RESEARCH ARTICLE

PREVALENCE OF HEPATITIS B VIRUS INFECTION IN PREGNANT FEMALES OF RURAL AREAS OF KARACHI AND IDENTIFICATION OF IMPORTANT RISK FACTORS

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ABSTRACT

Objective: *This study undertakes seroprevalence of Hepatitis B Virus(HBV) infection in pregnant females of rural areas and identifies important risk factors associated with hepatitis B virus.*

Study design: *Cross-sectional study*

Place and Duration of Study*: The study was carried out at Baqai Medical University and Muhammadi Blood bank Karachi from January to December 2021.*

Patients and Methods: *A total of 385 samples were collected from pregnant females belonging to different areas of Karachi. Pregnant females of age 17- 45 years of rural areas were included while all non-pregnant females having co-morbids were excluded. Samples were collected in EDTA tubes. Serum was extracted by centrifugation. Screening for hepatitis B was done by Electro Chemi Luminiscence Immunoassay (ECLIA) on cobas e 411 analyzer. Amplification and reporting of HBV was done using Real time PCR. Statistical analysis was done by using SPSS version 25.*

Results: *The prevalence of HBV is 10.4% in pregnant females. Important risk factors identified includes middle aged pregnant females (13.5%) having lack of education (42.2%) belonging to low socioeconomic status (14.5%) and most of them are housewives. The proportion of pregnant females found to be infectious who did give history of contact with diagnosed cases of hepatitis was 100% and 58.3% had positive history of transfusion. There was significant association of history of miscarriage and HBV (15.9%). History of previous C-section with hospital admissions were found significantly associated with HBV.*

Conclusion: *Our findings are depictive of an increasing trend and also highlight the important risk factors associated with spread of this virus in community. Lack of awareness among general population, reproductive age bracket, inappropriate screening of blood at rural health centers and malpractice of surgical procedures are some of the important risk factors pointed out in our study.*

Key words: *Hepatitis B, Pregnant females, Risk factors*

INTRODUCTION

Hepatitis is a potentially life threatening infection. WHO has therefore emphasized on its complete eradication by the year 2030 through early investigations, effective management plans and prompt preventive measures.[1] Hepatitis B virus (HBV) is a blood borne infectious agent.[2] According to the data quoted by WHO 2% of the population is affected in Southeast Asia.[3] Pakistan is included under the region where HBV is endemic.[4]

Pregnancy is a hyper metabolic state in which a pregnant woman undergoes profound changes in anatomy and physiology of body. All the vital systems will adapt to changing requirements helping the mother and child to cope up with increased demands. These physiological changes will cause problems in appreciating clinical features and changes in laboratory investigations in pregnant woman and it will be a tiresome and thought provoking job.[5]

Viral infections occurring at the time of pregnancy is a major threat to fetal well- being and also posing a great

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risk to mother health.[6] It can be transmitted by many routes like crossing through placental barrier or parenteral by infectious body secretions.[7] Pregnant females infected with viral hepatitis of any type needs to be thoroughly evaluated and carefully monitored as it is regarded as the most likely cause of jaundice in pregnant females.[8]

There is an increase in duplication and growth of HBV during gestational period.[9] According to the estimates frequency of HBV infection is reported to be 27 times greater in Asian American and 5 times more in African American pregnant population in comparison to white population.[10] HBV is very much prevalent in expecting mothers particularly in those populations where it is found to be endemic. Arrival of newborn in those cases can be accompanied with a lot of risks. In areas where it is endemic 50% will be suffering from chronic hepatitis B either at birth or infancy and there is a higher risk of chronic hepatitis later on.[11,12]

PATIENTS AND METHODS

This descriptive cross-sectional study was started after the approval of synopsis from the Ethics Committee & Board of Advanced Studies and Research (BASR), (Ref: BMU-EC/07-2020) dated 6/11/2020. It was carried out at Baqai Medical University and Muhammadi Blood bank from January 2021 to December 2021. Samples were collected from different areas of Karachi including Fatima hospital (Teaching hospital Baqai Medical University Gadap Town Karachi), Creek General Hospital, Korangi and Lyari General hospital Karachi from pregnant females of less than 45 years of age. All serological and molecular tests were performed at Muhammadi Laboratory and Diagnostic Centre Numaish Karachi. Written informed consent was taken from all the participants after explaining details of the study procedure. Samples were collected in EDTA tubes. Serum was extracted by centrifugation. Screening for hepatitis B was done by electrochemiluminescence immunoassay (ECLIA) on cobas e 411 analyzer. DNA extraction of reactive samples was done by QIAGEN extraction kit using automated QIAcube Germany. Amplification and reporting of HBV was done using Real time PCR (QIAGEN 3rd generation, HRM channel Germany).

