

MATERNAL AND FETAL HEALTH CHALLENGES IN HEPATITIS E-INFECTED PREGNANCIES

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(Received, 13th March 2024, Revised 30th June 2024, Published 11TH July 2024)

Abstract: The emergence of Hepatitis E virus (HEV) infection presents a mounting apprehension in less developed areas. When contracted during pregnancy, this infection instigates dire ramifications, posing grave threats to the well-being of both the expectant mother and the developing fetus. Notably, HEV accounts for a substantial fraction of maternal fatalities, encompassing a range of 19% to 25%, while also contributing to a noteworthy 7-13% of neonatal deaths. The primary objective of this study is to delve into the intricate relationship between HEV infection and the ensuing consequences for maternal and fetal health during pregnancy. **Objectives:** To explore the maternal and fetal outcomes in pregnant women with Hepatitis E. **Methods:** A prospective study design was implemented, and 160 pregnant women were enrolled. The study was conducted at a tertiary healthcare facility over the period spanning from April 2021 to September 2022 after fulfilling the inclusion criteria and consent form. The collected data were entered and analyzed by using SPSS version 23. **Results:** A total of 160 pregnant women enrolled in this study, the mean age 30.90±7.323 (Age Range 18-44); gestational age was divided into two groups ≥ 36 weeks 77(48.1%) compared with < 36 weeks as 83(51.9%). The frequency distribution of table -2 showed postpartum hemorrhage 82(51.2%), disseminated intravascular coagulation 70(43.8%) and hepatic encephalopathy 46(28.8%). The mode of pregnancy termination due to hepatitis E virus infection showed induction of labor 64(40%), hysterectomy 111(69.4%), and dilation and evacuation (D&E) 84(52.5%). While comparing maternal HEV infection with other research variables, it was observed that there was a significant difference found in HEV-positive pregnant women and low birth weight (< 2500g), fetal scalp monitors during delivery, and hysterectomy as p-value < 0.05. **Conclusion:** A high mortality rate was evident in hepatitis E virus infection-affected pregnancies in this study. There is a need to educate pregnant ladies regarding preventive measures to avoid fulminant consequences. Emphasis should be given to following hygienic practices during pregnancy, and proper antenatal visits should be mandatory to educate the women.

Keywords: Hepatitis E virus, Fetus Outcomes, Pregnancy, Maternal.

Introduction

Hepatitis E virus infection represents a substantial threat during pregnancy, giving rise to unforeseen and often dire circumstances. This infection is an emerging challenge, particularly in developing countries. (1) When the hepatitis E virus strikes during pregnancy, it inflicts devastating consequences that endanger the lives of both the expectant mother and the fetus. (2) It's worth noting that various hepatitis viruses pose complications during pregnancy, impacting both maternal and fetal well-being. Globally, hepatotropic viruses are prevalent during pregnancy due to the inherent risks associated with this period of life. (3) In developing countries such as Pakistan, all types of hepatitis viruses persist and are responsible for acute hepatitis in the population. (4) Among these, hepatitis A and E are waterborne diseases transmitted through the fecal-oral route, often linked to the consumption of contaminated water. Unhygienic lifestyle habits further elevate the risk of hepatitis E infection (5).

The incubation period for the hepatitis E virus typically spans 8-10 weeks, and the infection usually resolves within six weeks without any chronic consequences. In Pakistan, the likelihood of contracting hepatitis E virus infection is notably higher, especially during pregnancy, due to the

combination of low socioeconomic status and suboptimal living conditions(6). Cases of hepatitis E are frequently reported during the summer season, often manifesting as outbreaks. While hepatitis E cases are generally diagnosed and treated promptly, the impact during pregnancy is particularly overwhelming, resulting in a markedly higher mortality rate. (7)

Hepatitis E virus predominantly affects pregnant women during the second and third trimesters, giving rise to various obstetric complications, including preterm rupture of membranes (PROM), postpartum hemorrhage (PPH), spontaneous abortions, and intrauterine fetal demise (IUFD), among others (8). Furthermore, the virus exerts detrimental effects on the fetus, resulting in increased rates of prematurity and low birth weight infants. (9)

Methodology

A prospective study design was used to assess the effects of viral hepatitis E infection on fetomaternal outcomes. The study was conducted in a tertiary healthcare sector from March 2021 to January 2022. A total of 160 pregnant women having positive HEV infection confirmed with clinical presentation and serological testing were included

in this study. Women with other types of viral hepatitis, i.e., A, B, C & D, were excluded from this study. One hundred sixty pregnant women with confirmed HEV infection were followed during the study. Outcome variables were maternal and fetal morbidity; during the study period, pregnant ladies were assessed for any pregnancy-related complications like induction of labor, hysterectomy, and Dilation and Evacuation (D&E).

