

Proportion of hepatitis B virus infection, vaccine awareness, and coverage among pregnant mothers attending a tertiary care hospital in Odisha – A cross-sectional study

Swayam P. Parida¹, Baijayantimala Mishra², Vikas Bhatia³,
Saubhagya K. Jena⁴, Debkumar Pal¹, Sourabh Paul⁵, Jyotiranjan Sahoo⁶

¹Department of Community and Family Medicine, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India, ²Department of Microbiology, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India, ³Executive Director, All India Institute of Medical Sciences, Bibinagar, Telangana, India, ⁴Department of Obstetrics and Gynecology, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India, ⁵Department of Community Medicine, All India Institute of Medical Sciences, Raebareilly, Uttar Pradesh, India, ⁶Department of Community Medicine, Institute of Medical Sciences and Sum Hospital, Bhubaneswar, Odisha, India

ABSTRACT

Background: Knowledge regarding the hepatitis B vaccination is crucial for eliminating hepatitis B. We aimed to estimate the proportion of hepatitis B infection among pregnant mothers attending a tertiary care hospital in eastern India, along with an assessment of knowledge on hepatitis B infection and preventive measures among them. We also aimed to estimate the coverage of the hepatitis B vaccine and the factors responsible for the nonacceptance of the vaccine. **Methodology:** We conducted a cross-sectional study at All India Institute of Medical Sciences, Bhubaneswar, for a year from 1 May 2017 to 30 April 2018. Study participants were selected from pregnant women coming to the outpatient department (OPD) of the Department of Obstetrics and Gynaecology for routine antenatal check-ups who were willing to participate and consented to the study. A pre-designed, pre-tested questionnaire was used to collect data regarding the level of knowledge on hepatitis B infection and vaccination. We also collected venous blood samples for the detection of Hepatitis B Surface Antigen (HBsAg). **Results:** A total of 510 pregnant women were recruited for 1 year. The mean age of the study participants was 27.2 years (± 4.7 years). Only 2 (0.3%) out of 510 study participants were HBsAg-positive. Around two-thirds of study participants, that is, 324 (63.5%), had heard of hepatitis B. When enquired about the source of information, radio and television were mentioned by 24% of participants. Another 11% mentioned they received information from doctors. Only 12.4 % of participants received the Hep-B vaccine, 85.9% did not, and 1.8% were unaware of their vaccination status. **Conclusion:** It was revealed that the proportion of hepatitis B among pregnant women was below the national level. The level of knowledge among the beneficiaries was not satisfactory. Organised health education through mass media has to be enhanced to increase awareness among the general population regarding the hepatitis B vaccination.

Keywords: Blood-borne infection, hepatitis B infection, hepatitis B vaccination, pregnancy

Introduction

Address for correspondence: Dr. Debkumar Pal,
Department of Community and Family Medicine, All India
Institute of Medical Sciences, Bhubaneswar, Odisha, India.
E-mail: dkpal19945@gmail.com

Received: 14-09-2024

Revised: 29-11-2024

Accepted: 06-12-2024

Published: 25-04-2025

Hepatitis B infection poses a significant global public health challenge, affecting approximately 254 million individuals with chronic hepatitis B infection.^[1-3] In 2020, complications from chronic hepatitis B led to an estimated 8,87,000 deaths

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Parida SP, Mishra B, Bhatia V, Jena SK, Pal D, Paul S, *et al.* Proportion of hepatitis B virus infection, vaccine awareness, and coverage among pregnant mothers attending a tertiary care hospital in Odisha – A cross-sectional study. J Family Med Prim Care 2025;14:1420-4.

