Indian Journal of Microbiology Research 2022;9(4):279–282

Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Microbiology Research

Journal homepage: https://www.ijmronline.org/

Original Research Article

Sero-prevalence of hepatitis B infection among antenatal patients at tertiary care hospital - A prospective study

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ARTICLE INFO

Article history:
Received 06-10-2022
Accepted 14-10-2022
Available online 23-01-2023

Keywords:
Hepatitis B
Seroprevalence

ABSTRACT

Background: Hepatitis B infection in a neonate leads to chronic forms of the infection in 90% of the cases associated with the high risk of complications. This is due to transplacental transmission of HBV to the neonates. Early intervention can prevent the infection in the neonates or prevent them to succumb to a chronic infection. The present study aims to explore the seroprevalence of the HBsAg in the blood samples from healthy pregnant women patients.

Materials and Methods: A total of 200 blood samples were collected from pregnant women attending anti-natal clinic at ZMCH Dahod. HbsAg ELISA and rapid antigen test (HEPA CARD) were used to detect the surface antigen of hepatitis B virus.

Result: The age wise distribution of hepatitis B infection in pregnant women using HBsAg specific ELISA shows a total prevalence of 5.26% of hepatitis B infection among pregnant women of different age groups. The prevalence of hepatitis B infection among women of age groups 18-27 years to be 4.76%, followed with 6.89% in age group 28-37 years.

Conclusion: The present study shows a prevalence range of 4% to 5.26% of hepatitis B infection among antenatal women.

1. Introduction

Infection with Hepatitis B virus (HBV) has infected more than 2 billion people making it a global health problem.[1] Approximately 350 million people worldwide are infected chronically with HBV, among which the perinatal transmission of the diseases accounts for half of the chronically infected population.[2,3] If the mother is positive for both HBsAg and HBeAg then the child will have a 70-90% chances of acquiring perinatal HBV infection and more than 85-90% of them can become chronic carriers of the diseases.[4,5] These chronic carriers of HBV become the reservoir for the continuous transmission of HBV.[6] India has upto 10% of the 350 million chronic carriers of HBV.[7,8]

The hepatitis B virus (HBV) is a small DNA virus with unusual features similar to retroviruses.[9,10] A spherical double shelled structure 42nm in diameter, consisting HBsAg that surrounds an inner nucleocapsid composed of hepatitis B core antigen (HBcAg) with the virally encoded polymerase and the viral DNA genome is the infectious HBV viron (Dane particle). Its genome is partially double stranded circular DNA.[11] HBV can be transmitted by 3 possible routes which are from mother to infants i.e. transplacental, natal or postnatal (i.e. in-vitro, during delivery or during infants care or; through breast milk).[12–14] When the infants and the maternal blood or other body fluid comes in contact with the infant it leads

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https://doi.org/10.18231/j.ijmr.2022.046

to perinatal transmission of HBV.[15]

HBV infection in immunocompetent adults causes moderate, transient liver disease and viral load in more than 95% of adults, and more than 90% of neonates exposed to HBV at birth are progressively infected. The incubation period is of 1 to 6 months. In the prodromal stage serum sickness like syndrome can be seen, which is further succeeded by constitutional symptoms, anorexia, nausea, jaundice and right upper quadrant discomfort. A patient is said to have chronic HBV infection if the HBsAg remains positive for more than 6 months. Blood is the specimen of choice for diagnosis of HBV infection. Diagnostic screening is done through serological tests for viral antigens and antibodies which can be run on both serum and plasma.[16] HBsAg, anti-HBs, HBeAg, anti-HBe, and anti-HBc IgM and IgG are the serological markers for HBV infection.[17] The serological hall of HBV infection is HBsAg. HBcAg is present intracellularly and hence not identified in serum. Anti-HBc IgM and IgG is detected within 1-2 weeks during acute unfection following presence of HBsAg in concordance with elevated serum aminotransferase and symptoms.[18,19]

The following study was conducted to explore the seroprevalence of the HBsAg in the blood samples from healthy pregnant women patients coming to Zydus Medical College and Hospital, Dahod; a tertiary hospital situated in the tribal district of Gujarat India.

2. Materials and Methods

2.1. Study design

Hospital based prospective study was conducted at department of Microbiology, Zydus Medical College and Hospital during May and June 2021.

