



**PREVALENCE AND RISK FACTORS OF HEPATITIS B
VIRUS AND HEPATITIS C VIRUS AMONG PREGNANT
WOMEN OF FAISALABAD, PUNJAB, PAKISTAN**

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| <p>ARTICLE INFO</p> <p>Keywords: HBV, HCV, ELISA, pregnancy, infection.</p> <p>Corresponding Author: Muhammad Sarwar Hayat, Department of Allied Health Sciences, The Superior University Lahore, Faisalabad Campus, Pakistan Email: sarwar10858@gmail.com</p> | <p>Abstract</p> <p>Background: Hepatitis B (HBV) and Hepatitis C (HCV) are serious health concerns worldwide, especially for pregnant women, as they can lead to complications for both the mother and baby. This study aimed to understand how common these infections are among pregnant women in Faisalabad, Pakistan, and what factors put them at risk. Between April and July 2023, researchers surveyed 200 pregnant women at National and Faisal Hospitals, collecting information through structured interviews and blood tests. Positive samples were confirmed using ELISA testing.</p> <p>Results: The findings were concerning 03% of the women tested positive for HBV, while 14% had HCV, rates significantly higher than average. The most common way the viruses spread was through unprotected sexual contact, with 86% of infected women reporting exposure to an infected partner. Rural women had a higher infection rate (58%) compared to those in urban areas (42%). Working women were more affected (60%) than housewives (40%), and education played a role too less educated women had a higher infection rate (20.9%) compared to their educated counterparts (15.2%). Additionally, exposure to contaminated blood or syringes increased the risk, with 13.3% of cases linked to direct contact.</p> <p>Conclusion: These infections can have devastating effects, increasing the risk of stillbirth, miscarriage, and long-term health issues for newborns. The study highlights the need for routine screening during pregnancy, better public awareness, and stronger prevention measures such as safe sex education, improved medical safety, and harm reduction for drug users to protect both mothers and their babies.</p> |
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Introduction

The word "hepatitis" comes from Latin and means inflammation of the liver. In today's world, viral hepatitis remains a serious health threat, especially in developing countries across Asia. It can lead to severe liver diseases and, in some cases, even liver cancer (1). Most cases result from an infection caused by one type of virus but infections may also be caused by a variety of virus (2). Hepatitis can be acute or chronic, potentially leading to cirrhosis or liver cancer. While autoimmune diseases and drugs can cause it, viruses remain the primary cause (3). Hepatitis B and C can cause liver cancer or end-stage liver disease, both potentially fatal. Given their high infection rates and severity, urgent global action is needed (4). In Pakistan about 10 million people suffer by HCV. The chronic form of HCV can cause the liver to develop cirrhosis (5). Hepatitis is a contagious liver disease caused by viruses A, B, C, D, and E. Chronic Hepatitis B, C, and D can lead to cirrhosis, liver cancer, and even death. This study explores the impact of Hepatitis B and C on pregnant women (6). HBV, a DNA virus from the hepadnaviridae family, has a core antigen (HBcAg) surrounding its DNA and polymerase, with a surface antigen (HBsAg) coating it. HCV is a major global health concern, widespread in many countries, placing a heavy burden on healthcare systems (7). Each year, 8–16 million HBV and 2–5 million HCV cases arise in developing countries due to unsterilized medical equipment, especially contaminated injections (8).

Pakistan faces high rates of Hepatitis B and C, unsafe blood transfusions, and maternal mortality, worsened by low blood donations and poor screening (9). Hepatitis C can be transmitted from mother to baby, with rising cases since 2009. Infected pregnant women face higher risks, with 3-10% experiencing severe infections. Increased HCV RNA levels during pregnancy can lead to preterm birth, low birth weight, and fetal complications. In Pakistan, the situation is worse, with 12 million affected by HBV and HCV (10).