Access this article online

Quick Response Code:



Website:

<http://journals.lww.com/JFMPC>

DOI:

10.4103/jfmprc.jfmprc_1581_24

worldwide.^[3,4] A meta-analysis revealed that India has a 1.46% proportion of chronic hepatitis B infection, corresponding to around 17 million carriers.^[5] The World Health Assembly's Global Health Sector Strategy aims to eliminate viral hepatitis as a public health threat by 2030.^[1] Vaccinating infants against hepatitis B is a well-established strategy for reducing hepatitis B infection in the population. The World Health Organization (WHO) recommends hepatitis B vaccination at birth, followed by two or three additional doses.^[6-8] Many countries have observed reduced hepatitis B proportion and hepatocellular cancer rates after implementing hepatitis B vaccination. India introduced the hepatitis B vaccine in its Universal Immunization Program, initially piloted in select cities and districts and later expanded nationwide. Private healthcare providers also play a significant role in vaccine delivery. Hepatitis B virus infection is a public health problem globally. WHO estimated that one-third of the global population has been infected with hepatitis B with serological evidence of past or current infection. South Asia, including India, has been grouped under countries with intermediate endemicity. With a 3.7% proportion of hepatitis B infection, India has around 40 million chronic hepatitis B cases, accounting for 15% of the total global pool of hepatitis B-infected persons.^[5] Exposure to hepatitis B often results in a self-limited infection that can be asymptomatic or present as acute hepatitis, usually followed by immunity. However, a significant proportion of those exposed to hepatitis B become chronically infected. These individuals continue to be potentially infectious to others and are at considerable risk of liver cancer as well as chronic active hepatitis and cirrhosis. Public health authorities have recommended that education about hepatitis B transmission and the promotion of hepatitis B serologic testing, immunization of susceptible individuals, and regular monitoring of chronically infected persons is of utmost importance in preventive strategies. However, health education programs should be based on thoroughly understanding the target population's knowledge and practices. No comprehensive study has been done in this part of India to find out the proportion of Hepatitis B infection in the general population. There are no data on the current awareness and proportion of hepatitis B infection and their preventive strategies in the eastern part of India. So, the present study was carried out to estimate the proportion of hepatitis B infection among persons attending a tertiary care hospital in eastern India, along with an assessment of knowledge on hepatitis B infection and preventive measures among them. We also aimed to estimate the coverage of the hepatitis B vaccine and the factors responsible for non-acceptance.

Methodology

Study design and study settings

We conducted this hospital-based cross-sectional study at All India Institute of Medical Sciences, Bhubaneswar, a tertiary care hospital in eastern India. It caters to the population residing in the eastern Indian states of Odisha and West Bengal. This institute has a footfall of almost 9000 pregnant women annually for antenatal care services in the Department of Obstetrics and

Gynaecology (OBG). It also provides routine immunisation services for pregnant mothers and children as per the National Immunization Schedule.

Study participants

We included pregnant mothers aged more than 18 years coming to the OBG outpatient department (OPD) during the year 2019 for ANC check-ups. We excluded the pregnant mothers with any co-morbidities or visiting the OPD for more than one time during 2019.

Sample size

We estimated a sample size of 400 with an expected percentage of hepatitis B infection of 3.7% and a relative precision of 50%. The sample size was finally estimated at 500, with a 20% non-response rate.^[5] We included every third of pregnant mothers coming to OBG OPD till completion of the sample size.

Data collection tools

We used a pre-validated semi-structured questionnaire to collect data on awareness about preventing hepatitis B infection, including hepatitis B vaccination. The questionnaire had three parts. The first part pertained to the socio-demographic profile. The second part pertained to the knowledge of hepatitis B and its preventive strategies. The third part was used to collect information on vaccination coverage. We also collected 2 millilitres of blood using venous sampling using a standard procedure, and the sample was tested for hepatitis B surface antigen (HBsAg) using standard HBsAg ELISA kits following the validated procedure. Those with a vaccination history were selected to estimate the anti-hepatitis B antibody titre using the standard ELISA method.

