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PREVALENCE AND RISK FACTORS ASSOCIATION WITH HEPATITIS B & C INFECTED PREGNANT LADIES VISITING TERTIARY CARE HOSPITALS OF PESHAWAR: AN UNMATCHED PILOT CASE-CONTROL STUDY

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ABSTRACT

Objective: To determine the prevalence, risk factors, and their association with Hepatitis B and C infection among pregnant females visiting Tertiary Care Hospitals of Peshawar.

Methods: A pilot case-control study was conducted in the Gynecology & Obstetrics units of Tertiary Care Hospitals of Peshawar after being approved by the institutional IRB Committee. A consecutive sampling technique was used to enroll 21 pregnant females in a ratio of 1: 1 among both groups. The included cases were HBsAg positive with ELISA positive HCV while the negative ones were in the control group. A validated research tool from previous studies was used. The collected data were analyzed through SPSS Version- 19. Descriptive and inferential statistics like frequency, percentages, 95% confidence interval, chi-square and odds ratio were applied with cut-off p-value limit set at 0.05.

Results: The mean age for cases and controls was 37±9 and 28±6 years. The seroprevalence of HBV was 28.9% and HCV as 61.9%. Abortion history OR=1.23 (95% CI=0.34-4.35), hospitalization OR=2.90 (CI=0.77-10.8), past surgical procedure OR=3.69 (CI=0.81-16.6), dental extraction OR=1.25 (CI=0.33-4.63), delivery in hospital OR=4.26 (CI=1.13-16.05), injection in hospitals OR=1.47 (CI=0.43-5.04), household contact with jaundice OR=5.66 (CI=1.41-22.7) were the significant risk factors. Normal vaginal delivery OR=1.96 (CI=0.51-7.48) and history of sexually transmitted infections OR=2.23 (CI=0.36-13.7) were independently associated with HBV, and HCV.

Conclusion: Hepatitis C prevalence rate was more with blood transfusions, unsafe injections, tooth extractions, home deliveries with past history of sexually transmitted infections, abortion, hepatitis infection, and hospital admissions as the significant risk factors among pregnant women.

Keywords: Association; Risk Factors; Hepatitis B; Hepatitis C; Unsafe Sex; Pregnancy.

INTRODUCTION

Hepatitis B and C are of public health concern that transform into chronic disease in millions of people. Globally 354 million people live with hepatitis B or C. World Health Organization (WHO) reported 96% burden due to Hepatitis B and C.¹ Hepatitis-B infection can be transmitted to the fetus in 70- 90% cases. HBsAg positive mothers still have 3- 13% babies positive. WHO Eastern Mediterranean Region (EMRO) estimated Hepatitis-B prevalence as 4.3 million. The EMRO countries prevalence showed 1.2% in Iran, Egypt-2.2% and Turkey with 4%. No reliable data of Hepatitis infection among pregnant ladies found.²

The EMRO showed HCV prevalence of 2.3% and

pregnancy related burden, complications and mortalities accounted for 0.3 to 31%. Pakistan had the highest burden of these infections in South East Asian Region.³

Hepatitis- C prevalence among general population was 8- 15 % and among pregnant women as 3.27 % - 8.9 %. The risk factors included blood products transfusion, occupational injury, surgery, injections and vertical transmission. A Pakistani study reported highest Hepatitis- C infection double than the global statistics as 5.9% with 6.6 % Hepatitis- C infection among pregnant females with 29.6% in primigravida and 70.3 % among multigravida.⁴ A large percentage of infectious diseases burden in developing countries is attributed to Hepatitis B and C viruses. Good awareness in relation to Hepatitis B and C however, confu-

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sions revealed in modes of transmission and vaccination.⁵ HCV infection was predominant in transgender community, in turn a threat to community.⁶

A Survey in multiple districts of Sind revealed seroprevalence of 15.76%.⁷ A Brazilian study showed high prevalence of Hepatitis- B among pregnant females.⁸ An Ethiopian study showed 4.7% prevalence of Hepatitis B infection among the pregnant females and history of a surgical procedure, blood transfusion, multiple sexual partners and surgical procedure as risk factors.⁹

Pakistani statistics regarding Hepatitis B and C is not authentic and updated. The present study was planned with a purpose to determine the prevalence of HBV and HCV, risk factors responsible for the transmission with association of infections and risk factors among the pregnant ladies coming to Tertiary Care Private and Public Hospitals of Peshawar.