HCV affects 1–8% of pregnant women worldwide. In developing countries, it spreads mainly through contaminated needles and blood transfusions, while in developed countries, mother-to-baby transmission is more common (11). HBsAg is common in pregnancy worldwide, with the highest rates in developing countries. In Pakistan, HBV prevalence varies by region, from 0.34% in Karachi to 3.98% in Swat. Blood tests, including rapid kits and ELISA, are used to screen and confirm HBV and HCV infections in pregnant women (12). Early screening and prenatal care are vital to reduce hepatitis-related pregnancy risks, with preventive treatment available for HBV but no proven way to prevent HCV transmission (13). In HBV-endemic regions, most infections occur at birth or early childhood, with babies of HBeAg-positive mothers facing up to a 95% risk of chronic infection. Since chronic HBV can lead to severe

liver disease, preventing mother-to-child transmission is crucial (14). An HBV-infected mother can transmit the virus to her baby during pregnancy, at birth, or through breastfeeding (15). Despite the effectiveness of HBIG and HBV vaccines, 3–9% of babies born to HBV-positive mothers still contract the virus(16). PEP failure occurs in about 3% of cases, rising to 9% in mothers with high HBV-DNA levels, likely due to prenatal (intrauterine) infection (17). HBV intrauterine infection likely occurs through transplacental leakage of HBeAg-positive maternal blood, often triggered by uterine contractions or placental barrier breakdown (18). Researchers found that intrauterine HBV infection in fetuses is mainly caused by transplacental transmission from the mother (16). Research suggests HBV can be transmitted to the fetus before conception through infected sperm or via vaginal secretions during pregnancy (19). It is believed that the exposure to mother's blood and cervical secretions post-childbirth will cause the baby to be infected with the HBV virus (20). Breastfeeding is safe for babies of HBV-infected mothers as long as they receive timely HBV vaccination (21). Mothers should care for their nipples while nursing, keeping them dry and intact to prevent cracks and reduce the risk of HIV transmission (22). In endemic areas, mother-to-child transmission accounts for about 50% of chronic HBV infections, primarily affecting infants and children (23). The first and most important step to decreasing the burden worldwide for chronic HBV is elimination of the an MTCT (20). Immunoprophylaxis at birth significantly reduces HBV transmission, making newborn vaccination the most effective and cost-efficient strategy to prevent chronic infection (24). With 130-180 million HCV-positive people worldwide, most suffer from chronic infection. Understanding how pregnancy affects HCV, its transmission to infants, and maternal immune responses is crucial for better prevention and management (24).

The present incidence of HCV in mothers who are pregnant is not easy to determine due to the lack of screening specific to the majority of this group. The amount of the serum HCV antibody within cohorts with > 3000 mothers who are pregnant ranges from 0.1 percent and 3.6 percent with a mean of 1.16 percent, and the frequency of HCV RNA varies between 42.5 percent and 72 percent(25). Acute Hepatitis C in pregnancy is rare but seen in high-risk groups like IV drug users. A case of a 16-year-old pregnant woman with chronic HIV and HCV superinfection showed that HCV suppressed HIV replication during its acute stage (26). Intra-hepatic cholestasis of pregnancy usually occurs in the third trimester, causing itching and elevated liver enzymes, while jaundice is rare. (27). Acute fatty liver in pregnancy, often emerging in the third trimester, can lead to liver failure and encephalopathy, requiring urgent treatment unlike conservatively managed acute hepatitis (28). Changes in the liver enzymes of a pregnant