2.2. Sample collection

A total of 200 blood samples were collected from pregnant women with age group ranging from 18 to 45 years, attending anti-natal clinic at Zydus Hospital Dahod. After taking a written consent from the participants, 4-5 ml of blood samples was collected aseptically in a plain vacutainer.

2.3. Sample inclusion criteria

All ANC patients between 18– 45 years of age attending in Gynecology department at Zydus Medical College and Hospital.

2.4. Sample exclusion criteria

Patients with less than 19 years and more than 45 years of age, those who have not given the consent were excluded from this study.

2.5. Ethical clearance

This study was approved by institutional ethical committee of Zydus Medical College and Hospital.

2.6. Serum separation

Blood in serum separator tube was kept at room temperature for 30 minutes for clot retraction. It was centrifuged further for 10 min at 3000 rpm. Approximately 200 μL serum sample was transferred to the cryo-vials. Serum sample was further stored at -20^{o}C in a deep freezer.[20]

Serum samples were tested for hepatitis B surface antigen using rapid antigen test (Hepa card, Reckon diagnostic pvt ltd.) and ELISA (ErbaLisa SEN HBsAg ELISA, Transcesia biochemicals ltd). The test were carried out as per the kit instruction.

3. Results

Table 1 depicts age wise distribution of hepatitis B infection in pregnant women using rapid immuochormatographic test (Rapid test). It shows a total of 4.16% prevalence of hepatitis B infection among women of age groups 18-27 years followed with 3.44% in age group 28-37 years. The overall prevalence rate of hepatitis B infection was found as 4%.

Table 1: Age wise distribution of Hepatitis B infection in pregnant women using rapid immunochromatographic test (Rapid HBsAg)

Age group	No. of Rapid HBsAg Positive n (%)	No. of Rapid HBsAg Negative n
18 – 27	7(4.16)	161
28 – 36	1(3.44)	28
37 – 45	0(0)	3

[n=total number of patients]

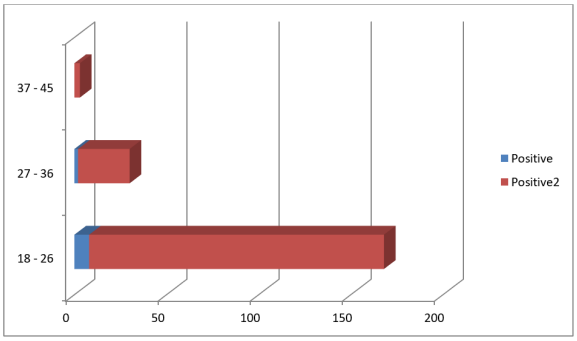

Fig. 1: Bar diagram of age wise distribution of hepatitis B infection in pregnant women using Rapid Immunochromatographic test (Rapid HBsAg)

Table 2 depict age wise distribution of hepatitis B infection in pregnant women using ELISA. It shows a

total prevalence of 5.26% of hepatitis B infection among pregnant women of different age groups. It was also found that prevalence of hepatitis B infection among women of age groups 18-27 years to be 4.76%, followed with 6.89% in age group 28-37 years.

Table 2: Age wise distribution of Hepatitis B infection in pregnant women using ELISA test (ELISA)

Age group	No of ELISA test Positive n (%)	No. of ELISA test Negative n
18 – 27	8(4.76)	160
28 – 36	2(6.89)	27
37 – 45	0(0)	3

[n=total number of patients]

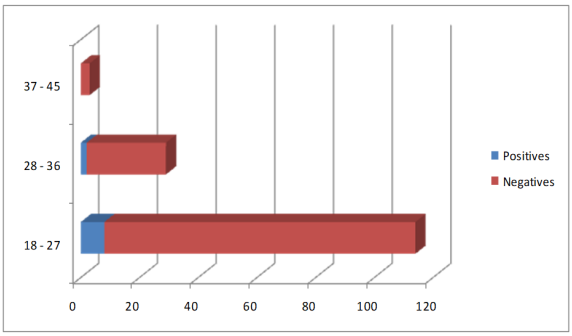

Fig. 2: Bar diagram of age wise distribution of hepatitis B infection in pregnant women using ELISA test (ELISA)

Rapid HBsAg test (Reckon) kit was evaluated using true positive and true negative cases with respect to ELISA test shown in Table 3. It reveals the sensitivity of Rapid HBsAg test of 80% (8/10), specificity 100% (190/190), positive predictive value 80% (8/10) and negative predictive value of 98.95% (190/192) in our health care setting.

