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Original Article

Seroprevalence and Associated Factors of Hepatitis-B among Antenatal Women at a Tertiary Care Hospital

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Abstract

Background: The aim was to study the seroprevalence and associated factors of Hepatitis-B among antenatal women attending the out-patient department of Obstetrics and Gynaecology, GMH, Tirupati.

Materials and Methods: This is a cross-sectional study conducted in the Department of Obstetrics and Gynaecology, GMH, Tirupati for antenatal women attending from April 2019 to March 2020.

Results: This study has found that the seroprevalence of hepatitis-B surface antigen (HBsAg) among pregnant women at Government Maternity Hospital, Tirupati was 1.2%. The socio-demographic factors and associated factors among these women were discussed in the results and are as follows: The mean age group was 25, the majority of the women were between 21 and 30 years of age, had their primary education (59%), were housewives (57%) and were parous women (78%). The high prevalence among parous women concurs with the observation that pregnant women are considered at a higher risk of hepatitis B virus infection due to increased exposure to risk factors (such as blood transfusion, intravenous drugs or surgical procedures). 3.2% of them had associated human immunodeficiency virus coinfection. 2% of women had a previous history of blood transfusions, 4.2% had a history of dental procedures, 6.3% women had a history of abortions, 5.3% women had a previous history of caesarean section and 5.3% of women had tattooing done.

Key words: Hepatitis-B surface antigen, Hepatitis B virus, Human immunodeficiency virus-Hepatitis B virus coinfection, Caesarean section, GMH

INTRODUCTION

Hepatitis B viral infection is a disease which has healthy carriers in the community. Fortunately, we can detect hepatitis B virus (HBV) infection early by testing the serum of individuals for the presence of hepatitis-B surface antigen (HBsAg). We can take the necessary steps in time to avoid further damage to the liver. Hepatitis B is a life-threatening disease and contributes to considerable human resources as well as economic loss worldwide. It is a severe and common infectious disease of the liver, affecting millions of people worldwide.[1] It is caused by a HBV which can be transmitted through percutaneous, punctures through the skin and mucosal membranes, exposure to infectious blood or blood products and body fluids.[2] Vertical transmissions of the virus from mother to child, and unsafe sexual intercourse are also essential routes for transmitting the disease. The age of acquisition of HBV is an important determinant of outcome; the earlier the age, the higher the risk of chronicity (e.g., >90% in newborns (vertical transmission), 30% in children aged 2–5 years, and <5% in adults).[3]

Viral hepatitis during pregnancy is associated with a high risk of maternal complications and a high rate of vertical transmission. Fetal and neonatal hepatitis acquired from the mother during pregnancy leads to impaired cognitive

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and physical development in the latter life of the children. The risk of vertical transmission depends on the time at which a pregnant woman acquired HBV infection and on her status of HBsAg and hepatitis B early antigen (HBeAg). In the absence of immunoprophylaxis 10–20% of women seropositive for HBsAg transmit the virus to their neonates. The vertical transmission rate reaches approximately 90% when women are seropositive for both HBsAg and HBeAg.[4]

Hepatitis-B is one of the leading causes of death globally; on the other hand, hepatocellular carcinoma (HCC) ranks fifth among humans' most frequent cancer.[5,6] As per the WHO survey, 2000 million people alive today are infected with HBV at some time in their life.

About 257 million remain infected chronically and become a carrier of the virus. Three-quarters (3/4) of the world's population lives in high endemicity areas. Every year 4 million acute clinical cases of HBV were reported and about 25% of them become carriers. One million people in a year die from chronic active hepatitis, cirrhosis of the liver or primary cancer.[1] We can quickly assess that hepatitis B is a kind of disease responsible for millions of deaths worldwide causing a public health concern. These deaths can be avoided or minimized to a great extent by creating awareness and implementing hepatitis-B vaccination among adults and especially in children. Vaccination against HBV infection can be started at birth and provides long-term protection in more than 90% of healthy people.[7]

In 1992, the WHO recommended including hepatitis-B vaccination in immunization programs of all countries. One hundred ninety-two member countries had adopted universal childhood hepatitis-B vaccination policies. This has produced a remarkable reduction in HBV-related diseases. WHO divided the regions into areas of low (<2%) prevalence, intermediate (2–8%), and high (>8%) prevalence. India has an intermediate prevalence of HBsAg, 2–10%.[8,9] with a disease burden of about 50 million. Pockets of higher endemicity are found in tribal areas where the high burden is maintained through intra-caste marriages, tribal customs, illiteracy, and poor exposure to health care resources.[3] The overall carrier rate is often quoted as 4.7% among the population's studies based on a meta-analysis.[8,10]

Limited studies are conducted so far to know the prevalence of the HBV in India. The hospital-based study cannot represent any area confined community. But the sufficient sample size may help to see the city's prevalence and may pave the way for area-specified studies. The hospital always attracts a representative sample of the whole community from near and remote areas. Sample from the hospital cannot represent a particular area of the city.