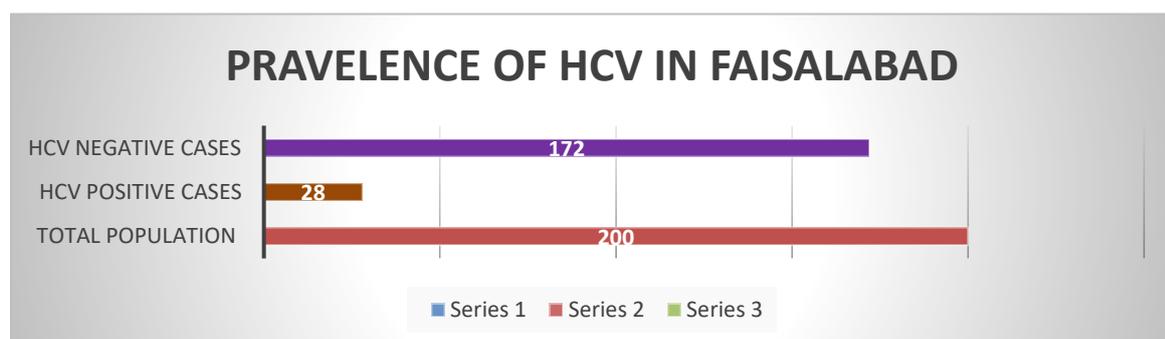
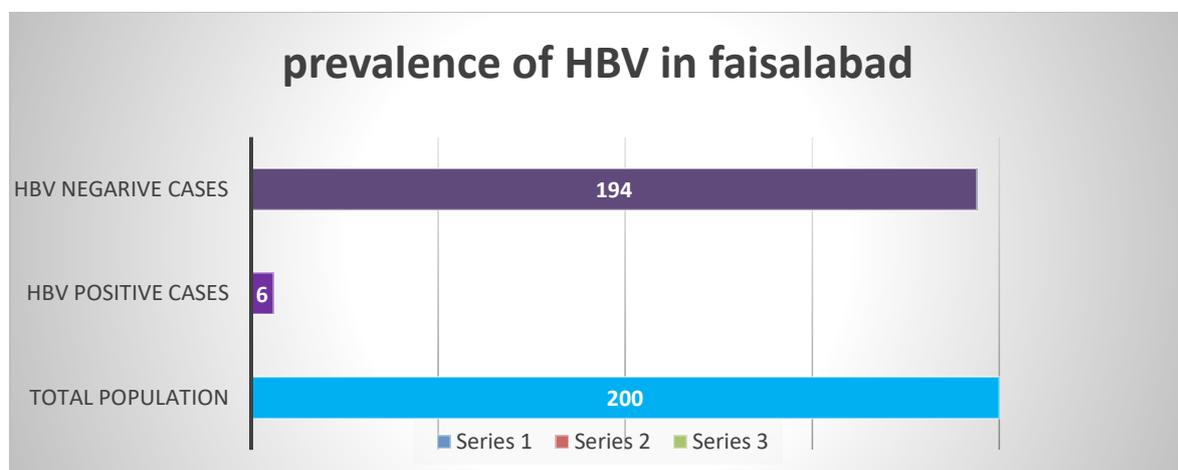
woman can be explained in part by the release of interferon endogenous from the placenta. However, this doesn't prevent the clearance of viral particles (29).

Research methodology

This cross-sectional study, conducted from April to July 2023 at National Hospital and Faisal Hospital in Faisalabad, examined the prevalence of HCV and HBV among pregnant women from both urban and rural areas. A total of 200 women (100 from each hospital) participated, with only ultrasound-confirmed pregnancies included. Critically ill women unable to answer the questionnaire were excluded. Blood samples (5ml) were collected using aseptic techniques, stored in red-capped vacutainers, and centrifuged for serum separation. HBsAg and HCV antibodies were initially screened using Abbott test strips, with results appearing within 15 minutes, followed by confirmation through ELISA on Mindray (CL-900i). Data on demographics, medical history, and risk factors were gathered through structured interviews after obtaining informed consent. The collected data was analyzed using SPSS (Version 23.0).

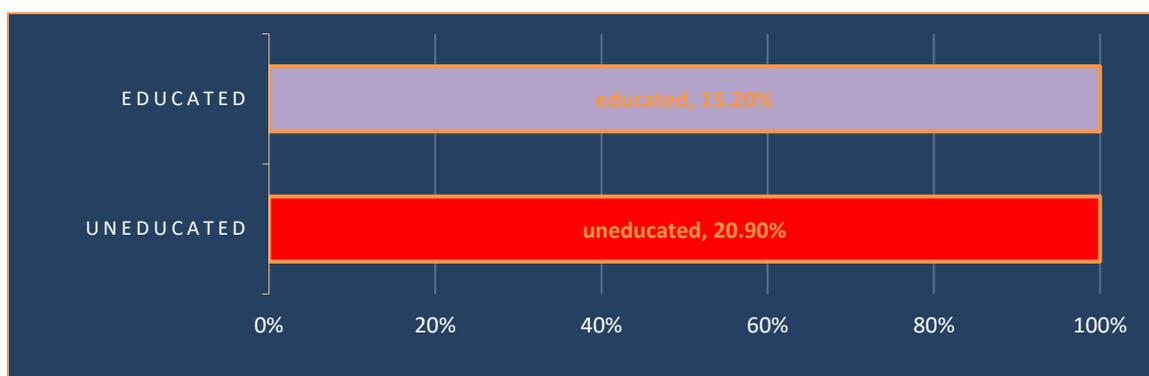
Results

Total 200 pregnant women of National hospital and Faisal hospital took part and among them 6 (3%) pregnant women were identified with HBV positive infection whereas 194 pregnant women showed negative results to HBV infection.



