et al.* (1976), 85% of neonatal HBV infections are caused due to intrapartum exposure to infectious blood and vaginal secretion, and the remaining 15% are caused by haematogenous transplacental viral spread.

Epidemiological data on HBV infection are important to program managers and health planners, to plan vaccination and other preventive strategies. Though several studies on epidemiology of viral hepatitis in pregnancy are available from Africa (Simpore *et al.*, 2006). There is paucity of such data from India.

The intrapartum period may be the only clinical access point for the antenatal population in limited resource settings. Successful interventions to prevent vertical transmission linked to intrapartum rapid testing have been demonstrated in a variety of limited resource settings (Lolekha *et al.*, 2002; Department of Vaccines and Biologicals, WHO, 2001).

Little is known about hepatitis C virus (HCV) infection in pregnant women in India. The seroprevalence of anti-HCV antibody in the healthy general population of India was found to be 1.5 per cent each in 234 voluntary blood donors and 65 pregnant women (Irshad *et al.*, 1995). Large scale studies on the estimates of the prevalence of HCV infection or the risk behavior of HCV infection in the low-risk Indian population are yet to be done. The current study is to

assess the prevalence of HCV infection within an obstetric population attending our hospital. Transmission of *T. pallidum* from a syphilitic woman to her fetus through the placenta may occur at any stage of pregnancy, but the lesions of congenital syphilis generally have their onset after the fourth month of gestation, when fetal immunologic competence begins to develop. This timing suggests that the pathogenesis of congenital syphilis depends on the immune response of the host rather than on a direct toxic effect of *T. pallidum*. The risk of infection of the fetus during untreated early maternal syphilis is estimated to be 75 to 95%, decreasing to approximately 35% for maternal syphilis of two years' duration (Kasper *et al.*, 2005).

HIV infection can be transmitted from an infected mother to her fetus during pregnancy, during delivery, or by breastfeeding. Virology analysis of aborted fetuses indicates that HIV can be transmitted to the fetus as early as the first and second trimesters of pregnancy (Kasper *et al.*, 2005).

People at high risk for HIV are also likely to be at risk for HBV or HCV enabling coinfection with these viruses common event (Saravanan *et al.*, 2007; Jain *et al.*, 2009). Co-infections of HBV and HCV in HIV positive patients are associated with reduced survival and an increased risk of progression to severe liver diseases with higher susceptibility towards hepato-toxicity due to antiretroviral therapy (Mohammad *et al.*, 2009). In United States and Europe have expert guidelines to screening of pregnant woman for HIV, HBV and HCV to help inappropriate management. In developing countries like India, no such uniform guidelines are available. Moreover literature regarding the prevalence of HIV co-infection with HBV &/or HCV in India is

sparse. Thus the present study was undertaken to detect the current seroprevalence of HBV&/or HCV, syphilis and HIV in pregnant women visiting tertiary care hospital, Gujarat.

Materials and Methods

This study was conducted to determine the prevalence of hepatitis B, hepatitis C virus, *Treponema pallidum*, and HIV virus among patients attending the antenatal clinic at tertiary care hospital, Gujarat. Serum samples from 1020 cases were collected at the tertiary care hospitals in Gujarat from June to September 2011. These samples were tested for hepatitis B surface antigen (HBsAg), antibody to hepatitis C, syphilis, and HIV. Test for the HIV was done as per Strategy III of the National AIDS Control Organization by using different test kit to establish diagnosis of HIV. Blood was collected as per standard guideline. Following tests were done from the serum as per manufacturer guideline.

The serum samples were checked for the presence of hepatitis B surface antigen (HBsAg) using Erba - Lisa Test Hepb (Transasia Biomedical Ltd. Daman, India). IgG antibodies to HCV using Innova HCV (M/S Span Diagnostics Ltd, Surat, India) test kit, a third-generation ELISA for the detection of antibodies against HCV in human serum or plasma. Micro wells were coated with HCV-specific recombinant antigens from the putative C-core (structural), E1 and E2 (envelop proteins), NS3, NS4, and NS5 (non-structural) regions of the HCV genome. The test was performed according to the manufacturer's instructions. The RPR syphilis screening test (Tulip Diagnostics Pvt Ltd, Goa, India) which is a macroscopic non-treponemal flocculation card test for the detection and quantitation of antilipoidal antibodies in serum or plasma.

Antibodies to HIV (anti-HIV) were determined by dot immunoassay (CombAids HIV 1 + 2 Immunodot Test Kit, M/S Span Diagnostics Ltd, Surat, India), and positive results were confirmed by the test which employs lateral flow-immunochromatographic type assay line immunoassay (Pareekshak HIV 1/2 Triline card test, Bhat Biotech Pvt Ltd, Bangalore, India) and the HIV TRI-DOT test (J. Mitra & Co Pvt Ltd, New Delhi, India), which is a visual, rapid, sensitive and accurate immunoassay for the detection of HIV-1 and HIV-2 antibodies (IgG) in human serum or plasma using HIV-1 and HIV-2 antigens immobilized on a porous immunofiltration membrane.