METHODOLOGY

An unmatched case control study was conducted at Gynecology & Obstetrics wards of two Public (Khyber Teaching & Lady Reading) and Private (Kuwait & Mercy Teaching) Hospitals of Peshawar upon 42 pregnant women of all trimesters infected with hepatitis B and C. The study was approved by the Prime Institutional review Board Committee through Prime/ERC/2019-017. Permission for the study included from the respective hospital and wards in charge personnel. Informed written consent on the first page of the questionnaire was obtained from the participants as cases and controls.

The hypothesis for this study was Hepatitis- B infection was more than Hepatitis- C among the pregnant women visiting Tertiary Care Hospitals of Peshawar. The sample size of the study was calculated through online calculator with Kelsey formula, keeping the

significance level at 0.05, power of the study as 80% and using 1: 1 ratio for the selection of cases and controls. The final sample size came out to be as 42, which was divided into 21 cases and an equal number of controls and recruited through random sampling technique. The female's viral status was retrieved from their hospital records and files in the wards through consecutive sampling technique.

Inclusion criteria adopted for the cases of the study was pregnant women of all trimesters as well as post-partum with positive HBS and HCV viral status, while the negative viral status females were included in the control group. However, the pregnant females unable to respond to the questions with no consent and having associated complications like eclampsia, PPH ectara were excluded from the study.

A structured and validated questionnaire¹⁰ was taken and applied in interview to gather relevant information in relation to socio-demographic characteristics like age, residential address, education, occupation, marital status, gestational age, parity, place of delivery and mode of delivery. Then the possible risk factors like history of hospitalization, surgical procedure, blood transfusion, history of use of injections with the place of exposure, past exposure of jaundice, household contact of jaundice, history of abortion, evacuation & curettage done and sexually transmitted infections were inquired from the included pregnant females of the study.

The data was analyzed through SPSS Version-19, as mean, frequency and percentages in descriptive statistics and compared with the seropositive and seronegative statuses of the pregnant female using chi square test with significance level set at 0.05. Univariate association of possible risk factors with serostatus was computed through Odds Ratio and 95% confidence

interval. All the results of the study were presented as absolute figures as percentages and in the form of tables as well.

RESULTS

During the study a total of 42 pregnant women were enrolled with response rate of 100%. There were 21 seropositive cases of HBS and HCV with their mean age as 37 ± 9 years and equal number of seronegative females in the control group with mean age as 28 ± 6 years.

The seroprevalence of HBV in this study was calculated as 28.9% ($n= 6$) and that of HCV as 61.9% ($n= 13$), while females infected with both were 9.5% ($n= 2$).

Demographic characteristics of the study participants depicted in detail with descriptive statistics in Table-1. Hepatitis B and C infected females risk associations among the cases and controls are detailed out in the Graph-1. Odds ratio, Confidence intervals with the p values are shown in the Table-2 through analysis of the study variables and associations of the risk factors with serostatuses.

DISCUSSION

This study enrolled 21 Pregnant women as HBsAg and HCV positive cases and same number of seronegative as controls keeping 1: 1 ratio. The mean age of the cases was 37 ± 9 years and that of controls as $28 + 6$ years. The results showed seropositivity of 28.6 % ($n= 6$) in relation to HBsAg, and 61.9 % ($n= 13$) for HCV with only 2 (9.5 %) positive cases for both infections. Among the Present study only one participant (4.8 %) belonged to first trimester, 4 (19 %) from second trimester, 10 (47.6 %) from third trimester and 6 (28.5 %) in post- partum group. The risk factors involved in this study were blood transfusions, unsafe injections, tooth extractions, home deliveries with past

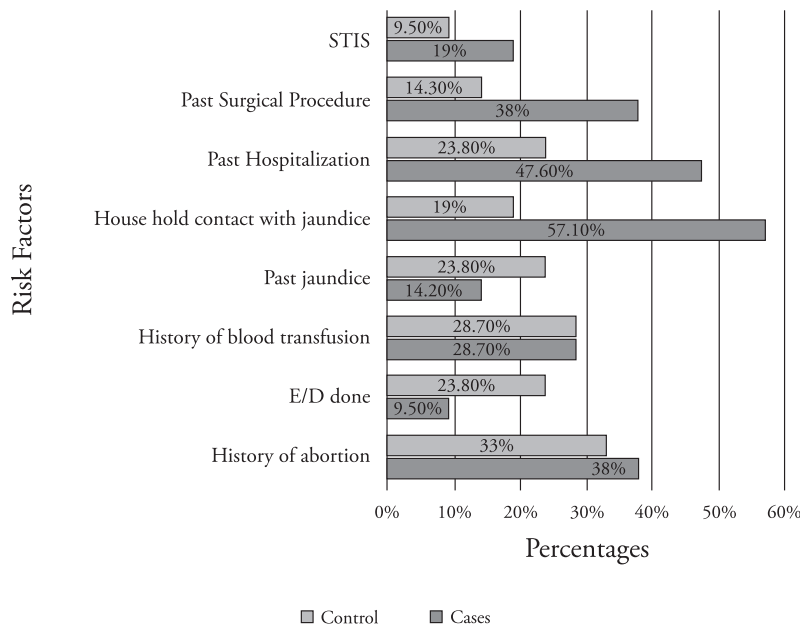
Table 1: The socio- demographic characteristics of study participants