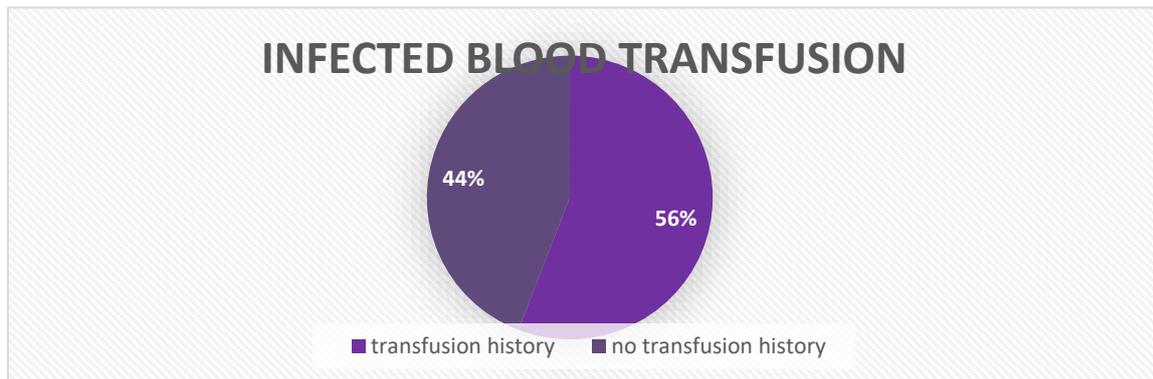
| | | hepatitis HCV and HBV | | | |
|----------------|----------|-----------------------------|----------|----------|-------|
| | | negative | positive | positive | Total |
| Age patient | of 18-24 | 45 | 1 | 3 | 49 |
| | 25-30 | 41 | 1 | 6 | 48 |
| | 31-35 | 55 | 3 | 9 | 67 |
| | 36-40 | 5 | 0 | 3 | 8 |
| | 41-45 | 20 | 1 | 6 | 27 |
| | 46.00 | 0 | 0 | 1 | 1 |
| Total | | 166 | 6 | 28 | 200 |

Out of 200 pregnant women 138 pregnant women was uneducated from which 17 were positive with HCV and 4 were positive with HBV. The total prevalence of HCV and HBV in uneducated people was observed 20.90%. 62 women was educated from which 11 were positive with HCV and 2 were positive with HBV. The prevalence of HCV and HBV in educated people was observed 15.20%. The prevalence of HCV and HBV was observed more in uneducated people as compared to educated people.

