ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: www.ijmacr.com

Volume – 5, Issue – 4, July – August - 2022, Page No. : 122 - 127

Analysis of risk factors for perinatal transmission of hepatitis b virus in sero positive pregnant women

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How to citation this article: Dr. Shimla Meena, Dr. Aditi Bansal, Dr. Pushpa Nagar, Dr. Sapna Chaudhary, Dr. Jyoti, "Analysis of risk factors for perinatal transmission of hepatitis b virus in sero positive pregnant women", IJMACR- July – August - 2022, Vol – 5, Issue - 4, P. No. 122 – 127.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: The aim of this study was to analyse risk factors associated with vertical transmission in newborn of pregnant women positive for HBsAg.

Material And Method: The study was conducted in department of Obstetrics and Gynaecology, SMS medical college, Jaipur and 100 HBsAg positive pregnant women admitted in labour room for delivery were recruited for the study. Blood sample of all pregnant women were sent for HBeAg, anti HBeAb, HBcAb and HBV DNA level, cord blood sample of new born were sent for HBV DNA level to asses vertical transmission.

Results: Among 100 HBsAg positive women HBeAg was found in 29 women and anti HBeAb was found in 86 pregnant women and maximum vertical transmission were found in women who were positive for HBeAg and negative for anti HBeAb. All the cord blood sample with HBV DNA positivity also has HBV DNA positivity in mothers serum and women who were delivered by lower segment caesarean section shows high vertical transmission in comparison to women who delivered by vaginal delivery.

Conclusion: Seropositive Pregnant women with positive HBeAg, negative anti HBeAb, high HBV DNA level and women who delivered by lscs shows higher risk of vertical transmission in neonates.

Keywords: HBeAb, HBcAb, HBV DNA

Introduction

Hepatitis B virus (HBV) is a deoxyribonucleic acid (DNA) virus belonging to family Hepdnaviridae which can cause both acute or chronic infection. According to World Health Organization estimates, it chronically infects more than 240 million people worldwide. In

highly endemic countries, mother-to-child transmission accounts for most cases of infections and therefore, it is the main mechanism that perpetuates the infection in the population[2].

HBV has been found in almost all body secretions and excretions. Though, it is found in all body secretions and excretions, the risk of transmission are only through blood, body fluids containing noticeable blood, semen and vaginal secretions. Major modes of HBV transmission include sexual contact with infected person, perinatal mother to infant transmission, using infected syringes for injecting drugs and nosocomial exposure[1].

HBV infection during pregnancy poses particular problems. These include the effect of HBV infection on pregnancy, the effect of pregnancy on HBV infection, the mother-to-child transmission of HBV, and the management of pregnancy[3].

Investigations to be done among patients with hepatitis B virus infection include the demonstration of Hepatitis B e antigen (HBeAg) which appears during the incubation period and rises during prodrome, acute and in certain patients in chronic phase. It is an important indicator of transmissibility and is replaced by HBeAb, whose presence indicate low transmissibility[4].

Without prophylaxis the risk of mother-to-child transmission is very high. It varies with the HBeAg / anti-HBeAb status of mothers, being 70%-90% for HBeAg-positive mothers, 25% for HBeAg-negative / HBeAb-negative mothers and 12%for HBeAg-negative/anti-HBeAb positive mothers. Maternal screening programs aimed at identifying HBsAg-positive mothers are part of pregnancy routine examinations in most countries[5]. Despite HBsAg prevalence, there is a paucity of data regarding HBeAg and anti HBeAb status among pregnant women which helps to design and implement preventive and control measures and awareness of transmission route of HBV infection[10]. Hence, the present study was designed to determine infectivity and associated associated risk factor of HBV among pregnant women attending our hospital.

Material and methods

A descriptive type of observational study conducted in department of Obstetrics and Gyaecology, SMS medical college, Jaipur from may 2020 to April 2021.

HBsAg positive pregnant admitted in labour room and willing to give written and informed consent were included in this study. Pregnant women with coexisting HIV or family history of hereditary immunodeficiency diseases were excluded from the study.

Pre-study work-up and investigations were done, Complete history was taken and data on socio demography was collected.

Venous blood sample (5ml) of HBsAg positive women was collected and sent to laboratory for HBeAg, Anti HBe, Anti HBc antibodies, (measured by ELISA) and HBV DNA (measured by HBV PCR kit) tests. Immediately after delivery cord blood was saved and sample was sent for estimation of HBV DNA level.

Women were managed as per hospital protocols during delivery, Mode of delivery was noted whether it is vaginal delivery or lower segment caesarean section.

Statistical Analysis

Data were coded, entered, and analyzed using SPSS version 20 (IBM Corp., Armonk, NY, USA). We described data using either proportion or mean with standard deviation (SD). Association between participant characteristics and outcome variables (HBsAg positivity) was assessed using $\chi 2$ test (or Fisher's exact test as appropriate) for categorical predictors. All

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explanatory variables with a p-value ≤ 0.05 in the bivariate analysis were included in the multivariate logistic regression model to identify variables which have been associated independently. Odds ratios (OR) with their 95% confidence intervals (CI) served to investigate the influence of various factors on the occurrence of HBV infection. A p-value of <0.05 was regarded as significant.