The sample size for study population was 385. It was calculated by WHO calculator keeping confidence interval of 95%.[13] Pregnant females of age 17 years to 45 years belonging to rural areas were included in the study while all non-pregnant females belonging to urban areas were excluded.

For evaluation of health status of the participants a detailed personal history was taken in the form of questionnaire. In addition of having some basic information including name, age, gender, address, marital status, family income, education level, transfusion history some questions pertinent to the study like number of pregnancies, mode of delivery, awareness regarding HBV is also taken into account.

The data was be tabulated on Microsoft excel. Statistical analysis was done by using SPSS version 25.0. The results were displayed in frequency (%) by using descriptive statistics. Chi square/Fisher Exact test was used for determination of association between the parameters. Odd ratio and 95% confidence interval were calculated. Level of significance (p) was kept as <0.05.

RESULTS

A total of 385 pregnant females who visited antenatal clinics were screened. The prevalence of HBV in our study population was 9.1%

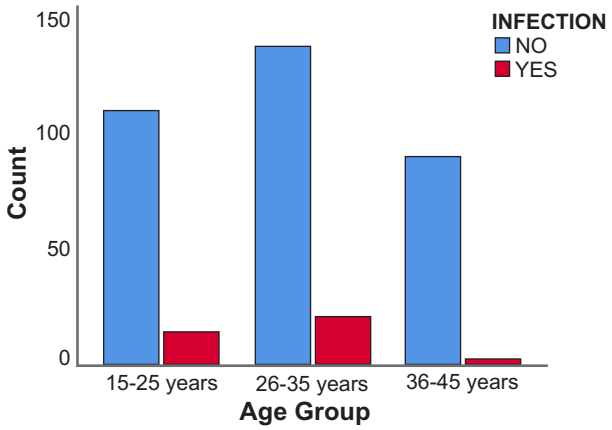

Figure 1: The prevalence of HBV infection in different age groups

There was significant difference in the proportion across the HBV infection per various age groups. The proportion of 15-25 years females who were found to be infectious were 11.8% (15/127). While proportion of 26-35 years females who were found to be infectious were 13.5% (22/163). Moreover, proportion of 36-45 years females who were found to be infectious were 3.2% (3/95) as shown in Figure 1.

There was a significant association between prevalence of HBV infection among different education levels (p<.001). Ninety (23.4%) individuals were illiterate out of which 38 tested positive for HBV. One hundred and

fifty four (40.0%) got primary education and 1 tested positive for HBV, 134 (34.8%) acquire secondary education with 1 individual having HBV and 7 (1.8%) got higher education with no positive cases. The proportion of pregnant females found to be infectious who were illiterate was 42.2%, those having primary education was 0.6%, while those having secondary and higher education showed prevalence of 0.7% and 0% respectively.

There was a significant association between prevalence of HBV infection with occupation of females [x2(1, N=385) =9.391, *p*=.002]. It was found that housewives were more likely to be infected than working women.

There was a significant association between prevalence of HBV infection among different socio-economic groups (*p*=.003). The proportion of females belonged to low socio-economic group who were found to be infectious were 14.5% (35/242). While proportion of females belonged to middle socio-economic group who were found to be infectious were 3.6% (5/140). Moreover, proportion of females belonging to high socio-economic group who were found to be infectious were 0%.

There was a significant association between history of hepatitis contact and prevalence of viral hepatitis infection [*p*=.005]. The proportion of pregnant females found to be infectious who did not give history of hepatitis contact was 8.4% while proportion of pregnant females found to be infectious who did give history of contact was 100% (5 individuals had history of contact with hepatitis patients and all tested positive for HBV) as shown in Figure 2.

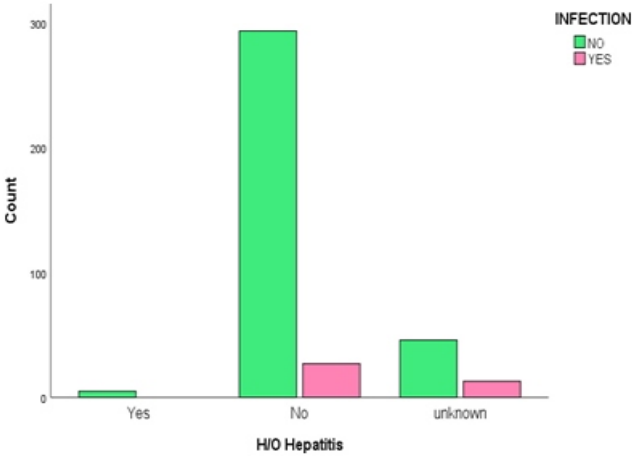

Figure 2: History of Hepatitis contact and frequency of HBV infection among study participants

There was significant association of history of miscarriage and HBV infection [x2(1, N=385) =19.375, *p*<.001]. Thirty seven individuals having previous history of miscarriage tested positive for HBV while only 3 showed positivity for HBV without history of miscarriage. It was concluded that females having history of miscarriage were more likely to be infected [OR-(CI): 9.487-(2.870-31.362), *p*-value: 0.002) as shown in Figure 3.