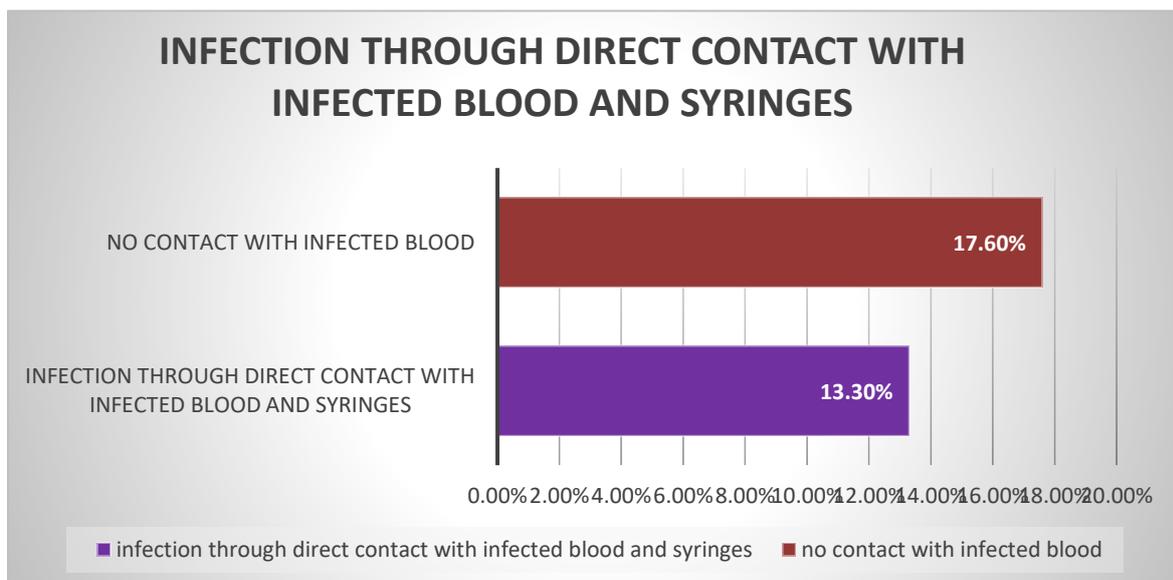


We have reviewed 200 biological sample, 32 pregnant women told that their husband have HCV or HBV infection from which 15 women were HCV positive and 3 were HBV positive and there was not transmission of infection in remaining 14 pregnant women. In 200 sample

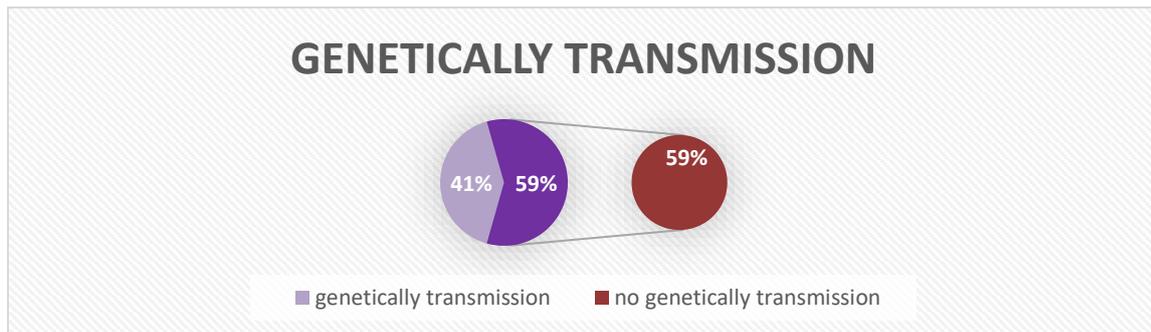
size 168 pregnant women told that their husbands have no HCV or HBV infection. The total prevalence of HCV and HBV in pregnant women was observed 86%.



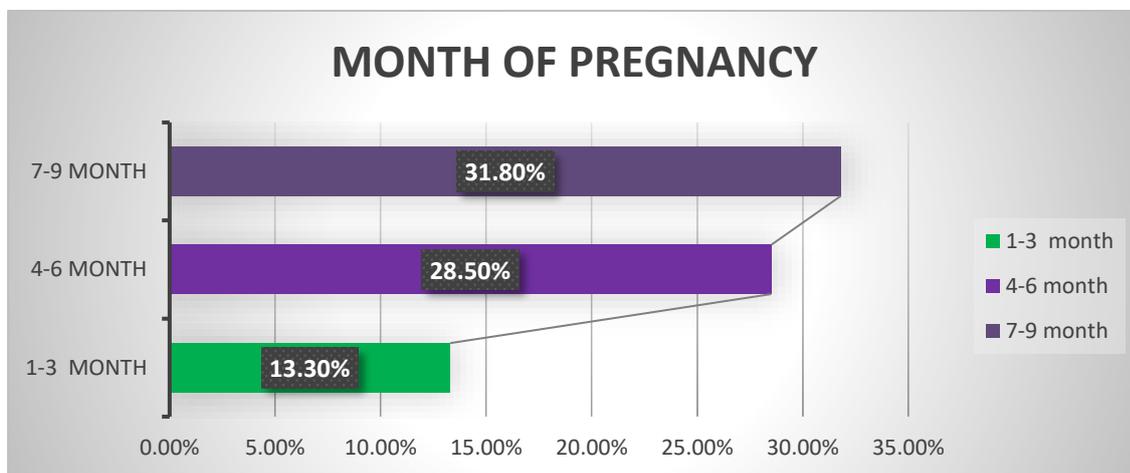
Out of 200 pregnant women 22 women was in direct contact with infected blood and syringes from which 4 women were HCV positive and no women was with HBV positive. It was observed that the woman who as in direct contact with infected blood and syringes have a prevalence of HCV and HBV 13.30%. Out of 200 170 women was not in contact with infected blood and syringes.