The present study aims to determine the prevalence of HBV carriers and create awareness about complications and HBV vaccinations. By knowing the prevalence, we can predict the future risk of HBV infection in the community. The preventive measures can be recommended, planned, and implemented at the appropriate place and at the proper time.

Aims and Objectives

Aim

The aim of the study was to determine the seroprevalence of HBV infection and associated factors among pregnant women attending antenatal clinic (ANC) at Government Maternity Hospital, Tirupati.

Objectives

The objectives are as follows:

1. To determine the seroprevalence of HBsAg among pregnant women attending ANC at GMH, Tirupati.
2. To determine the association of social-demographic factors and hepatitis B infection (HBsAg positivity) among pregnant women attending ANC at GMH, Tirupati.
3. To determine the association of previous blood transfusion, patient's mother, hepatitis B status, drug abuse, etc., with hepatitis B infection among HbsAg positive pregnant women attending ANC.

Inclusion Criteria

Antenatal women attending GMH, Tirupati, diagnosed HbsAg positive are included in the study.

Exclusion Criteria

Antenatal women diagnosed HbsAg positive and not willing to participate in the study.

MATERIALS AND METHODS

Place of Study

The present study is conducted at Government Maternity Hospital, Tirupati.

Study Design

The present study is a cross-sectional study. It is carried out to know the prevalence rate of HBV carriers among the patients attending Government Maternity Hospital. The study also includes knowing associated sociodemographic factors and evaluating the awareness in people about the vaccination. It creates awareness among patients and the paramedical staff.

Duration of the Study

The duration of the study is 1 year after ethical committee clearance from April 2019 to March 2020.

Sample Size

The sample size was calculated statistically taking the previous prevalence as reference. We calculated the sample size at a 5% significance level and the permissible error of 20%. The formula used for the calculation of sample size was N = 4pq/L2 (p = Present prevalence, q = 100–p, L = 20% of p). A total of 95 subjects were included in this study, which was almost equal to the calculated sample size.

Method of Collection of Data

All the antenatal women attending the antenatal clinic in Government Maternity Hospital, Tirupati, were routinely screened for HbsAg and human immunodeficiency virus (HIV). All the antenatal women who tested positive for HbsAg were informed and consent was taken for participating in the survey. After obtaining consent, a questionnaire was given to know the various sociodemographic factors involved and associated factors.

Statistical Methods

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 16.0. The determined proportions were compared using Fisher's exact test. A $P < 0.05$ was regarded as significant.

Ethical Considerations

The study was started after the Ethical committee clearance at GMH, Tirupati.

RESULTS

This study has found that the seroprevalence of HBsAg among pregnant women at Government Maternity Hospital, Tirupati was 1.2%. The sociodemographic factors and associated factors among these women were discussed in the results and are as follows: The mean age group was 25, majority of the women between 21 to 30 years of age [Table 1]. Majority of the women had their primary education (59%) [Table 2]. Majority of the women were housewives (57%) [Table 3]. Majority of them were parous women (78%) [Table 4]. The high prevalence among parous women concurs with the observation that pregnant women are considered at a higher risk of HBV infection. The high prevalence is due to increased exposure to risk factors (such as blood transfusion, intravenous drugs, or surgical procedures) . 3.2 % of them had HIV co- infection HBV Co-infection with human immunodeficiency virus (HIV) increases the rate of transmission of viral hepatitis substantially [Table 5]. It also increases the risk for hepatotoxicity of HAART and the likelihood of an onset of an AIDS-defining illness. 2% women had the previous history of blood transfusions [Table 6], 4.2% had a history of dental procedures [Table 7], 6.3% women had abortion history [Table 8]. 1.1% of women had history of unsafe injections [Table 9], 0% of women had history of liver disease [Table 10]. 5.3 % women had the previous history of caesarean section done [Table 11], 5.3 % of women had tattooing done.