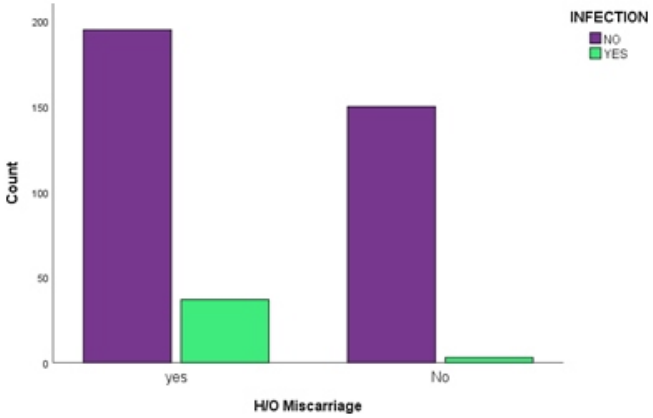

Figure 3: History of Miscarriage and frequency of HBV infection among pregnant females

There was significant association of mode of delivery of last childbirth and HBV infection [x2(2, N=385) =40.220, *p*<.001] as shown in Figure 4.

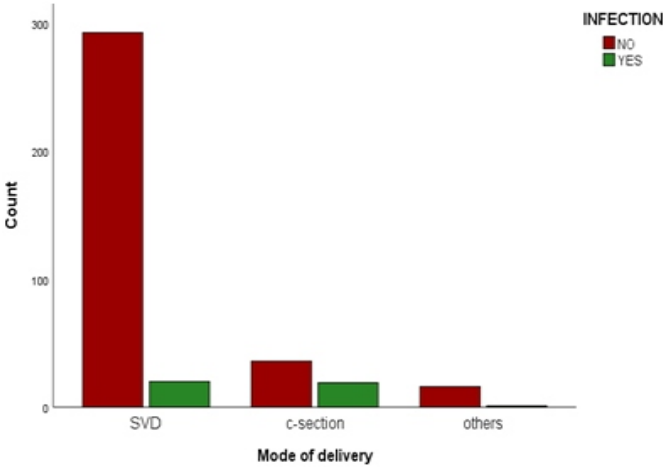

Figure 4: Mode of delivery of last child birth and frequency of viral hepatitis infection in study participants

There was significant association of place of delivery of last childbirth and HBV infection [x2(2, N=385) =35.136, *p*=<.001] as shown in Figure 5.

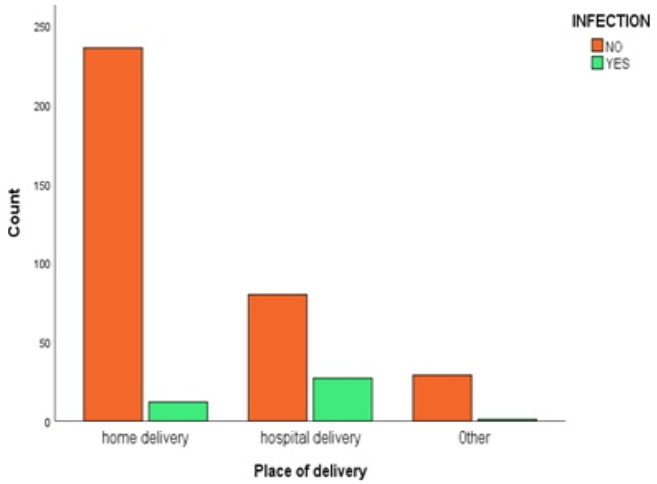

Figure 5: Place of delivery of last child birth and frequency of HBV infection

There was significant association of history of transfusion and HBV infection [x2(1, N=385) =112.87, *p*<.001]. The proportion of pregnant females found to be infectious who did give history of transfusion was 58.3% while proportion of pregnant females found to be infectious who did not give history of transfusion was 3.6%. It was found that females having history of transfusion were more likely to be infected [OR-(CI): 27.26- (12.49-59.49), *p*-value: <.001) as shown in figure 6.