Results and Discussion

A total of 1020 samples were tested from antenatal patients for hepatitis B virus, hepatitis C virus, syphilis and HIV infections.

Among the antenatal cases prevalence of HBsAg was maximum in the 22–26 year of age group (58.06%). HBsAg positivity was found in 31 patients out of 1020 samples; so the prevalence for HBsAg was 3.03 % as shown in table 1. Among that prevalence of HBsAg in the second trimester was the highest (43.33%), followed by the third (33.33%) and first trimester (23.33%) as shown in table 2. Positivity for antibody against HCV was found in 2 patients, thus the overall prevalence for anti-HCV was 0.19 % as shown in table 1. Two samples seropositive for anti-HCV in the first and second trimesters are shown in table 2. Prevalence of the *T. pallidum* was maximum in the 22-26 year age group among antenatal cases in present study. Five samples were positive for *T. pallidum* antibody out of 1020 samples; thus prevalence of syphilis in this study was 0.49% during pregnancy as

shown in table 1. Three samples from the third trimester were seropositive, while only one sample from the first and second trimesters each were seropositive as shown in table 2. All samples were tested by using both qualitative as well as quantitative method for RPR. All reactive qualitative RPR had a titre $\geq 1:8$. A total of 4 samples out of 1020 were positive for HIV; among which highest prevalence was found in the age group of 27–31 year (75%), followed by the age group 21–25 year (25%). the overall prevalence for HIV was 0.39% as shown in table 1. Seroprevalence for HIV was highest in the second trimester as shown in table 2. Co-infection with syphilis and HIV was found in three patients (0.29%) under the age group of 27–31years, of which one in first trimester and two were in second trimester of pregnancy.

As shown in our study, HBsAg prevalence rate was 3.03% among antenatal women, which is lower than the rates reported by Gill *et al.* (5%) (Gill *et al.*, 1995) and Mittal *et al.* (6.3%) (Mittal *et al.*, 1996). The results of our study are comparable to Sehgal (2.6%) (Sehgal *et al.*, 1992), Gupta (2.5%) (Gupta *et al.*, 1992, Panda (2.6%) (Panda *et al.*, 1991) and Nayak (3.7%) (Nayak *et al.*, 1987) studies. The results from our study is slightly higher than those reported by Biswas *et al.* (2.3%) (Biswas *et al.*, 1989).

The strong possibility of vertical transmission shows the importance in diagnosing the acute or chronic HBV infection in pregnant women and justifies mandatory antepartum serum HBsAg screening. (ACOG Technical Bulletin Number 174-November 1992–1993) Screening of HBsAg will reveal previously unsuspected chronic HBV infection in healthy, individuals have benefits. This

screening makes the possibility for referring such patients for appropriate antiviral therapy before significant liver damage.

Large scale studies on the estimates of the prevalence of HCV infection and risk behaviour of HCV infection in the Indian population are yet to undertaken. Of the 1020 samples, only two samples were positive for anti-HCV antibodies (0.19%), which is very low compared to the rates reported by Kumar *et al.* (1.03%) (Kumar *et al.*, 2007) and Shaikh *et al.* (3.44%) (Shaikh *et al.*, 2009), but similar to the rates reported by Gangu and Goel *et al.* (0%) (Ganju and Goel *et al.*, 2001) and Parthiban *et al.* (0.6%) (Parthiban *et al.*, 2009). In our study, HCV-positivity was 50% in the age group of 21-25 year, which is comparable to the findings of Parthiban *et al.* (52%) (Parthiban *et al.*, 2009). Prevalence of HCV infection is lower, identification of HCV infection poses a greater public health problem. The modules based on high risk factor analysis will fail to identify many patients who are being infected. Therefore, targeted screening is not sufficient and universal screening would cause cost constraints especially in resource-poor countries.

The prevalence rate of syphilis in our study (0.49%) was low compared to the rate reported by Kebede and Chamiso (2000) (2.9%), and Gupta *et al.* (2003) (1.47%). In India, available information indicates that the prevalence of maternal syphilis has remained at around 1.5% between 2003 and 2007 (strategy of WHO, 2009)

Among the screened patients, 4 (0.38%) patients were positive for HIV, which is slightly lower than the cases between 2009 and 2010 (0.49%) (NACO) Annual Report 2009-2010).