Table 3: Evaluation of sensitivity and specificity of Rapid HBsAg test (Reckon)

	HBsAg ELISA $^{+}$	HBsAg ELISA $^{-}$	Total
Rapid HBsAg^{+}	8	0	08
Rapid HBsAg^{-}	2	190	192
Total	10	190	200

4. Discussion

The present study reveals an overall 4% sero-prevalence of hepatitis B infection among pregnant women using rapid immuochormatographic test. In a previous study by Adegbesan-Omilabu MA et al. 2015 and Randriamahazo T R et al. 2012 have found a seroprevalence of 7.3% and 1.9% by rapid latex agglutination test and rapid immunochormatographic test respectively.[21,22] It was also found that the seroprevalence of hepatitis B infection is more common in age group of 18-27 years (4.16%) which is in concordance with the study of Randriamahazo T R et al. 2012 where they found the age group of 25-30 years had high prevalence rate of hepatitis B infection.[22]

According to the present study it was found that the seroprevalence of hepatitis B infection is more common in age group of 18 – 27 years (4.76%) which is in concordance with the study of Sibia A et al. 2014 where they found most common age group of pregnant women infected with Hepatitis infection was 25 – 30 years and Sathiyakala R et al. 2017 which showed the highest prevalence of Hepatitis B infection (46%) among 26 – 30 years age group.[23,24]

This study shows an overall 5.26% sero-prevalence of hepatitis B infection among pregnant women using ELISA test. In previous studies by Bittaye M et al. 2019, Sibia A et al. 2014, Sathiyakala R et al. 2017, Wang M et al. 2015, Samal N. et al. 2019 and Fomulu N J et al.; 2013 have found a sero-prevalance of 9.2%, 1.11%, 1.01%, 5.66%, 4.64% and 7.7% by using rapid diagnostic ELISA kits, ELISA, sandwich ELISA immunoassay, ELISA, HBsAg ELISA and Ultra ELISA kit respectively.[19,23–27]

The present study reveals the sensitivity of Rapid HBsAg test of 80% (8/10), specificity 100% (190/190), positive predictive value 80% (8/10) and negative predictive value of 98.95% (190/192) in our health care setting. The results are in concordance with the results of previous studies by Rakesh Kumar Shrivastava et al. 2020, which reveals sensitivity and specificity of rapid ICT was 96.8% and 99.7% as compared to ELISA, Megha Sharma et al.; 2019, showed 100% sensitivity, 99.59% specificity, 81.81% positive predictive value, 100% Negative predictive value and 99.60% diagnostic efficiency of rapid card test with comparison to ELISA for HBsAg detection and Torane V P et al., 2019, showed sensitivity and specificity of the rapid card test was found to be 80.15% and 100% respectively.[28–30]

5. Conclusion

The present study shows a prevalence range of 4% to 5.26% of hepatitis B infection among antenatal women. The study is limited to HBsAg marker; more studies can be conducted based on the other markers like HBcAg, HBeAg, Anti HBsAg and Anti HBeAg to reveals the actual hepatitis B infection in our health care set up. It is also important to give special attention towards immunization programme of hepatitis B in antenatal women to prevent further infections and complications. Such data's can help to reveal the severity of the condition.

6. Conflict of Interest

None.

7. Acknowledgement

Yesha Lad: I would like show my sincere gratitude to our esteemed CEO, Prof. (Dr.) Sanjay Kumar and our respected Dean Dr. C. B. Tripathi for the approval to conduct the project. I would also like to thank our former Microbiology HOD at Zydus Medical College and Hospital Dr. Atul Rukdikar for his complete support and help throughout the project. I would like to thank my mentor; Dr Deepak Deshkar to guide me through the project. I'm also thankful to Dr. Nitesh Jaiswal for his help throughout the project and paperwork. With their guidance this project was completed successfully.

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Cite this article: Lad Y, Deshkar D, Jaiswal NK, Rukadikar AR. Sero-prevalence of hepatitis B infection among antenatal patients at tertiary care hospital - A prospective study. *Indian J Microbiol Res* 2022;9(4):279-282.