DISCUSSION

Overall seroprevalence of Hepatitis B infection in the study of antenatal women was 1.2%. This shows low endemicity of HBV according to WHO criteria . Most of the pregnant women having history of surgical procedures such as caesarean sections, instrumental deliveries, surgical evacuation for various types of abortions followed by blood transfusions.

This study has found that the seroprevalence of HBsAg among pregnant women at Government Maternity Hospital, Tirupati, was 1.2%. The sociodemographic factors and associated factors among these women were discussed in the results and are as follows: The mean age group was 25, the majority of the women between 21 and 30 years of age, majority of the women had their primary education (59%), majority of the women were housewives (57%), and majority of them were parous women (78%). The high prevalence among parous women concurs with the observation that pregnant women are considered at a higher risk of HBV infection. The high prevalence is due to increased exposure to risk factors (such as blood transfusion, intravenous drugs, or surgical procedures).

About 3.2% of them had HIV co-infection. HBV co-infection with HIV increases the rate of transmission of viral hepatitis substantially. It also increases the risk for hepatotoxicity of Highly Active Retroviral Therapy and the likelihood of an onset of an AIDS-defining illness. About 2% of women had a previous history of blood transfusions, 4.2% had a history of dental procedures, 6.3% women had abortion history, 5.3% women had a previous history of caesarean section, and 5.3% of women had tattooing done.

A similar study was conducted in 2020, in Ghana, a country in West Africa, found in one of the regions with the highest HBV prevalence.[7] This study sought to determine the seroprevalence of HBV and associated factors among pregnant women attending Korle-Bu Teaching Hospital antenatal care. The seroprevalence of HBV infection was 7.7%. As per World Health Organization's criteria for HBV severity, (≥8%; high, 2–7%; moderate and < 2%; low), the prevalence of 7.7% indicates moderate endemicity. The age group with the highest prevalence was 25–30 years. Furthermore, HBV positivity was higher among women without formal education unemployed and multiparous.

Table 1: Distribution of patients according to age

Age (years)	No. of patients	Percentage
<20	12	12.6
21–25	36	37.9
26–30	37	38.9
>30	10	10.5
Total	95	100
Mean age	25.43±4.267	

Table 2: Education distribution of patients according to education

Education	No. of patients	Percentage
Primary	59	62.1
Secondary	19	20.0
College and University	6	6.3
Non-formal	11	11.6
Total	95	100.0

Table 3: Distribution of patients according to occupation

Occupation	No. of patients	Percentage
Housewife	57	60.0
Unskilled	18	18.9
Skilled	14	14.7
Professional	6	6.3
Total	95	100.0

Table 4: Distribution of patients according to parity

Parity	No. of patients	Percentage
Nil	22	23.2
1	45	47.4
2	23	24.2
3	4	4.2
4	1	1.1
Total	95	100

Table 5: HIV co-infection

HIV seropositive	No. of patients	Percentage
Negative	92	96.8
Positive	3	3.2
Total	95	100.0

Table 6: Distribution of patients according to history of previous blood transfusions

Previous blood transfusions	No. of patients	Percentage
Negative	92	96.8
Positive	3	3.2
Total	95	100.0

Table 7: Distribution of patients according to history of dental procedures

Dental procedure	No. of patients	Percentage
Yes	4	4.2
No	91	95.8
Total	95	100.0

Table 8: Abortions

Abortions	No. of patients	Percentage
No	89	93.7
1 time	4	4.2
2 times	2	2.1
Total	95	100.0

Table 9: Unsafe injections

Unsafe Injections	No. of patients	Percentage
Yes	1	1.1
No	94	98.9
Total	95	100.0

Table 10: Liver diseases

Liver diseases	No. of patients	Percentage
Yes	0	0
No	95	100.0
Total	95	100.0

Table 11: Caesarean section

Caesarean section	No. of patients	Percentage
No	90	94.7
1 time	4	4.2
2 times	1	1.1
Total	95	100.0

Table 12: Comparison between the present study and Ghana 2020 study

S. No.	Variables	Present study	Ghana (2020)
1	Prevalence	1.2%	7.7
2	Mean age	25	25–30 years
3	Parity	Parous (78%)	Multiparous
4	Education	Primary (59%)	Illiterates
5	Occupation	Housewives (57%)	Unemployed

The main reason for the high prevalence was the lack of education. All the other factors were similar to those in our study. Educational status plays a vital role. Minimal education is necessary for the women to understand the need to register the pregnancy, follow the advice, and get the investigations done [Table 12].