Results

A total of 160 pregnant women enrolled in this study, with a mean age of 30.90±7.323 (Age Range 18-44); gestational age was divided into two groups ≥ 36 weeks 77(48.1%) compared with < 36 weeks as 83(51.9%). Mothers diagnosed with HIV infection were found to be 95(59.4%) and suffering from other infections 92(57.5%). The low birth deliveries was only 46(28.8%), fetal scalp monitors

during delivery observed 87(54.4%) and mode of delivery was mostly Vaginal as 110(68.8%) and breastfeeding status 113(70.6 %) (Table 1).

The frequency distribution of table -2 showed postpartum hemorrhage 82(51.2%), disseminated intravascular coagulation 70(43.8%) and hepatic encephalopathy 46(28.8%). (Table 2).

The mode of pregnancy termination due to hepatitis E virus infection showed induction of labor 64(40%), hysterectomy 111(69.4%), and dilation and evacuation (D&E) 84(52.5%). (Table 3).

While comparing maternal HEV infection with other research variables, it was observed that there was a significant difference found in HEV-positive pregnant women and low birth weight (< 2500g), fetal scalp monitors during delivery, and hysterectomy as p-value < 0.05. (Table 4).

Table 1: Demographics of the Study Participants.

Characteristics	Constructs	Frequency	Percentage
Age of Participants in Years	≤ 18	4	2.5
	20-29	81	50.6
	30-39	43	26.9
	≥ 40	32	20.0
Gestational age	≤ 36 weeks	77	48.1
	≥ 36 weeks	83	51.9
Maternal HIV infection	Yes	95	59.4
	No	65	40.6
Other infections in pregnancy	Yes	92	57.5
	No	68	42.5
Low Birth Weight < 2500g	Yes	46	28.8
	No	114	71.2
Fetal scalp monitors during delivery	Yes	87	54.4
	No	73	45.6
Mode of delivery	Cesarean Section	50	31.2
	Vaginal	110	68.8
Breastfeeding status	Yes	113	70.6
	No	47	29.4

Table 2: Frequency Distribution of Outcomes of HEV Infection in Pregnancy.

Maternal Morbidity		Frequency	Percentage
Postpartum Hemorrhage	Yes	82	51.2
	No	78	48.8
Disseminated intravascular coagulation	Yes	70	43.8
	No	90	56.2
Hepatic Encephalopathy	Yes	46	28.8
	No	114	71.2

Table 3: Mode of pregnancy termination due to hepatitis E virus infection.

Maternal Morbidity		Frequency	Percentage
Induction of Labor	Yes	64	40.0
	No	96	60.0
Hysterectomy	Yes	111	69.4
	No	49	30.6
Dilation and Evacuation (D&E)	Yes	84	52.5
	No	76	47.5

[Citation: Hussain, J., Noor, N., Rehman, F., Ilyas, A., Tofail, S., (2024). Maternal and fetal health challenges in hepatitis e-infected pregnancies. *Biol. Clin. Sci. Res. J.*, 2024: 984. doi: <https://doi.org/10.54112/bcsrj.v2024i1.984>]

Table 4: Comparison between Maternal HEV Infection with other research variables.

Research Variables	Maternal HEV		p-value
	Yes	No	
Low Birth Weight (< 2500g)	43(45.3%)	3(4.6%)	0.00
	52(54.7%)	62(95.4%)	
Fetal scalp monitors during delivery	37(38.9%)	50(76.9%)	0.00
	58(61.1%)	15(23.1%)	
Mode of delivery	31(32.6%)	19(29.2%)	0.390
	64(67.4%)	46(70.8%)	
Breastfeeding status	65(68.4%)	48(73.8%)	0.288
	30(31.6%)	17(26.2%)	
Postpartum Hemorrhage	50(52.6%)	32(49.2%)	0.397
	45(47.4%)	33(50.8%)	
Disseminated intravascular coagulation (DIC)	38(40.0%)	32(49.2%)	0.160
	57(60.0%)	33(50.8%)	
Hepatic Encephalopathy	30(31.6%)	16(24.6%)	0.219
	65(68.4%)	49(75.4%)	
Induction of Labour	34(35.8%)	30(46.2%)	0.125
	61(64.2%)	35(53.8%)	
Hysterectomy	74(77.9%)	37(56.9%)	0.004
	21(22.1%)	28(43.1%)	
Dilation and Evacuation	54(56.8%)	30(46.2%)	0.121
	41(43.2%)	35(53.8%)	

Discussion

The 69th World Health Assembly approved the "Global Health Sector Strategy on Viral Hepatitis 2016–2021" in 2016. The approach hopes to eradicate viral hepatitis as a public health concern by 2030. HEV, or hepatitis A virus (HAV) infection, provides the most significant hazard to maternal health and, consequently, to the fetus during pregnancy, even though all hepatitis (hepatitis A, B, C, D, and E) viruses can affect the mother and child.

