ORIGINAL ARTICLE

An Observational Study on Prevalence and Risk Factors of Hepatitis B and C in Pregnant Women at Bakhtawar Amin Trust Hospital

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ABSTRACT

Objective: To evaluate the prevalence and associated risk factors of Hepatitis B and C in pregnant women.

Study Design: An observational study.

Place and Duration of Study: This study was conducted at the Department of Gynecology and Obstetrics, Bakhtawar Amin Trust Hospital, Multan, Pakistan from September 2022 to September 2023.

Methods: A total of 500 pregnant women who were in their 1st trimester and tested positive for chorionic gonadotropin hormone were selected for the study by consecutive sampling. A 5ml blood sample was drawn from all women, and serum samples were separated, stored, and then processed by enzyme-linked immunosorbent assay (ELISA). Hepatitis B antigen was identified in each serum sample using ELISA. ELISA kits were used to test the anti-HCV antibodies. Patients were also tested for human immunodeficiency virus (HIV) by HIV1/2 STAT PACK and ARBON.

Results: The prevalence of Hepatitis B and Hepatitis C was 25 (5%) and 10 (2%), respectively. Only one subject was infected with both viruses (2.8%). Eight of the women infected with the Hepatitis B virus were also positive for HIV. HBV showed high prevalence in rural residents (5%), patients who had undergone blood transfusion (20%), and those with sexually transmitted diseases (20%). Women with HIV were twice the risk of infection (OR: 2.1 (2-6.3)). Women with sexually transmitted diseases were eightfold more at risk (OR: 8.5), and women who had undergone blood transfusion were seven times more susceptible to infection (OR: 7.3 (3.2-17.1)). Women aged between 17 and 25 were at threefold more risk of Hepatitis C infection than older women (OR: 3.5 (1.5-9.2)). A high prevalence was noted in women with sexually transmitted diseases (13.3%)

Conclusion: The prevalence of Hepatitis B and C infection in first-trimester pregnant women was 5% and 2%. The prevalence of viral hepatitis was associated with young age (25 years or younger), which suggested the importance of early antenatal screening and hepatitis vaccine to reduce the risk of mother-to-child transmission.

Keywords: *Hepatitis B, Hepatitis C, Pregnancy, Risk Factors.*

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Introduction

Hepatitis is a liver inflammation disease with high mortality and morbidity. More than 1.4 million people have died due to this condition globally, and currently, 400 million people are diagnosed with hepatitis B and C.[1] Hepatitis B and C is prevalent in Africa and Asia including Pakistan.[2] In Pakistan, due to a lack of awareness, less than 10% of the affected population reports their condition and seeks treatment.[3] Most of the patients remain asymptomatic and either die undiagnosed or transmit the virus to others.

Hepatitis B is transmitted through blood and bodily fluids by unprotected sexual activity and shared equipment like syringes and needles.[4] The virus can also be transmitted from mother to child during

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pregnancy or delivery. Children infected with HBV by their mothers develop hepatocellular carcinoma, hepatitis B infection, cirrhosis, and can often lead to death. To prevent mother-to-child transmission, frequent screening, treatment, and vaccinations should be administered soon after birth.[5]

Hepatitis C is transmitted through exposure to infected blood by sexual contact, blood transfusion, drug use, and therapeutic injection.[6] Hepatitis C is also transmissible from mother to fetus or infant. Treatment of this virus is 70% effective in adults but most of these drugs are not suitable for pregnant women.[7] Since no vaccination is available for Hepatitis C, no preventive measures can be taken to prevent mother-to-child transmission of the virus.

Hepatitis in pregnant women is associated with fetomaternal mortality and complications, including abortion, low birth weight, stillbirth, and premature delivery.[8] Therefore, WHO has taken steps to discover treatments for viral hepatitis to eliminate it as a major threat to public health by 2030.[9] Frequent screening and prophylactic treatment are recommended for mothers positive for hepatitis.

In Pakistan, the incidence of hepatitis B and C in pregnant women ranges from 2-8%, but still, the management of these diseases is not practical. All the studies conducted previously were on subjects from all trimesters; we focused on first-trimester women, which gives more opportunity for early detection and treatment of mother-to-child transmission of the virus.[10] We conducted this study to evaluate the prevalence and associated risk factors of Hepatitis B and C in pregnant women.

Methods

A prospective observational study was conducted at the Department of Gynecology and Obstetrics, Bakhtawar Amin Trust Hospital, Multan, Pakistan from September 2022 to September 2023. A total of 500 pregnant women who were in their 1st trimester and tested positive for chorionic gonadotropin hormone were selected for the study by consecutive sampling. The sample size was calculated by using Cochran's sample size formula, keeping a 95% confidence interval, a 50% proportion, and a 4.4% error margin. The margin of error was reduced from conventional 5% to reach the targeted sample size and higher precision. Women whose gestational age was not known, terminally ill, undergoing treatment for viral hepatitis, and those with non-viral severe liver disease were excluded. All the subjects provided their informed consent to be included in the study. The Ethical Review Board of the hospital has approved the study by letter: 20/120, dated 8th February 2022.