As we reviewed 200 sample from which 32 pregnancy women told that their family have genetic history. From these 32 pregnant women 1 woman was infected with HCV and 3 were infected with HBV. 168 pregnant women told that their family have no genetic history. The prevalence of HCV and HBV is higher in women who have no genetic transmission history (59%) as compared to those who have genetically transmission history (41%).



As we categories the month of pregnant woman in 3 groups. In group 1 (1-3 months) the total prevalence of HCV and HBV in pregnant woman was observed 28.5% (n=6), in group 2 the prevalence of HCV and HBV was observed 31.8% (n=7) and in group 3 the prevalence of HCV and HBV in pregnant women was observed 13.30% (n=21).



Discussion

Hepatitis C Virus (HCV) and Hepatitis B Hepatitis B (HBV) are both significant global health issues that affect millions of people around the world. Our study of 200 pregnant women at National and Faisal hospitals found an HCV prevalence of 14%, lower than previous reports. A 2016 study at Faisalabad Medical School reported a higher incidence of 25%(10). HBV infections were also detected in pregnant women. In our study. The prevalence of HBV was recorded as at 3%. The study was conducted at the Molvi Jee Hospital in Peshawar Pakistan July 2013 through April 2014. The HBV prevalence in the study was 1.16 percent(12). HCV was more common than HBV among pregnant women. Of 200 participants, 58% of rural women had HBV or HCV, compared to 42% in urban areas. Rural women faced a higher risk. A study in East Wollega found HBV and HCV rates of 4.8% in rural areas and 0.8% in urban areas.(30).Among 200 pregnant women, HBV and HCV were more common among working

(60%) and uneducated women (20.9%). Housewives had a lower infection rate (40%), while educated women had the lowest (15.2%). This pattern aligns with an Ethiopian study showing higher infection rates in uneducated women (22.7%) than educated ones (15.5%) (31). Among 200 pregnant women, 32 had husbands with HBV or HCV; 18 tested positive, while 14 remained uninfected. The overall infection rate among pregnant women was 86%. Additionally, 55 women received blood transfusions, with 11 testing positive (56%). A study at St. Joseph Hospital found a 10.2% infection rate in transfusion recipients (32). Among 200 pregnant women, 22 had direct contact with contaminated blood or syringes, with 4 testing positive for HCV and none for HBV. The highest infection rate (13.3%) was among those exposed. Of 32 women with a family history of hepatitis, 1 had HCV and 3 had HBV, while 59% of infections occurred in those without a genetic link. Infection rates varied by trimester, peaking in the second (31.8%). Age also played a role, with higher prevalence in women aged 26-45 (60.4%) compared to those 18-25 (39.6%). The study was conducted in Ethiopia's Amhara region (30).

Conclusion

Hepatitis B (HBV) and Hepatitis C (HCV) are widespread in Faisalabad, with HCV affecting 14% and HBV 33% of pregnant women. Various risk factors contribute to their spread, including behavioral, health-related, and socioeconomic issues. Rural women face a higher risk due to poor healthcare, lack of awareness, poverty, and inadequate sanitation. Infection rates are also higher among uneducated women due to limited health knowledge and access to care. Contaminated blood transfusions, unsafe medical procedures, and lack of proper screening play a major role in transmission. Sexual contact with infected partners, unprotected sex, and multiple partners further increase the risk. Additionally, indirect exposure to infected blood and syringes contributes to the spread. Understanding these risks is crucial for effective prevention and targeted interventions.

Recommendations

Routine HBV and HCV screening for all pregnant women is crucial for early detection. Healthcare providers should conduct mandatory tests during prenatal visits and educate the public through campaigns and materials. Safe medical practices, universal antenatal care, partner testing, and a comprehensive medical-social approach can help reduce infections and protect maternal and child health.

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