Statistical analysis

The data were entered in MS Excel 2007 and analysed in SPSS version 21. Continuous variables were reported using mean and standard deviation (SD), and categorical variables were analysed using proportion and the Chi-square test. A *P* value of 0.05 was considered as the level of statistical significance.

Ethical approval

We obtained written informed consent from all study participants before data collection. We also obtained ethical approval from the Institutional Ethical Committee, AIIMS Bhubaneswar.

Results

A total of 510 pregnant women were recruited for a 1-year period. The mean age of the study participants was 27.2 years (SD 4.7 years). Around 63% of the study participants belonged to rural areas, and 71% were homemakers. Almost half (65%) of study participants had completed primary education, followed by graduation (19%), higher secondary (6%), and secondary education (9%). Around 1% of study participants were illiterates [Table 1].

Table 1: Socio-demographic profile of the study participants (n=510)

Variable	Categories	Number (Percentage)
Age	≤25 years	190 (37.3)
	>25 years	320 (62.5)
Occupation	Housewife	423 (82.9)
	Working	87 (17.1)
Monthly income	Up to 20,000 Rs/month	343 (67.3)
	20,001-1,00,000 Rs/month	150 (29.4)
	>1,00,000 Rs/month	17 (3.3)
Residence	Rural region	319 (62.5)
	Urban region	191 (37.5)
Education status	Illiterate	5 (1.0)
	Primary	330 (64.7)
	Secondary	47 (9.2)
	Higher Secondary	30 (5.9)
	Graduation and above	98 (19.2)

Only 2 (0.4%) out of 510 study participants were HBsAg-positive. Around two-thirds of study participants, that is, 324 (63.5%), had heard of hepatitis B. When enquired about the source of information, radio and television were mentioned by 24% of participants. Another 11% mentioned they received information from doctors. Only 6.5% stated that fever is the main symptom of hepatitis B infection, 38% opined that the liver is the target organ, and 15% mentioned that hepatitis B infection could lead to cancer. When enquired about the modes of transmission, 22%, 21.3%, 16.4%, and 12% of study participants mentioned sharing of needles, mother to child, through blood transfusion, and sexual intercourse, respectively. Almost 18% and 7.8% of participants mentioned transmission by drinking contaminated water and coughing, respectively. Most participants (82 %) opined that appropriate blood tests can detect infection. When asked whether the disease is vaccine-preventable, the majority, 80%, opined a vaccine could prevent the disease, and 16% were unaware [Table 2].

Only 12.4 % of participants received the hepatitis B vaccine, 85.9% did not, and 1.8% were unaware of their vaccination status. On a further query about the reason for the hesitancy towards the vaccine, around half of the participants, that is, 44%, were not aware of the vaccine, 16% did not have knowledge about where the vaccine is available, and 2.3% mentioned they were afraid to take the vaccine. Among the vaccinated individuals, 49% had received three doses of hepatitis B. Around 36%, 29%, and 23% received hepatitis B vaccination in private hospitals, Government hospitals, and health camps, respectively. Among vaccinated participants, 34% received the Hepatitis B vaccine in the past 5 years, whereas 34% received it in the past 10–15 years [Table 3]. Around 17% of the vaccinated had an appropriate anti-hepatitis B antibody titre. Almost 7% have donated blood, and around 3% had received blood transfusions earlier.

The proportion of individuals aged >25 years was higher in the vaccinated group (71.4%) compared to the unvaccinated group, and it was statistically significant ($P = 0.033$). Similarly, housewives, higher-income individuals, individuals residing in

Table 2: Distribution of variables related to awareness about hepatitis B virus (n=510)