Demographic and clinical characteristics of women were recorded by interviewing the patients. Sexually transmitted diseases (STDs) included any prior diagnosis of HIV, syphilis, gonorrhea, or chlamydia. Unprotected sex was defined as self-reported vaginal intercourse without condom use in the last 12 months. A 5 mL blood sample was drawn from all women, and serum samples were separated, stored, and then processed by ELISA. Hepatitis B antigen was identified in each serum sample using ELISA. ELISA kits were used to test the anti-HCV antibodies. Patients were also tested for HIV by HIV1/2 STAT PACK and ARBON.

All the data was analyzed by SPSS version 23. Descriptive data were presented by mean ±SD and frequency. Bivariate regression analysis was done to analyze the relationship between the outcome and explanatory variables. Multivariate regression was performed for variables with a value ≥0.2 in the bivariate regression. 95% confidence interval and adjusted odds ratio values determined the strength of the relationship. Statistically, significance was taken at a *P*-value less than 0.05.

Results

A total of 500 pregnant women were evaluated. All the women were married and mostly belonged to the age group 26-45 years (60%), 340 women (68%) were multigravida, and 260 women (52%) were multiparous. The mean age was 26.1 ± 5.2, hence we classified patients by the age of 25 years as a cut-off. The baseline characteristics of patients are shown in Table 1.

The prevalence of Hepatitis B and Hepatitis C is shown in Table II. Only one subject was infected with both viruses (2.8%). Eight of the women infected with HBV were also positive for HIV. (Table 2).

HBV showed high prevalence in rural residents (5%), patients who had undergone blood transfusions (20%), and those with sexually transmitted diseases (20%). Women with HIV were twice the risk of

Table 1: Patients' baseline characteristics	
Variable	**N (%)**
Age (years)	
17-25	200 (40%)
26-45	300 (60%)
Married women	500 (100%)
Residence	
Urban	400 (80%)
Rural	100 (20%)
High school education	150 (30%)
Occupation	
Housewife	420 (84%)
Employed	80 (16%)
Gravida	
Primigravida	160 (32%)
Multigravida	340 (68%)
Parity	
Nulliparity	240 (48%)
Multiparity	260 (52%)
Vaccinated for HBV	20 (4%)

Table 2: Prevalence of Hepatitis B and C in study patients		
	Hepatitis B	**Hepatitis C**
Positive	25 (5%)	10 (2%)
Negative	475 (95%)	490 (98%)
95% CI	3.5-6%	1.1-2.5%
HIV positive	8/25	-

infection (OR: 2.1 (2-6.3)). Women with sexually transmitted diseases were eightfold more at risk (OR: 8.5), and women who had undergone blood transfusion were seven times more susceptible to infection (OR: 7.3 (3.2-17.1)). (Table 3).

Women aged between 17 and 25 were at threefold more risk of HCV infection than older women (OR: 3.5 (1.5-9.2)). A high prevalence was noted in women with sexually transmitted diseases (13.3%) (Table 4).

Table 3: Bivariate and multivariate analysis of Hepatitis B in pregnant women

Variable	N	HBV status		Crude Odds Ratio	Odds ratio
		Positive	Negative		
Age					
17-25	200 (40%)	12 (6%)	188 (94%)	3 (2.2-4.5)	2.8 (1.5-4.8)*
26-45	300 (60%)	13 (4.3%)	287 (95.7%)	1	-
Married women	500 (100%)	25 (5%)	475 (95%)	1	-
Dental extraction	65 (13%)	2 (3%)	63 (97%)	1.9 (0.65-4)	-
Blood transfusion	15 (3%)	3 (20%)	12 (80%)	7 (3.5-16)	7.3 (3.2-17.1) **
Surgery	41 (8.2%)	2 (4.8%)	39 (95.1%)	1.2 (0.34-3.2)	-
Sexually transmitted disease	15 (3%)	3 (20%)	12 (80%)	0.70 (0.29-1.5)	-

HIV	50 (10%)	4 (8%)	46 (92%)	2.8 (1.10-5.6)	2.1 (2-6.3)*
Abortion	80 (16%)	4 (5%)	76 (95%)	0.9 (0.8-2.7)	-
Unprotected sex	37 (7.4%)	3 (8.1%)	34 (91.9%)	2.1 (0.74-5.0)	-
Ear piercing	110 (22%)	8 (7.3%)	102 (92.7%)	2.4 (2-4.5)*	-
Nose piercing	22 (4.4%)	2 (9%)	20 (91%)	4 (2.5-8.6)*	0.150
Diabetes	10 (2%)	1 (10%)	9 (90%)	3.3 (0.92-11)	-
Hospitalization	64 (12.8%)	3 (4.8%)	61 (95.3%)	0.93 (0.44-3)	-
Family history of hospitalization	44 (8.8%)	5 (11.4%)	39 (88.6%)	4 (2.3-7)	4.1 (1.5-19) **
Sharing sharp material	23 (4.6%)	2 (8.6%)	21 (91.3%)	2.0 (0.36-5.1)	-