Results

Our results shows that maximum HBsAg positive women belong to 25-29 years age group and maximum vertical transmission (38.8%) were seen in women who were >30 years of age; vertical transmission among neonates of Hindu mother was 18% and of Muslim mothers it was 23%; maximum women were house wives by occupation and shows 18.75% vertical transmission; 39 women were illiterate and among them 41.03% women were shows vertical transmission; maximum women (61%) were belonged to middle socioeconomic class but highest vertical transmission was seen in women who belonged to lower socioeconomic class; maximum 68% women were multiparous and 18.25% vertical transmission was seen in primigravida women and 22% vertical transmission was seen in multi parous women.

Table 1: Vertical transmission of HBsAg in relation to socio demographic factors of mother

Age (yrs)	HBsAg positive mothers	HBV DNA positivitivty in cord blood	P- Value	S / NS	
<25 years	33	8 (24.2%)			
25-29 years	49	6 (12.2%)	0.051	NS	
30-35 years	18	7 (38.8%)			
Religion					
Hindu	44	8 (18.1%)	0.714	NS	
Muslim	56	13 (23.2%)			
Occupation					
House wife	80	15 (18.75%)	0.425	NS	
Working	20	6 (30%)			
Education					
Illitrate	39	16 (41.03%)			
Primary	11	1 (9.09%)	0.004	S	
Secondary	27	2 (7.4%)			
Graduate/ PG	23				
Socio economic class					
Lower	28	14 (50%)			
Middle	61	6 (9.8%)	0.001	S	
Higher	11	1 (9.09%)			
Parity					
0	32	6 (18.25%)			
1	47	10 (21.2%)	0.905	NS	
2 or more	21	5 (23.81%)			

[NS – Non significant, S – Significant]

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Table 2: Maternal risk factors in relation to HBV DNA level in cord blood

Maternal risk factors	HBeAg positivity	Anti HBeAb positivity	Anti HBeAb negativity	High HBV DNA level	Mode of delivery	
					VD	LSCS
Number of women	29	86	14	38	53	46
HBV DNA positivity in cord blood	18 (62.07%)	9 (10.47%)	12 (85.71%)	21 (55.26%)	6 (13.9%)	15 (42.8%)
P- Value	<0.001	< 0.001		<0.001	O.O4 Significant	
S/NS	Significant	Significant		Significant		
Total HBsAg positive women	100	100		100	100	

In this table out of 100 HBsAg positive women 29 women were HBeAg positive and 62.07% vertical transmission were seen in HBeAg positive women and only 4.23% vertical transmission were seen in HBeAg negative women, only 10.47% vertical transmission was seen in anti HBeAb positive women but 85.71% vertical transmission was seen in anti HBeAb negative women. High HBV DNA level were found in 38 HBsAg positive women and 55.26% vertical was seen in them, out of 100 women 53% delivered by vaginal delivery and 46% women delivered by lower segment caesarean section with 42.8% vertical transmission.

Discussion

In our study we observed that associations between sociodemographic factors like maternal age, religion, occupation, parity and vertical transmission were not statistically significant. On contrary our study shows statistically significant correlation between socioeconomic status and education of mother. Maximum vertical transmission (HBV DNA positivity in cord blood of neonates was 41%) was seen in illiterate women, this may be because illiterate women are not aware of dangers of infection and benefits of vaccination, prophylaxis and treatment of viral infection and mostly do not know the importance of hygienic life style and similar results were also found by Anteneh Amsalu et al.[9], Etame et al.[7] . Women who were belonged to lower socioeconomic class shows maximum vertical transmission, this may be because the women of lower socioeconomic status often associated with lower education level, poor hygienic conditions, non-availability of proper nutrition, lack of awareness about viral infection, treatment and prophylaxis of viral infection during pregnancy. Hence, there is possibility of higher rate of viral infection and increase chances of higher viral load in mother which may be directly corelated with vertical transmission of HBsAg infection, and similar results were also found by Raaj A et al.[6] and Shedain et al.[10]

In this study statistically significant correlation found between HBeAg positivity, anti HBeAb negativity and HBV DNA positivity in cord blood of neonates. It shows that anti HBeAb found to be protective against vertical transmission of HBsAg infection and similar results

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were also found by Raaj A et al.[6], Etame et al.[7], Nelson J et al.[8] and Gua et al.[11]. Statistically significant positive correlation found between high maternal HBV DNA level and HBV DNA positivity in cord blood sample and similar results were also found by Wiseman et al.[13], Raaj A et al.[6]. Results of our study suggest that vertical transmission was more common in women who delivered by caesarean section, Lee et al.[12] and Raaj A et al.[6] also reported similar results in their study.

Conclusion

Vertical transmission of hepatitis B virus was higher in women who were belonged to lower socioeconomic class, illiterate, positive for HBeAg and negative for anti HBeAb. It shows that anti HBeAb found to be protective against vertical transmission of HBsAg infection. The HBeAg and anti HBeAb status of mother can predict the possibility of vertical transmission of hepatitis B virus infection and identify the stage of infection so, we can decide whether to give antiviral chemotherapy to intervene the vertical transmission in pregnant women. We observed in our study that vertical transmission rate was higher in infants of pregnant women who had higher level of HBV DNA level, HBeAg level and delivered by LSCS.

HBeAg positivity and LSCS could be the independent risk factor of vertical transmission than any other risk factors. Therefore, elective LSCS should not be advisable in HBsAg-positive pregnant women to prevent vertical transmission of HBV.

Standard passive–active immuno prophylaxis with HBIG plus HBV vaccine in neonates within 12 h after delivery is proved to be successful in preventing approximately 90% of new born from MTCT of HBV.

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