Variable	Categories	Number (Percentage)
Aware about hepatitis B	Yes	324 (63.5)
	No	186 (36.5)
Source of information related to hepatitis B*	Radio	91 (17.8)
	Books and Journals	88 (17.3)
	TV	87 (17.1)
	Physician	42 (8.2)
	Family Members	26 (5.1)
Symptoms related to hepatitis B infection*	Newspaper	21 (4.1)
	Friends	13 (2.5)
	Jaundice	82 (16.1)
	Fever	34 (6.7)
	Nausea	16 (3.1)
Knowledge about transmission of the disease*	Abdominal pain	7 (1.4)
	Weakness	4 (0.8)
	others	83 (16.3)
	Don't know	297 (58.2)
	Sharing of needles	150 (29.4)
Organs affected by hepatitis B infection	Mother to child	145 (28.4)
	Drinking Contaminated Water	122 (23.9)
	Blood Transfusion	112 (22.0)
	Sexual Intercourse	82 (16.1)
	Coughing	53 (10.4)
Ability of hepatitis B infection to cause cancer	Shaking hands	17 (3.3)
	Liver	123 (24.1)
	Spleen	7 (1.4)
	Stomach	7 (1.4)
	Others	13 (2.5)
Hepatitis B infection as vaccine-preventable	Don't know	174 (34.1)
	Yes	50 (9.8)
	No	54 (10.6)
Detection Blood Test	Don't know	220 (43.1)
	Yes	256 (50.2)
	No	17 (3.3)
	Don't Know	51 (10.0)
	Yes	268 (52.5)
	No	9 (1.8)
	Don't know	47 (9.2)

*Multiple responses present

urban areas, and highly educated individuals were vaccinated higher in number (P value < 0.001) [Table 4].

Discussion

We conducted this hospital-based cross-sectional study to identify the knowledge about the hepatitis B vaccine and the coverage of the vaccine along with the disease transmission. Only two of the individuals were HbsAg-positive, whereas 12.4% of individuals were vaccinated with at least one dose of the hepatitis B vaccine. We estimated a higher proportion of individuals were aware of the hepatitis B infection.

The proportion of hepatitis B infection, as identified in our study, was lower than in the studies conducted earlier in India.^[9-12] The

proportion was also lower than the national estimate of 2–4% of prevalence in the general population. The screening of pregnant mothers for hepatitis B was found to be an effective strategy for the control of hepatitis B worldwide.^[13-15] Thus, the lower proportion in our study could reflect a lower infection rate in the study population. However, this smaller number is estimated to be a positive finding towards the national goal of eliminating hepatitis B infection.

The earlier studies established a similar proportion of individuals with adequate knowledge about hepatitis B.^[9] However, the level of knowledge, as mentioned in other studies, varied widely depending on the study population. Our study population was comparatively lower educated. However, we did not explore the level of knowledge and socio-demographic status.

Table 3: Distribution of variables related to vaccination status (n=510)

Variable	Category	Number (Percentage)
Vaccination status	Vaccinated	63 (12.4)
	Not vaccinated	438 (85.9)
	Don't know	9 (1.8)
Reason of not taking vaccine	Not aware about the vaccine	194 (38.0)
	Not aware where the vaccine is available	70 (13.7)
	Afraid of infection	8 (1.6)
	Fear of vaccine	2 (0.4)
	High cost of the vaccine	0 (0)
	No reason	164 (32.2)
Number of doses	At least one dose	63 (12.4)
	At least two doses	56 (11.0)
	At least three doses	43 (8.4)
	More than three doses	12 (2.4)
Time duration since last dose vaccine	Less than 5 years	22 (34.9)
	Five to 10 years	3 (4.8)
	More than 10 years	21 (33.32)
	Don't know	17 (27.0)

The number of individuals vaccinated with the hepatitis B vaccine was higher than in other studies. Despite having a study population born before the introduction of the hepatitis B vaccine in NIS, the higher vaccination can be attributed to optional vaccination or vaccination in private healthcare facilities. The lower cost and highly effective vaccines are available in the open market to make things more accessible for vaccination.