Variables		Cases (n= 21) n (%)	Controls (n= 21) n (%)
Age	Age in years (mean ± SD)	37 (± 9)	28 (± 6)
Residency	Urban	7 (33.3)	14 (66.6)
	Rural	14 (66.6)	7 (33.3)
	Marital status (married)	21 (100)	21 (100)
Occupational Status	Working	2 (9.5)	2 (9.52)
	Housewife	19 (90.5)	19 (90.4)
Educational Level	No formal education	17 (81.0)	12 (57.1)
	Primary level	3 (14.3)	7 (33.3)
	Secondary level	1 (4.8)	2 (9.52)
Gestational Age	First trimester	1 (4.8)	-
	Second trimester	4 (19)	3 (14.2)
	Third trimester	10 (47.6)	18 (85.7)
	Postpartum within 40 days	6 (28.5)	-
Parity	Primi-Para	4 (19)	5 (23.8)
	Multi-Para	17 (80.9)	16 (76.1)

Table 2: The analysis of study variables

Variables	OR	95% CI	p-value
Parity	0.753	0.171- 3.312	0.70
Delivery → Home	4.267*	1.134- 16.050	0.02
Delivery → Hospital	0.100	0.01- 0.906	0.01
Normal Vaginal Delivery	1.969*	0.518- 7.488	0.30
Caesarean Section	0.708	0.138- 3.641	0.60
Injection → Market	0.821	0.239- 2.810	0.53
Injection → Hospital	1.477*	0.432- 5.046	0.75
Abortion History	1.231*	0.348- 4.358	0.70
E/C Done	0.337	0.057- 1.977	0.20

Note; OR= Odds Ratio; CI= Confidence Interval.



Graph- 1; Risk Factors Assessment Among Cases & Controls.

history of sexually transmitted infections, abortion, hepatitis infection, and hospital admissions.

A Pakistani study screened pregnant females in five districts of KPK, with extremely high rate of HCV infection with 5.9% and association of HCV infection with the location. These results are similar to the results of this study which also revealed high rate of Hepatitis-C (n= 13; 61.9%) infection but no association of infection and location. Also, the present study was only conducted in one city of District Peshawar.³ A Karachi based hospital study identified injections, surgery and blood transfusions as the common risk factors and high prevalence of the HCV infection among the pregnant women.⁴ These results correlate with the present study findings with same methodology for the test however, the present study determined the seroprevalence of Hepatitis-B as well as Hepatitis-C. An Observational study screened all population among five districts of Sind with 3.9% seroprevalence for HBV and 11.8% for HCV infection however, higher prevalence among female groups. This high prevalence was also reported for HBV and HCV respectively in the present study but the target population was different and risk factors were not identified in this study.⁷

An International Retrospective Quantitative Brazilian study found high seroprevalence of HBsAg among the prenatal mothers without any significant correlation of age and positivity ratio. However, there was a direct association between HBsAg and last four years of study testing. The present study results however showed HCV high rates but no association with last four years.⁸ An Ethiopian Study found a high prevalence of HBsAg among the pregnant females, contrary to the present study with high rate of HCV infection and blood transfusion history, multiple sexual partners and past history of surgical procedure identified as risk factors. However, the present study risk factors were history of

jaundice, hospitalization history and surgical procedures done in the past.⁹

A Descriptive study on seroprevalence of Hepatitis B and C infection with associated risk factors was carried out among the pregnant ladies of Swabi and depicted HBsAg as 3.7% and 2.1% prevalence of HCV respectively contradictory to the present study seroprevalence results with HCV as of higher prevalence. The risk factors identified were dental extractions in the past, blood transfusions, urban residents and low education. However, age and past surgery were found to be significantly associated with HCV positive mothers correlated with the present findings.¹⁰ A Systematic review of African countries researches regarding Hepatitis B and C infection among pregnant women revealed high prevalence of Hepatitis- B as 6.8% (95% confidence interval [CI]: 6.1–7.6) and HCV as 3.4% (95% CI: 2.6–4.2)¹¹ however, not correlated to the present study prevalence which was more in Hepatitis- C.