Table.1 Hepatitis-B, Hepatitis-C, Syphilis and HIV among antenatal cases in various age groups

Type of Infections	Results	Age-Group (years)					Total
		17-21	22-26	27-31	32-36	>36	
HBsAg	Positive	8	18	5	0	0	31
	Negative	226	544	186	29	4	989
	Total	234	562	191	29	4	1020
HCV	Positive	0	1	0	1	0	2
	Negative	234	561	191	28	4	1018
	Total	234	562	191	29	4	1020
Syphilis	Positive	0	5	0	0	0	5
	Negative	234	557	191	29	4	1015
	Total	234	562	191	29	4	1020
HIV	Positive	0	1	3	0	0	4
	Negative	234	561	188	29	4	1016
	Total	234	562	191	29	4	1020

Table.2 Hepatitis-B, Hepatitis-C, Syphilis and HIV among antenatal cases in various trimesters

		Trimester			
		1st	2 nd	3rd	Total
HBsAg	Positive	7	13	10	30
	Negative	325	383	282	990
	Total	332	396	292	1020
HCV	Positive	1	1	0	2
	Negative	330	396	292	1018
	Total	331	397	292	1020
Syphilis	Positive	1	1	3	5
	Negative	330	396	289	1015
	Total	331	397	292	1020
HIV	Positive	0	4	0	4
	Negative	331	393	292	1016
	Total	331	397	292	1020

The findings in our study were lower compared to the findings of Mathur *et al.* (2008) (1.86%), Mustafa *et al.* (2007) (1.1%) and Gupta *et al.* (2007) (0.88%). Our study indicates a lower prevalence of HIV. Although sample size is limited, positivity of HIV in pregnant woman will directly lead to high perinatal transmission and a reciprocal increase in pediatric AIDS cases. Therefore, it may be recommended that even though the curative treatment for HIV is not available, we can minimize pediatric HIV infection by early screening of pregnant mothers for HIV followed by perinatal

short-term anti-retroviral therapy, safe delivery practices and modified infant feeding.

In conclusion, this study can help the health professionals to efficiently treat antenatal patients. The data also reinforces the need for effective prevention programs, which could lead to a reduction in the prevalence of HBV, HCV, syphilis, and HIV.

Acknowledgement

We would like to express sincere

appreciation and deep gratitude to the support of our hospital and also to the all participants in this work.

References

- ACOG Technical bulletin, 1992. Hepatitis in pregnancy. No. 174 - November Hepatitis in pregnancy. ACOG Technical Bulletin Number 174--November 1992 (1993). *Int. J. Gynaecol. Obstet.*, 42: 189–98
- Biswas, S.C., Gupta, I., Ganguly, N.K., Chawla, Y., Dilawari, J.B. 1989. Prevalence of hepatitis B surface antigen in pregnant mothers and its perinatal transmission. *Trans. R Soc. Trop. Med. Hyg.*, 83: 698–700.
- Cheesbrough, M. 2000. District laboratory practice in tropical countries, 3rd edn. Cambridge University press, UK. Pp. 250–252.
- Department of Vaccines and Biologicals, World Health Organization. Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents. World Health Organization, Geneva; 2001.
- Edmunds, W.J., Medley, G.F., Nokes, D.J. 1996. The transmission dynamics and control of hepatitis B virus in The Gambia. *Statistics Medicine*, 30(15): 2215–33.
- Ganju, S.A., Goel, A. 2001. Hepatitis C virus activity in Shimla – A preliminary report. *Indian J. Med. Microbiol.*, 19: 227.
- Gupta, I., Sehgal, A., Sehgal, R., Ganguly, N.K. 1992. Vertical transmission of hepatitis B in North India. *J. Hyg. Epid. Microbiol. Immunol.*, 36: 263–267.
- Gupta, N., Gautam, V., Sehgal, R., Gill, P.S., Arora, D.R. 2003. Screening by VDRL test to detect hidden cases of syphilis. *Indian J. Med. Microbiol.*, 21: 118–120.
- Gupta, S., Gupta, R., Singh, S. 2007. Seroprevalence of HIV in pregnant women in North India: a tertiary care hospital based study. *BMC Infect. Dis.*, 7: 133.
- Irshad, M., Acharya, S.K., Joshi, Y.K. 1995. Prevalence of hepatitis C virus antibodies in the general population and in the selected groups of patients in Delhi. *Indian J. Med. Res.*, 102: 162–164.
- Jain, M., Chakarvati, A., Verma, V., Bhalla, P. 2009. Seroprevalence of hepatitis virus in patients infected with human immunodeficiency virus. *Indian J. Pathol. Microbiol.*, 52: 17–9.
- Kasper, L., Braunwald, E., Fauci, A., Hauser, S., Longo, D., Jameson, J.L. 2005. Harrison's principles of internal medicine, 16th edn. McGraw-Hill Medical Publishing Division, New York. 2607 Pp.
- Kebede, E., Chamiso, B. 2000. Prevalence of syphilis in pregnancy in Addis Ababa. *East Afr. Med. J.*, 77: 212–216.
- Kumar, A., Aparna Sharma, K., Gupta, R.K., Kar, P., Chakravarti, A. 2007. Prevalence and risk factors for hepatitis C virus among pregnant Women Indian *J. Med. Res.*, 126: 211–215.
- Lolekha, S., Warachit, B., Hirunyachote, A., Bowonkiratikachorn, P., West, D.J., Poerschke, G. 2002. Protective efficacy of hepatitis B vaccine without HBIG in infants of HBeAg-positive carrier mothers in Thailand. *Vaccine*, 20: 3739–43. doi: 10.1016/S0264-410X(02)00358-4.
- Mathur, M., Taklikar, S., Turbadkar, D. 2008. Study of HIV seroprevalence and sociodemographic patterns in antenatal cases and vertical transmission to neonates. *Indian J. Med. Microbiol.*, 26: 289–290.