Hepatitis E is a disease of youngsters and mainly affects individuals aged 20-30. In this study, results show that primarily individuals affected with hepatitis E infection belong to the age group 22-29 at 81(50.6%) years. The mean age of current study participants was 30.90±7.323 (Age Range 18-44). Other studies also show similar results (10). The findings of a research study conducted by Wen et al. (2023), found that the risk of a severe HEV infection is increased in pregnant women, and there have been numerous documented negative consequences for expectant mothers associated with HEV infection. They enrolled 4244 pregnant women, and the mean age of the participants was maternal age was 28.18 ± 3.08 years. (11)

This current study showed that mothers with HIV infection were found to be 95(59.4%) suffering from other diseases 92(57.5%). The low birth deliveries were only 46(28.8%), fetal scalp monitors during delivery were observed at 87(54.4%), and the mode of delivery was mostly Vaginal at 110(68.8%), and breastfeeding status was 113(70.6 %).

Low Birth Weight was more common in moms who were HIV-positive (15.6%) than in mothers who were HIV-negative (8.3%). Maternal HIV infection was independently linked to LBW in the current investigation, with a 1.9-fold increased risk, in line with other findings. The alterations in the immunological responses of the mother and child pairs are probably a significant factor in this correlation. (12) In referral hospitals in the northwest Amhara region, the prevalence of LBW among women who are HIV positive and those who are not is compared in this study. The study's

finding regarding the prevalence of LBW indicates a distinction between the two target groups. Where LBW among those living with HIV+ was 10.1% (95% CI:6.3%—13.8%) as opposed to 17.7% (95% CI:14.1%-22.8%). in moms living with HIV. This conclusion is corroborated by a study done in Nigeria, where low birth weight was 3.3% in moms of HIV+ children and 48.3% in women with HIV, respectively. In comparison, unfavorable pregnancy outcomes occurred in 30.3% of HIV-positive women. (13)

Conclusion

Hepatitis E virus infection has overwhelming effects during pregnancy, threatening the lives of both mother and fetus. The best measures are to save lives by following safety precautions and avoiding transmission of infection. Pregnant ladies need to be educated regarding preventive measures to avoid consequences. Emphasis should be given to following hygienic practices during pregnancy, and proper antenatal visits should be mandatory to inform the women.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

It is approved by the department concerned. (IRBEC-SZHRH-03744)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

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Drafting & Concept & Design of Study

Open

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References

1. Wu C, Wu X, Xia J. Hepatitis E virus infection during pregnancy. *Virology journal*. 2020;17:1-11.
2. Nimgaonkar I, Ding Q, Schwartz RE, Ploss A. Hepatitis E virus: advances and challenges. *Nature Reviews Gastroenterology & Hepatology*. 2018;15(2):96-110.
3. Bazerbachi F, Haffar S, Garg SK, Lake JR. Extra-hepatic manifestations associated with hepatitis E virus infection: a comprehensive review of the literature. *Gastroenterology report*. 2016;4(1):1-15.
4. Shahzad A, Islam MB, Khan HA, Tharwani ZH, Malikzai A. Hepatitis B and C in Pakistan: is there hope for a better treatment? : *LWW*; 2023. p. e0216.
5. Kulkarni AV, Duvvuru NR. Management of hepatitis B and C in special population. *World Journal of Gastroenterology*. 2021;27(40):6861.
6. Zahoor S, Khan A, Asif S, Tabraiz SA, Mustafa H, Ansar S, et al. Past and future perspectives for hepatitis B and C in Pakistan. *Cureus*. 2021;13(8).
7. Khuroo MS, Khuroo MS, Khuroo NS. Hepatitis E: Discovery, global impact, control and cure. *World journal of gastroenterology*. 2016;22(31):7030.
8. Prasad GS, Prasad S, Bhupali A, Patil AN, Parashar K. A study of hepatitis E in pregnancy: Maternal and fetal outcome. *The Journal of Obstetrics and Gynecology of India*. 2016;66:18-23.
9. Wagner E, Bień K, Łomża A, Grunwald A, Kimber-Trojnar Ź, Libera A, et al. Stress of Prematurity in the Experience of the COVID-19 Pandemic—Current State of Knowledge. *Life*. 2023;13(8):1757.
10. Ayyaz TK, Zahoor S, Mukhtar MU, Atif MM, Haideri RM. Hepatitis E viral infection in pregnant ladies, a challenge for obstetricians and physicians. *Age*. 26:4.69.
11. Wen G-P, Wang M-M, Tang Z-M, Liu C, Yu Z-H, Wang Z, et al. Prevalence of hepatitis E virus and its associated outcomes among pregnant women in China. *Pathogens*. 2023;12(9):1072.
12. Pfeifer C, Bunders MJ. Maternal HIV infection alters the immune balance in the mother and fetus; implications for pregnancy outcome and infant health. *Current Opinion in HIV and AIDS*. 2016;11(2):138-45.
13. Fentie EA, Yeshita HY, Bokie MM. Low birth weight and associated factors among HIV positive and negative mothers delivered in northwest Amhara region referral hospitals, Ethiopia, 2020 a comparative cross-sectional study. *PLoS One*. 2022;17(2):e0263812.