An institution-based cross-sectional study was conducted among pregnant women attending antenatal clinics in the Wolaita Zone from October–November 2018.[1] A total of

Table 13: Comparison between the present study and the Wolaita zone (2018)

S. No.	Variables	Present study	Wolaita Zone
1	Prevalence	1.2%	7.3%
2	Mean age	25	26
4	Education	Primary (59%)	Diploma level (33.9%) Non-formal (18.7%)
5	Occupation	Housewives (57%)	Housewife (40.3%) Employees (29%)
6.	Blood transfusion	2%	8.4%
7	Surgical history	10.7%	10.7%
8	Dental procedures	4.2%	26%
9	Abortions	6.3%	25%

Table 14: Comparison between the present study and Antioch Turkey

S. No.	Variables	Present study	Antioch Turkey
1	Prevalence	1.2%	2.1%
2.	Blood transfusion	2%	9.51%
3.	Tattooing	5.3%	13.6%

675 women participated in the study, making a response rate of 100%. The mean age was 26 years. Four hundred forty-four (65.8%) of the respondents were urban dwellers. The majority of the study participants were housewives which accounts for 272 (40.3%), followed by employees 196 (29%) and merchants 124 (18.1%). Regarding education level, 229 (33.9%) of the women learned to the diploma level and above whereas 126 (18.7%) had no formal education. From a total of 675 study participants, 72 (10.7%) had a history of surgical procedure performed on them, 57 (8.4%) had a history of blood transfusion, 178 (26%) had a history of tooth extraction, and 492 (72.9%) had a history of genital mutilation. Among 675 participants, 48 (7.1%) had a history of multiple sexual partners, and 170 (25%) had a history of abortion. The prevalence of HBsAg among pregnant women was 49 (7.3%) [Table 13].

History of multiple sexual partners, surgical procedures, genital mutilation and tooth extraction and household or close contacts were associated with HBV. In our study at Government Maternity Hospital, Tirupati 5.3% had a history of surgical procedure performed on them, 2% had a history of blood transfusion, 4.2% had a history of tooth extraction, and 6.3% had a history of abortion. Compared with the above study, the prevalence of all the above-mentioned associated factors was less among our patients but not completely absent. We could not enquire about the history of genital mutilation and multiple sexual partners among our patients because of ethical issues. Intermediate endemicity of HBV (7.3%) was observed among mothers attending antenatal clinics in Wolaita Zone.

A similar study was conducted in Turkey.[2] The study aimed to assess the seroprevalence of HBsAg and the risk factors associated with HBV infection among pregnant women attending the University Hospital's antenatal care clinics in Antioch, Turkey. The seroprevalence of HBsAg was found to be 2.1%. History of blood transfusion, history of hepatitis, tattooing and history of household or close contacts were significantly associated with the risk of HBV infection [Table 14].

Figure 1: Our national viral hepatitis B control centre program

Figure 2: "Best Performance Award" given to the state of Andhra Pradesh given from Government of India

Sibia *et al.*, studied seroprevalence and sociodemographic factors in North India in 2016.[11] In that study, seroprevalence of HBsAg positive antenatal females was 1.11%. The mean age of HBsAg-positive pregnant women was 24.98 ± 4.16 years. Thirty-one (75.61%) subjects hailed from a rural area. 4 (09.75%) and 3 (07.31%) subjects had HBV-hepatitis

C virus (HCV) co-infection and HBV-HIV co-infection, respectively. The mean parity of women with HBV infection was 1.83 ± 0.87. The most common age group with HBV infection was 25–30 years. They concluded that the high prevalence of HBsAg seropositivity among antenatal females should call for routine vaccination against HBV infection. Our study results are similar to the above study such as mean age (25) and HIV - HbsAg co-infection (3%). Screening for HCV is not routinely done in our institution.

