

A Large Data Set; Hepatitis B and C Infection in Pregnant Females

USMAN ZAFAR¹, AYMEN JAVED², SUMAIRA FATIMA SABIR³, MUHAMMAD ASIF NAVEED⁴, SUFYAN AHMED⁵, MUHAMMAD ZAHID LATIF⁶

¹Assistant Professor Department of Medicine, Islamabad Medical & Dental College, Islamabad

²Senior Registrar, Department of Obstetrics and Gynecology, Services Hospital, Lahore

³Senior Registrar, Department of Obstetrics and Gynecology, Lahore General Hospital, Lahore

⁴Associate Professor, Department of Hematology, University of Health Sciences, Lahore

⁵Ph.D. Scholar, Riphah School of Business Management, Riphah International University, Lahore

⁶Professor of Community Medicine/Public Health, Azra Naheed Medical College, Superior University, Lahore

Correspondence to: Usman Zafar, Email: usman.zafar@imdcollge.edu.pk, Cell: 0333-5723685

ABSTRACT

Background: Hepatitis B and C virus (HBV & HCV) infection is on the surge among pregnant women as a result of unsaved dental and cosmetic procedures, reuse of needles, raising the risk of perinatal transmission and HBV & HCV infection in children. Although few studies on the prevalence of HBV and HCV infection during pregnancy have been conducted but the majority of the studies are on very low sample size. The current study is based on large data set.

Objectives: The major goal of this study was to find out the frequency of HBV & HCV in pregnant women.

Methods: We conducted a retrospective cohort study in Alkhidmat Raazi Hospital Rawalpindi. A total of 31911 pregnant women who delivered between 2016 and 2021 were analyzed and categorized as HBV & HCV infected or HBV & HCV uninfected by billing codes. The birth certificate and hospital discharge records were used to identify infant records related to HBV and HCV-infected pregnant mothers. Pregnant women's plasma samples were tested for HBV and HCV using chemiluminescence ARCHITECT i1000SR® Abbott Diagnostics. Data were analyzed using packages within SPSS software and $P \leq 0.05$ was considered significant. Cross-tabulation chi-square analysis was performed with a significance level of 5%.

Results: The pregnant women with age under 25 years were 12699 (39.8%), women with age from 26 to 29 years were 9734 (30.5%), while women with age 30 and older were 9478 (29.7). The patients who were primigravida were 9514 (29.8%), multipara having 1-4 children 18545 (58.1%) and those having more than five children were 3852 (12.1%). The prevalence of HBV and HCV in 31911 pregnant women were 170/31911 (0.5%) and 478/31911 (1.5%), respectively. The mean age was 27.9 years.

Conclusions: HBV and HCV infection is present in pregnant females, which may ultimately increase the treatment cost and vertical transmission.

Keywords: Hepatitis B, Hepatitis C, Infection, Pregnant females

INTRODUCTION

Viral Hepatitis is a widespread infection that affects both pregnant and non-pregnant women. Hepatitis B and C viruses (HBV and HCV) are responsible for almost 1.3 million deaths and 10 million new infections per year, reported in 2015¹. HCV had a global prevalence of 71 million people, whereas HBV had 257 million, according to WHO in 2015²⁻⁴.

Liver cirrhosis, a disorder characterized by substantial changes in liver architecture and function, can develop in around 20% of people with chronic HBV infection and can lead to hepatocellular carcinoma (HCC) as a result of cirrhosis or viral pro-oncogenic characteristics⁵⁻⁶. Although all hepatitis viruses can affect the mother and her child, the greatest risk to maternal health and the fetus is observed with acute hepatitis A virus or hepatitis E virus infection during pregnancy. The main risks of HBV, HCV, and hepatitis D virus infection are connected to the severity of the mother's underlying liver disease and the likelihood of HBV and HCV transmission from mother to child (MTCT)⁷.

HBV and HCV are transmitted predominantly by blood and body fluids, with prenatal and early infant transmission, and also sexual and parenteral routes of transmission^{8,9}. During pregnancy, HBV and HCV are frequently linked to HCC, which leads to an increase in maternal mortality estrogen have been suggested as a factor in the development of HCC. In addition, HCC has been associated with immunological suppression during pregnancy. Both viruses have the same transmission ways, which is especially concerning when it comes to vertical transmission from mother to child¹⁰. Several risk factors have been associated with vertical transmission of hepatitis C virus from mother to child, including maternal HCV RNA, viral load greater than 6 logs IU/mL, co-infection with HIV, and obstetric interurrences are of major clinical importance^{11,12}. HBV and HCV have a perinatal transmission rate of roughly 10% and 5%, respectively. (Hwang et al., 2011) Both infections are harmful to a pregnant woman's health. Pregnancy cholestasis, newborn narcotic withdrawal syndrome, and neonatal

critical care unit hospitalization are all linked to maternal chronic HCV infection¹³.