An Ethiopian Systematic Review & Meta-Analysis of 2018 went through 17 studies upon 5629 pregnant women and revealed intermediate level Hepatitis- B infection of 4.7% (95% CI 4.0–5.4%) prevalence.¹² Another Ethiopian Systematic Review & Meta- Analysis was conducted in 2021 to determine pool prevalence of Hepatitis-C virus infection among the same target group. They searched 502 studies and included only 6 with 2117 pregnant women data. The overall prevalence of Hepatitis- C virus infection among the pregnant women in Ethiopia came out to be intermediate level as 1.83% (95% CI: 0.61, 3.06).¹³ Both of these results coincide with the present study prevalence of Hepatitis- B (28.7%) and C (61.9%) with the present study rates higher than those studies. However, these researches did not mention the risk factors which was the hallmark of this study.

A Pakistani Meta- Analysis & Systemat-

ic Review used data from 1994- 2016 and included 231 eligible reports. Only one Pakistani National Survey of 2008, one incidence study and 248 prevalence measures regarding Hepatitis- C virus infection were reported. The extracted data was from general population with blood donors, pregnant women, children & refugees. They also included high risk population, intermediate risk people, special clinical population, injection users and population with liver diseases. These results showed Hepatitis- C prevalence ranged from 0.7 to 20.7%, with a median of 6.0% (95% CI; 5.7%- 6.7%).¹⁴ Although this prevalence is far low than the present study estimation (61.9%) yet its prevalence signifies the infection.

A Retrospective Chinese Cohort Study compared complicated maternal Hepatitis- B infection with preterm labor. They found Hepatitis-B infection as an independent preterm risk factor (adjusted odds ratio 1.770; 95% confidence interval [1.046–2.997]).¹⁵ These results do not correlate with the present study findings as this was not an objective of the present study. A Case- Control study looked for determinants of HBV infection in HIV infected pregnant women. The results revealed STI history [AOR, 1.97, 95% CI, 1.09–3.56], hospital admission [AOR, 3.08, 95% CI, 1.69–5.61], ante-natal care [AOR, 3.31, 95% CI, 1.72–6.37], family history of HBV [AOR, 3.33, 95%CI, 1.72–6.37], presence of opportunistic infections [CI, 0.12–0.58], viral load [95%CI, 3.18–8.01], CD4 count [95% CI, 1.01–4.59], anemia [95% CI, 1.71–5.51] and unsafe sex [95%CI, 1.09–3.61] as statistically significant with HBV among the pregnant women.¹⁶ This study was exactly same in methodology and data analysis with the present study but with no HCV infection data. The determinants correlate with the present study findings as well.

Another review study found pregnancy outcomes in relation to HBV infection more serious, causing severity of the disease and

fatalities with changes in hepatitis flare specially in post-partum period not in correlation with the present study results as pregnancy outcomes were never tested in the present study.¹⁷ A Pakistani review article depicted Hepatitis B and C prevalence rates of Pakistan with their target group and national rate. It showed high rates from previous years as 6.8%- 7.44%, and highest rate as 68.3% among intravenous drug users, health care workers and pregnant women weighted average prevalence rate of these infection as $7.19\% \pm 1.96^{18}$, which coincides with present result findings. A Cross- Sectional Chinese study conducted upon the pregnant group found a low prevalence of Hepatitis- B infection in three provinces of China as compared to the national figures. They found an association of age with infection.¹⁹ The study results were in comparison with the present ones. This study had few limitations as well. This being an unmatched case control study was conducted only in few of the Tertiary Care Hospitals of Peshawar, so the data cannot be extrapolated. Bias in the form of selection is part and parcel of such studies. The results could have been different if the core antibodies were tested which were not in this study.

CONCLUSION

The findings of this study suggested hospital admissions, surgical interventions, blood transfusions and unsafe injections to mothers as significant risk factors involved for transmission of Hepatitis B and C infections among the pregnant ladies, which were also for general population as well. Home deliveries by untrained individuals, sexually transmitted infections during pregnancy, unsafe tooth extractions with history of abortions were the contributing factors.

RECOMMENDATION

Hepatitis B & C routine and universal screening of the ante-natal women seeking

health care at the Tertiary Care Hospitals is highly recommended along with child vaccination programs for the pregnant ladies for early identification of the disease, prompt treatment as well as timely management of delivery to save the mother and baby.

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Author's Contribution

JJF and FRM conceived the idea, designed the study, collected the data and helped in Data analysis, and drafted the manuscript. FN contributed in the collection of data and analysis of data and helped in drafting the manuscript. KJF contributed in data collection, and SPSS data entry and helped in the writing of the manuscript. Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest

Authors declared no conflict of interest

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None

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.