*P<0.05, **P<0.001

Table 4: Bivariate and multivariate analysis of Hepatitis C in pregnant women

Variable	N	HCV status		Crude Odds Ratio	Odds ratio
		Positive	Negative		
Age					
17-25	200 (40%)	7 (3.5%)	193 (96.5%)	2.3 (0.90-6.2)	3.5 (1.5-9.2)*
26-45	300 (60%)	3 (1%)	297 (99%)	1	-
High school education	150 (30%)	1 (0.7%)	149 (99.3%)	1	-
Dental extraction	65 (13%)	1 (1.6%)	64 (98.4%)	1.5 (0.55-5.3)	-
Blood transfusion	15 (3%)	0	15 (100%)	-	-
Surgery	41 (8.2%)	1 (2.5%)	40 (97.5%)	0.61 (0.15-2.8)	0.60 (0.20-3.1)
Sexually transmitted disease	15 (3%)	2 (13.3%)	13 (86.7%)	0.75 (0.22-2.6)	-
HIV	50 (10%)	1 (2%)	49 (98%)	2.2 (0.28-15.5)	-
Unprotected sex	37 (7.4%)	1 (2.8%)	36 (97.3%)	2.01 (0.45-4.0)	-
Ear piercing	110 (22%)	3 (2.8%)	107 (97.2%)	-	-
Diabetes	10 (2%)	0	10 (100%)	-	-
Hospitalization	64 (12.8%)	2 (3.2%)	62 (96.8%)	0.44 (0.15-1.10)	-
Sharing sharp material	23 (4.6%)	0	23 (100%)	-	-

*P<0.05

Discussion

This cross-sectional study was conducted to evaluate the prevalence and risk factors of Hepatitis B and C virus in pregnant women of Pakistan. The prevalence of HBV was 5% and that of HCV was 2%. These results are within the range reported by WHO regarding the viruses' classification, i.e., 2-7% and <1.5% respectively.[11] Similar studies conducted in Asia also reported similar seroprevalence.[12,13]

The rate of coinfection in our study was 2.8% which complies with prior literature.[14,15] The coinfection indicated common transmission routes. This rate is dangerously high in endemic areas in both pregnant women and infants.

Younger women were more associated with HBV infection (6%) which the high rate of sexual activities can justify as compared to the older population. Similar conclusions were drawn in other studies.[16,17]

Unmarried pregnant women and women with multiple sexual partners have been reported as susceptible to infection in international literature. Still, considering the culture of Pakistan, this factor was not considered.[18,19] The prevalence of sexually transmitted diseases was also significantly lower than commonly reported incidence in literature i.e 6-8%.[20]

As a major risk factor for HBV, blood transfusion was identified as an independent factorwhich can be explained by lack of adequate screening to detect, primarily due to inadequate screening for the virus during blood transfusion. This is consistent with previous data.[21, 22] A family history of HBV also puts the women at risk of infection (11.4%) due to a lack of awareness and precautionary measures.[23] Pregnant women with HIV were twice as susceptible to the virus, indicating the common transmission routes of both viruses.

Young age was also associated with Hepatitis C virus (3.5%) due to exposure to more sexual activity at this age. However, our finding contradicts some previous research reporting a high prevalence of HCV in older women.[24,25] Women with less education and sexually transmitted diseases were also at higher risk of developing HCV infection, which can be due to a lack of awareness.[25,26]

Surgery was not a significant risk factor in our study. However, other studies conducted in Pakistan studied the association between surgeries and transmission of HCV, which was considered an independent risk factor.[26] Similarly, body piercings and iatrogenic risk of HCV have also been reported as a risk factor in other studies, but in our study, these were not significant.[27]

Only 4% of the population was vaccinated for HBV, which is significantly less than reported in developed countries.[28] This may be due to the fact that the vaccination was introduced in Pakistan in 2009, due to which most of the older population did not opt to vaccinate. In addition, the recommended treatment to prevent the vertical transmission of HBV from mother to child is HBV immunoglobulin and birth dose vaccine; however, this treatment is expensive and not accessible to a large part of our population. Therefore, it is recommended to administer the birth dose vaccine to the infant within 24 hours of delivery to minimize the chances of mother-to-child transmission.[29]

Our study has some limitations. We did not include women from different socioeconomic backgrounds, especially the lower class. Large multi-center studies with participants of distinct demographics are necessary for better results.

Conclusion

The prevalence of Hepatitis B and C infection in first-trimester pregnant women was 5% and 2%. The prevalence of viral hepatitis was associated with young age (25 years or younger), which suggested the importance of early antenatal screening and hepatitis vaccine to reduce the risk of mother-to-child transmission.

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HZQ: Conception and design of the work
BK: Manuscript writing for methodology design and investigation
AI: Data acquisition, curation, and statistical analysis
HI: Validation of data, interpretation, and write-up of results
MAI: Revising, editing, and supervising for intellectual content