Few studies are available for the prevalence of HBV and HCV infection in a healthy population of blood donors. These studies showed that the highest rate of HBV infection is in Sindh (6.2% ± 1.96) while the lowest is in Lahore (1.1% ± 1.96). On the other hand highest rate of HCV infection is recorded in Quetta, i.e. 20.8%, and the lowest in Multan. Prevalence of HCV infection in pregnant females has been studied in KPK and Sindh, showing a rate of 8.95% in Hazara and 4.7% in Hyderabad. As HBV and HCV both are caused by the dental procedures, using reusable needles and via blood, so prevalence varies from one area to another depending upon the literacy rate and local practices of dentists, doctors, beauticians and blood banks. This study was conducted to see the prevalence of HBV and HCV among pregnant females presented to Alkhidmat Raazi Hospital, Rawalpindi.

MATERIAL AND METHODS

This study was approved by the ethical committee of Alkhidmat Health Foundation. It was a retrospective cohort study of pregnant women (primigravida and multipara) attending antenatal clinic in Alkhidmat Raazi Hospital. A total of 31,911 pregnant women were delivered between January 1, 2016, and December 31, 2021. Demographic characteristics, maternal medical history, and obstetric and neonatal outcomes were also extracted from the Alkhidmat Raazi Hospital Rawalpindi Obstetric Maternal and Infant database.

Sample collection: Five ml of blood sample was collected in Clot activator & Gel tubes (serum tubes) from thirty one thousand nine hundred and eleven (31911) pregnant women in Alkhidmat Raazi Hospital Rawalpindi. Serum was subsequently harvested as early as possible by centrifugation at 3500 rpm for 10 minutes to avoid hemolysis.

Chemiluminescent microparticle immunoassay (CLIA)

All the samples included in the study were tested for HCV & HBV using CLIA (Architect i1000SR, Abbott Diagnostics, IL, USA) as per the manufacturer's protocol. CLIA is a chemiluminescent

microparticle immunoassay (CMIA) for the qualitative detection of HBsAg and HCV Ab in human serum. Values higher than 1.00 (≥ 1.00) indicated the reactive result and values lower than 1.00 indicated the nonreactive result. The results were expressed as signal/cut-off ratio (S/Co). Specimens with S/Co of 0.90 were considered as nonreactive, between 0.9 and 1.0 as indeterminate.

Data analysis: All collected data were analyzed through packages within Statistical Package for Social Sciences (SPSS) version 25 statistical software (SPSS, Inc., Chicago, IL, USA). Results of HBV & HCV using CLIA analyzed on SPSS. The frequencies of HBV and HCV in selected patients were determined. Qualitative variables in this study such as primigravida and multiparity were expressed in terms of frequencies and percentages and presented as frequency distribution tables.

Numerical variables like maternal age were presented as means with standard deviation. Significance was accepted at the level of $p \leq 0.05$.

RESULTS

The prevalence of HBV and HCV in 31911 pregnant women were 170/31911 (0.5%), and 478/31911 (1.5%), respectively. Our study showed a high predominance of HCV infection (1.5%) in pregnant women with a mean age was 27.9 years. This study found that the majority of pregnant females belonged to age under 25 years i.e., 12,699 (39.8%), women with age from 26 to 29 years were 9734 (30.5%), while women with age 30 and older were 9478 (29.7%). The primigravida women were 9,514 (29.8%), multipara having 1-4 children 18,545 (58.1%) and those having more than five children were 3852 (12.1%) as shown in Table 1.

Table 1: Frequency of Maternal Age, Gravida, Parity, Hep B and Hep C in pregnant women

	Frequency (N=31911)	% age
Maternal Age at Delivery		
under 25 years	12699	39.8
26-29 years	9734	30.5
30 and older	9478	29.7
Gravida		
Primigravida	9514	29.8
1-4 Childrens	18545	58.1
≥ 5	3852	12.1
Parity		
≤ 2	26623	83.4
≥ 3	5288	16.6
Hepatitis B		
Negative	31726	99.4
B +ve	170	0.5
Hepatitis C		
Negative	31418	98.5
C +ve	478	1.49
Both Hepatitis B & C +ve	15	.04

Table 2: Characteristics of Women with Hepatitis B infection in pregnant women

	Hepatitis B (N=31911)		X2	p-Value
	Hep B +ve (170)	Hep B -ve (31726)		
Maternal Age at Delivery				
under 25 years	77	12619	12.8	0.040
26-29 years	52	9678		
30 and older	41	9429		
Gravida				
Primigravida	48	9464	3.14	0.534
1-4 Childrens	97	18437		
≥ 5	25	3825		
Parity				
≤ 2	134	26474	3.71	0.155
≥ 3	36	2548		

Hepatitis C was most common in the <30 years of age group (p value = 0.000). Its prevalence was highest in multipara (p value = 0.000) as shown in table III.