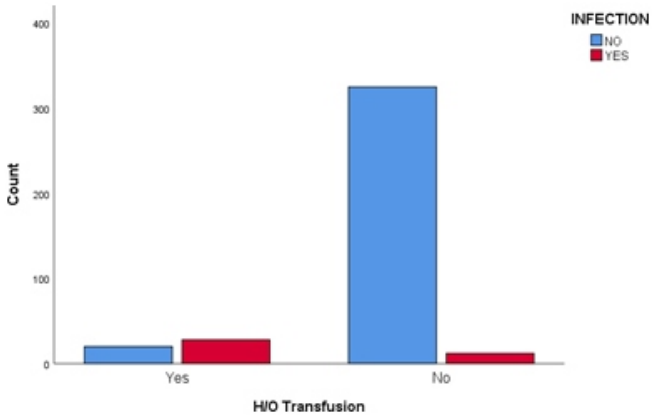

Figure 6: History of transfusion and prevalence of HBV infection

DISCUSSION

A total of 385 pregnant females were made a part of study. Out of these 35 participants tested positive for HBV infection showing prevalence of 9.1% respectively. The disease burden is affecting developing regions like Pakistan, especially rural population of Sindh province.[12] A study carried out in Sindh showed frequency of positive cases of hepatitis B to be 6.7% emphasizing on the importance of associated risk factors like history of previous transfusion of blood and its products, hospital admissions, needle stick injuries and use of contaminated equipment.[13] Researches carried out globally like in Saudi Arabia and China showed seroprevalence of HBV to be 4.1% and 7.5% respectively in expecting mothers. [14]

Our study undertakes various demographic characteristics and important risk factors as HBV infection is quite prevalent in our region and is on a continuous rise.[15] We noted that prevalence of Hepatitis B infection is found more in middle age groups, while pregnant females of less than 26 years of age and more than 36 years of age were less affected (Figure 1).Thus it suggests that major age group belongs to reproductive age bracket focusing on due importance to preventive measures in all females of reproductive age. Studies carried out in India and Nigeria also suggests similar findings.[16]

Education status and hepatitis B infection has a negative correlation indicating that improving education of the individuals will lead to better understanding of the disease consequences and preventive measures. Similar findings were observed in other studies like the study carried out in our own country[17] and also observed globally like in Italy[18] which indicate that a low literacy rate is also a risk factor for the spread of this virus.

Occupation is also considered as part of the risk factors, in which the study population was divided into two halves, house wives and working women. The outcome of study represents a rise in seroprevalence of HBV in housewives. Similar finding was also concluded in a study carried out in Nigeria showing highest prevalence in house wives[19] pointing to better awareness among working ladies.

The study population was grouped into three including low, middle and high socioeconomic groups. The results showed higher incidence in low socioeconomic group. Similar results have been observed in other studies.[20,21]

History of hepatitis contact has a direct relationship with positive cases of HBV (Figure 2). A study carried out in Nigeria represented an increased prevalence of HBV infection in women who gave positive history of contact with house hold members or friends with a known positive history of previous hepatitis B infection. [22]

It is also noted that hepatitis B virus has a positive correlation with miscarriage. The study population who were positive for Hepatitis B infection gave a positive

history of miscarriage as compared to others. (Figure 3) A significant association was established in a study conducted in Ethiopia and Nigeria indicating a lack of sterilization practices.[23] Patients who had undergone C-section in the hospitals were at a greater risk of infection (Figure 4 and 5). Similar findings were also observed in studies carried out in other parts of the world[24] suggestive that sterilization practices need improvement.

Transfusion of blood and its products is considered a risk factor for spread of HBV infection (Figure 6).This finding is supported by a study conducted in Nigeria.[25]

There is lack of follow up for treatment of the patients and investigation of children born to hepatitis positive mothers.

CONCLUSION

This study highlights the importance of the serological screening of HBV in pregnant females belonging to rural areas. It is shown that simple screening of HBV by ELISA in pregnant females can be helpful in early detection of positive cases which can be confirmed by Real time PCR. Moreover by estimating the prevalence in expecting mothers we can point well towards estimating their levels in the overall occupants of the society.

It is indicative of a rising trend of HBV cases and also highlights the important demographic and risk factors associated with spread of this virus in community. Lack of awareness among general population, reproductive age bracket, inappropriate screening of blood and its products at rural health centers and malpractice of surgical procedures are some of the important risk factors pointed out in our study.

CONFLICT OF INTEREST

None

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Authors' contributions:

Zarrish Qasim: Conception of study/Designing/Planning, Experimentation/Study Conduction, Analysis/ Interpretation/Discussion, Manuscript Writing, Critical Review, Facilitated for Reagents/Material Analysis

Muhammad Younus Jamal Siddiqi: Conception of study/ Designing/Planning, Experimentation/Study Conduction, Manuscript Writing, Critical Review

Syeda Hira Abid: Experimentation, Study Conduction, Manuscript Writing

Maeesa Wadood: Experimentation/Study Conduction, Facilitated for Reagents/Material Analysis

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