We found a significant association between education status, age, residence type, type of occupation, monthly family income, and vaccination status. This finding is similar to that of the earlier studies conducted in different countries belonging to lower-middle-income countries.^[16-18] The higher education status and urban residence indirectly talk about the accessibility and availability of the vaccine and vaccine-related information.^[19,20] This factor even becomes more crucial when this vaccine was not available in the National Immunization Schedule during their childhood, and the individuals were vaccinated using their own money.

Strength

Our study first estimated the burden of hepatitis B infection in the eastern part of India among pregnant women, along with the coverage of hepatitis B vaccination. We used standard techniques for measurements of the antibody titre. We used a sampling technique to include as many pregnant mothers as possible in the study. We can assume that the findings related to hepatitis B knowledge and vaccination can be generalisable in the study population.

Limitations

Our study has limitations, such as the absence of a detailed tool to measure the level of knowledge. An analytical approach to identify the determinants associated with hepatitis B infection was impossible as only two individuals had HBsAg. The findings of our study may not be generalisable because it is a hospital-based study. We could also not apply a multi-variable model for a detailed analysis of the factors responsible for vaccine uptake.

Table 4: Association between socio-demographic factors and vaccination status (n=501)

Socio-demographic variable	Categories	Vaccinated (Number, percentage %) (n=63)	Not-vaccinated (Number, percentage %) (n=438)	Chi-square value	P
Age	≤25 years	18 (28.6)	187 (42.7)	4.544	0.033
	>25 years	45 (71.4)	251 (57.3)		
Occupation	Housewife	33 (52.4)	392 (89.4)	58.964	<0.001
	Working	30 (47.6)	46 (10.6)		
Monthly income	Up to 20,000 Rs/month	19 (30.2)	318 (72.6)	46.298	<0.001
	20,001-1,00,000 Rs/month	38 (60.3)	109 (24.9)		
	>1,00,000 Rs/month	6 (9.5)	11 (2.5)		
Residence	Rural region	18 (28.6)	299 (68.3)	47.343	<0.001
	Urban region	45 (71.4)	139 (31.7)		
Education status	Illiterate	0 (0)	5 (1.1)	14.142*	<0.001
	Primary	48 (76.2)	275 (62.8)		
	Secondary	0 (0)	47 (10.7)		
	Higher Secondary	0 (0)	30 (6.8)		
	Graduation and above	15 (23.8)	81 (18.5)		