There was no significant difference found between the women with HBsAg positivity concerning maternal age (p value = 0.899), gravida (p value = 0.534) and parity (p value = 0.155), but a significant difference was demonstrated among women under 30 years of age (p value = 0.040) as shown in table 2.

Table 3: Characteristics of Women with Hepatitis C infection in pregnant women

	Hepatitis C (N=31911)		X2	p-Value
	Hep C +ve (478)	Hep C -ve (31418)		
Maternal Age at Delivery				
under 25 years	134	12562	75.5	0.000
26-29 years	124	9606		
30 and older	220	9250		
Gravida				
Primigravida	96	9416	75.6	0.000
1-4 Children	267	18267		
≥ 5	115	3735		
Parity				
≤ 2	345	5248	45.6	0.000
≥ 3	133	5151		

DISCUSSION

Hepatitis caused by a virus is relatively frequent and looks to be on the rise across the world. Pregnant women are also vulnerable to the condition, which can cause significant maternal and perinatal morbidity and mortality^{14, 15}. Hepatitis B virus (HBV) infection is a primary cause of mortality around the world, with cirrhosis and hepatocellular cancer being the most prevalent complications. HBV is spread primarily through mother-to-child transmission (MTCT). In the United States, HBV testing is part of regular prenatal treatment, and children born to HBsAg-positive mothers get HBV immune globulin and vaccination to prevent transmission^{16, 17}.

In this study, 31911 pregnant women were screened for HBV and HCV infection between 2016 and 2021. The frequency of HBV and HCV in 31911 pregnant women were 170/31911 (0.5%), and 478/31911 (1.5%), respectively.

The prevalence of hepatitis C and B infections has been reported to be 6.7%¹⁸ and 2.5%, respectively in the general population of Pakistan^{19, 20}. The results of our study present a much lower prevalence of hepatitis B and C as compared to the study carried out at Nawabshah city of Sindh Province, Pakistan conducted by Samo et al with the prevalence of hepatitis C at 14.3% and hepatitis B virus as 6.7%^{21, 22}. Compared to a study conducted in Jabalpur, Madhya Pradesh India from July 2015 to June 2017 by Barde et al hepatitis C virus load reported was much lower i.e. 0.6% and hepatitis B was 9.8%²³. The average prevalence reported in a retrospective study conducted at the University Dental Hospital Sharjah (UDHS) and the College of Dental Medicine, University of Sharjah, United Arab Emirates by Al-Ahmad et al was much higher for hepatitis B virus infection 2.2% while the prevalence of hepatitis C virus infection was 3.8%²⁴. The variable prevalence rate has been reported in numerous studies which may be due to variations in study design, sample size, and practices of doctors, dentists, beauticians and blood banks in that particular area^{25, 26}.

The results of our study estimated a much lower prevalence of hepatitis B compared to hepatitis C in pregnant women. Similar results were seen in two studies, one study is carried out at Sir Ganga Ram hospital Lahore by Sultana et al. the prevalence of hepatitis C was much higher at 2.17% followed by hepatitis B at 0.50%²⁷. In another study which was conducted in Ayub Teaching Hospital, Abbottabad by the prevalence of Hepatitis C (7.81%) was high as compared to Hepatitis B (5.27%)²⁸.

A study conducted in Lucknow, Uttar Pradesh showed 20(5.8%) were seropositive for hepatitis B and 6(1.7%) positive for hepatitis C among pregnant women out of 345²⁹.

The results of our study demonstrated that HCV infection occurred more often in women who were aged less than 30 years (X2 value 75.5 and P-value = 0.00). This is similar to a study

conducted in the US by Chappell et al. Chappell's found that hepatitis C virus-positive women were more likely to be under 30 years old (67% vs 53%; $P < .001$). This study was conducted in retrospective cohort of pregnant women who delivered between 2006 and 2014²⁹. Our study presented is different because it presented large data of pregnant women delineating the practices of that area.

CONCLUSION

HBV and HCV infection is present in pregnant females, which may ultimately increase the treatment cost and vertical transmission.

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