Bakare RA and his co-workers did a similar study in Nigeria in 2015.[6] In Nigeria, vertical transmission remains a major route of HBV infection. The seroprevalence of HBsAg was 8.3% out of which 26.7% were positive for HBeAg, 53.3% had HBeAb, 20% had neither HBeAg nor HBeAb, 100% had total HBcAb, and 86.7% had HBV DNA in their serum. The mean age was 32.1 years; the highest HBV infection rate occurred in the 25–29-year age group. Multiple sexual partners and early age at sexual debut were independent risk factors for HBV infection. The risk factors which were responsible for such high prevalence in Nigeria were not prevalent in India.

SUMMARY

For World Hepatitis Day 2020, WHO focuses on the theme "Hepatitis Free Future" to highlight the importance of addressing the prevention of mother to child transmission of HBV, launching new guidance, testing, and treatment services 2030 elimination targets.

We can integrate the hepatitis B testing and treatment of eligible pregnant women with the prevention of mother-to-child transmission of HIV and congenital syphilis with antenatal care service. This approach is often referred to as "Triple elimination" – an initiative that promotes the elimination of mother to child transmission of three infections: HIV, syphilis, and HBV.

As per the latest WHO estimates, the proportion of children under 5 years of age chronically infected with HBV dropped down to just 1% in 2019. It was around 5% in the pre-vaccine era ranging from the 1980s to the early 2000s. This drop-down marks one of the milestone targets' achievement to eliminate viral hepatitis in the Sustainable Development Goals – to reach under 1% prevalence of HBV infections in children under 5 years of age by 2020. According to the prevalence of the present study, 1.2%, our area comes under low prevalence area according to WHO. We are running National Viral Hepatitis Control Program, model centre in our institution to screen and manage the cases of Hepatitis B Viral infection [Figure 1]. Our state of Andhra Pradesh was awarded 'Best Performance State' for the National Viral Hepatitis program by the Government of India 2021 [Figure 2]. To achieve the above set goals, we need to follow the above-discussed programs and recommendations to achieve Hepatitis Free Future.

CONCLUSION

The purpose of this study is to aid clinicians in counseling their patients regarding complications, perinatal risks, and management options available to pregnant women with hepatitis B infection. We recommend the following:

1. Perform routine screening during pregnancy for HBV infection with maternal
2. HBsAg testing.
3. Administer hepatitis B vaccine and HBV immunoglobulin within 12 h of birth to all newborns of HBsAg-positive mothers, regardless of whether maternal antiviral therapy has been given during the pregnancy.
4. In pregnant women with HBV infection, we suggest HBV viral load testing in the third trimester.
5. In pregnant women with HBV infection and viral load greater than 200,000 U/ml, we should consider HBV-targeted maternal antiviral therapy to decrease the risk of intrauterine fetal infection. We suggest tenofovir as a first-line agent.
6. We recommend that women with HBV infection be encouraged to breastfeed.
7. Caesarean delivery to be performed only if indicated but not for the reduction of vertical HBV transmission

National viral hepatitis program has been launched by Ministry of health and family welfare, Government of India on the occasion of the world hepatitis day –July 28, 2018. It is an integrated initiative for the prevention and control of viral hepatitis in India. Operational guidelines for this program were:

1. To strengthen and enhance community awareness of hepatitis and lay stress on preventive measures among the general population especially high-risk groups and in hotspots.
2. Provide early diagnosis and management of viral hepatitis at all levels of healthcare
3. Develop standard diagnostic and treatment protocols for the management of viral hepatitis and its complications.
4. Strengthen the existing infrastructure facilities, build capacities of existing human resources and raise additional human resources, where required, for providing comprehensive services for the management of viral hepatitis and its complications in all districts of the country.
5. Develop linkages with the existing National programs towards awareness, prevention, diagnosis and treatment for viral hepatitis.

6. Develop a web-based "Viral Hepatitis Information and Management System" to maintain a registry of persons affected with viral hepatitis and its sequelae.[12]

Ethics Committee Approval

This journal article has been approved by the institutional ethical committee.

Informed Consent

Informed consent was obtained by participants of the present study.

Limitations

As we are carrying out our study in a tertiary care center, thinking in terms of the privacy of the patients attending antenatal OP we could not ask about the details of multiple sex partners and sexual abuse because of ethical issues. Investigations into the Hepatitis c virus are not offered in our institution.

AUTHORSHIP CONTRIBUTIONS

Dr. Vishali and Dr Nirmala Bandi - Data collection and analysis. Dr. T Bharathi and Dr K Radha - Study design and interpretation. Dr. N Lahari – Literature search. Dr. Sai Pranavi Varri - Writing, documentation.

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