*Fischer exact test

Conclusion

It was revealed that the proportion of hepatitis B infection among pregnant was lower than the national level. The level of knowledge among the beneficiaries was not satisfactory. Organised health education through mass media can be enhanced to increase awareness among the general population. The vaccination coverage was lower, with many study participants unaware of the hepatitis B vaccine. As one-fourth of respondents have received vaccination in health camps, organised health camps and behaviour change communication can effectively improve vaccination coverage. We also recommend conducting further studies to explore the underlying factors responsible for unawareness of the disease and vaccination status to identify effective interventions for improving vaccination coverage of hepatitis B among the adult population.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Hepatitis B: Key Facts. Available from: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-b>. [Last accessed on 2024 Jul 05].
- GBD 2019 Hepatitis B Collaborators. Global, regional, and national burden of hepatitis B, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *Lancet Gastroenterol Hepatol* 2022;7:796-829.
- Hsu YC, Huang DQ, Nguyen MH. Global burden of hepatitis B virus: Current status, missed opportunities and a call for action. *Nat Rev Gastroenterol Hepatol* 2023;20:524-37.
- GBD 2019 Europe Hepatitis B and C Collaborators. Hepatitis B and C in Europe: An update from the Global Burden of Disease Study 2019. *Lancet Public Health* 2023;8:e701-16.
- Puri P. Tackling the hepatitis B disease burden in India. *J Clin Exp Hepatol* 2014;4:312-9.
- Kumar D, Srivastava S, Tevatia MS, Kaur K, Sood A, Manrai M, *et al.* Hepatitis B vaccination in Indian children: Seroprotection and age-related change in antibody titres. *Med J Armed Forces India* 2021;77:200-4.
- Zhang W, Xu C, Rui Y, Chen J, Chen T, Dai Y, *et al.* Efficacy of the hepatitis B vaccine alone in the prevention of hepatitis B perinatal transmission in infants born to hepatitis B e antigen-negative carrier mothers. *J Virus Erad* 2022;8:100076. doi: 10.1016/j.jve.2022.100076.
- Wang S, Bai Y, Yuan F, Wang T, Luo W, Luo C, *et al.* Effects of hepatitis B vaccination on hepatitis B surface antigen in neonates and its change *in vivo*. *Asian Biomed (Res Rev News)* 2023;16:265-72.
- Premkumar M, Kumar Chawla Y. Chronic hepatitis B: Challenges and successes in India. *Clin Liver Dis* 2021;18:111-6.
- Yasobant S, Trivedi P, Saxena D, Puwar T, Vora K, Patel M. Knowledge of hepatitis B among healthy population: A community-based survey from two districts of Gujarat, India. *J Fam Med Prim Care* 2017;6:589-94.
- Jain AK, Joshi AD, Jain D, Sircar S. Study of knowledge, attitude, and practice regarding hepatitis B infection in first-degree relatives of patients suffering with hepatitis B infection. *Int J Community Med Public Health* 2023;10:1573-7.
- Kumar A, Arora A, Sharma P, Bansal N, Anikhindi SA, Khare S, *et al.* Public knowledge, awareness, and vaccination rates for hepatitis B in India: A cross-sectional survey. *Cureus* 2023;15:e43997. doi: 10.7759/cureus.43997.
- Giri S, Sahoo S, Angadi S, Afzalpurkar S, Sundaram S, Bhrugumalla S. Seroprevalence of hepatitis B virus among pregnant women in India: A systematic review and meta-analysis. *J Clin Exp Hepatol* 2022;12:1408-19.
- Sanghi V, Lindenmeyer CC. Viral hepatitis in pregnancy: An update on screening, diagnosis, and management. *Clin Liver Dis (Hoboken)* 2021;18:7-13.
- Singh R, Chaudhary M, Shrivastava K, Agarwal BV, Mitra S. Seroprevalence of hepatitis B infection among antenatal women in a tertiary care center in eastern UP and assessment of the associated high-risk factors. *J South Asian Feder Obst Gynae* 2021;13:378-81.
- Ayoola R, Larion S, Poppers DM, Williams R. Clinical factors associated with hepatitis B screening and vaccination in high-risk adults. *World J Hepatol* 2019;11:86-98.
- Kimera A, Atuyambe L, Mutyaba H, Nantongo C, Namagembe A, Nalumansi AM, *et al.* Proportion and factors associated with hepatitis B vaccination uptake and completion among communities targeted for mass vaccination in Gulu: A cross-sectional study. *BMC Public Health* 2024;24:866.
- Dekker T, Hefele L, Neven A, Hübschen JM, Essink DR, Black AP. Factors associated with hepatitis B vaccination in Laos: Findings from the multiple indicator cluster surveys in 2011 / 12 and 2017. *Lancet Reg Health West Pac* 2024;46:1-11. doi: 10.1016/j.lanwpc.2024.101059.
- Chhabra D, Mishra S, Gawande K, Sharma A, Kishore S, Bhadoria AS. Knowledge, attitude, and practice study on hepatitis B among medical and nursing undergraduate students of an apex healthcare institute at Uttarakhand foothills: A descriptive analysis. *J Family Med Prim Care* 2019;8:2354-60.
- Altamimi AR, Alqahtani TM, Ahmed JA, Aldosari LH, Alzahrani MM, Alotaibi GS, *et al.* Knowledge, awareness, and vaccination compliance of hepatitis B among medical students in Riyadh's governmental universities. *J Family Med Prim Care* 2021;10:485-90.