- Mittal, S.K., Rao, S., Rastogi, A., Aggarwal, V., Kumari, S. 1996. Hepatitis B, potential of perinatal transmission in India. *Trop. Gastroenterol.*, 17: 190–192.
- Mohammad, M., Talel, G., Sheikhan, A., Ebrahimzade, F., Pournia, Y., Ghasemal, E. *et al.* 2009. Survey of both hepatitis B virus (HBsAg) and hepatitis C virus (HCV-Ab) co-infection among HIV positive patients. *Virology J.*, 6: 202.
- Mustafa, M., Ahmed, K.S., Habibullah, C.M. 2007. Prevalence of Human Immunodeficiency Virus infection in pregnant women. *Indian J. Med. Microbiol.*, 25: 172-173.
- National AIDS Control Organisation India (NACO) Annual Report 2009-2010.
- Nayak, N.C., Panda, S.K., Zuckerman, A.J., Bhan, M.K., Guha, D.K. 1987. Dynamics and impact of perinatal transmission of hepatitis B virus in North India. *J. Med. Virol.*, 21: 137–145.
- Okada, K., Kamiyama, I., Inomata, M., Imai, M., Miyakawa, Y. 1976. e antigen and anti-e in the serum of asymptomatic carrier mothers as indicators of positive and negative transmission of hepatitis B virus to their infants. *N. Engl. J. Med.*, 294: 746–749.
- Ornoy, A., Tenenbaum, A. 2006. Pregnancy outcome following infections by coxsackie, echo, measles, mumps, hepatitis, polio and encephalitis viruses. *Reprod. Toxicol.*, 21: 446–57.
- Panda, S.K., Ramesh, R., Rao, K.V.S., Gupta, A., Zuckerman, A.J., Nayak, N.C. 1991. Comparative evaluation of the immunogenicity of yeast derived (recombinant) and plasma derived Hepatitis B vaccine in infants. *J. Med. Virol.*, 35: 297–302.
- Parthiban, R., Shanmugam, S., Velu, V., Nandakumar, S., Dhevahi, E., Thangaraj, K., Nayak, H.K., Gupte, M.D., Thyagarajan, S.P. 2009. Transmission of hepatitis C virus infection from asymptomatic mother to child in southern India. *Int. J. Infect. Dis.*, 13: 394–400.
- Regional Strategy for elimination of congenital syphilis, WHO, 2009.
- Saravanan, S., Velu, V., Kumarasamy, N., Nandakumar, S., Murugavel, K.G., Balakrishnan, P., *et al.* 2007. Coinfection of hepatitis B and hepatitis C virus in HIV infected patients in South India. *World J. Gastroenterol.*, 13: 5015–20.
- Sehgal, A., Gupta, I., Sehgal, R., Ganguly, N.K. 1992. Hepatitis B vaccine alone or in combination with anti-HBs immunoglobulin in the perinatal prophylaxis of babies born to HBsAg carrier mothers. *Acta Virol.*, 36: 359–366.
- Shaikh, F., Syed Qaiser, H.N., Kousar, J., Allah Dino Memon, R. 2009. Prevalence and risk factors for hepatitis c virus during pregnancy. *Gomal. J. Med. Sci.*, 2: 86–88.
- Simpore, J., Savadogo, A., Ilboudo, D. *et al.* 2006. Toxoplasma gondii, HCV, and HBV seroprevalence and co-infection among HIV positive and –negative pregnant women in Burkina Faso. *J. Med. Virol.*, 78: 730–3.
- Sweet, R.L. 1990. Hepatitis B infection in pregnancy. *Obstet. Gynecol. Report*, 2: 128.