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Original Research Article

# Liver Disease in Pregnancy: Insights from Clinical Medicine and Gynecology

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**Abstract:**

**Background:** Liver disease in pregnancy poses a significant challenge as it complicates 3–5% of gestations and is correlated with high maternal and perinatal morbidity and mortality. Common conditions include intrahepatic cholestasis of pregnancy (ICP), viral hepatitis, HELLP syndrome, and acute fatty liver of pregnancy (AFLP). Their timely recognition and appropriate management are critical for improving outcomes.

**Aim:** To evaluate the clinical profile, maternal complications, and fetal outcomes of liver disease in pregnancy from both clinical medicine and gynecology perspectives.

**Methods:** This prospective observational study was conducted at Darbhanga Medical College & Hospital, Laheriasarai, from September 2024 to August 2025. A total of 115 pregnant women with clinical and laboratory evidence of liver disease were enrolled. Data regarding clinical presentation, investigations, type of liver disease, maternal complications, and fetal outcomes were collected using structured proformas. Statistical analysis was performed using SPSS version 23.0, with $p < 0.05$ considered significant.

**Results:** The mean age of participants was 26.8 ± 4.3 years, with most cases diagnosed in the third trimester (53.9%). Intrahepatic cholestasis of pregnancy (30.4%) was the most common disorder, followed by viral hepatitis (26.9%), HELLP syndrome (21.7%), and AFLP (13.9%). Maternal complications occurred in 36.5% of cases, with preterm labor (17.4%) and postpartum hemorrhage (10.4%) being the most frequent. Maternal mortality was recorded in 3.5% of patients. Fetal outcomes showed 80% live births, with 24.3% preterm deliveries, 20% stillbirths, and 16.5% requiring NICU admission. Poor fetal outcomes were significantly correlated with maternal complications ($p=0.01$).

**Conclusion:** Liver disease in pregnancy continues to contribute substantially to maternal and perinatal morbidity and mortality. ICP was the most common condition with relatively favorable outcomes, whereas AFLP, HELLP syndrome, and viral hepatitis carried higher risks of adverse events.

**Recommendations:** Early diagnosis through vigilant antenatal screening, multidisciplinary management, and timely intervention are essential for improving maternal and neonatal outcomes. Strengthening awareness, establishing dedicated liver–pregnancy care protocols, and improving referral systems in resource-limited regions are strongly recommended.

**Keywords:** Liver disease, Pregnancy, Intrahepatic cholestasis, HELLP syndrome, Acute fatty liver of pregnancy

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## Introduction

Liver disease in pregnancy represents a unique clinical challenge because physiological changes of gestation can both mimic and mask hepatic disorders. Although liver disease affects only 3–5% of pregnancies, its impact on maternal and fetal health is profound, with potentially life-threatening consequences if not promptly diagnosed and managed [1]. Pregnancy-specific conditions such as (ICP), (AFLP), and HELLP syndrome constitute the majority of cases, while pre-existing or concurrent liver diseases like viral hepatitis and autoimmune hepatitis add further complexity [2].

Intrahepatic cholestasis of pregnancy is one of the most common pregnancy-related hepatic disorders, typically manifesting in the third trimester with pruritus and elevated bile acids. It is correlated with increased risks of preterm labor, fetal distress, and

stillbirth [3]. In contrast, acute fatty liver of pregnancy, though rare, is a rapidly progressive condition that can result in fulminant liver failure, disseminated intravascular coagulation, and high maternal and perinatal mortality if left untreated [4]. Similarly, HELLP syndrome, characterized by hemolysis, elevated liver enzymes, and low platelets, often complicates preeclampsia and carries a high risk of both maternal and neonatal morbidity [5].

In regions with high prevalence of viral hepatitis, such as South and Southeast Asia, pregnancy further amplifies risks. Hepatitis E virus infection, in particular, has been linked with fulminant hepatic failure and increased maternal mortality, making it a significant contributor to liver-related complications during pregnancy [6]. Despite improvements in obstetric care, viral hepatitis continues to account for adverse maternal and neonatal outcomes in developing countries [7].

Early recognition of clinical features, supported by biochemical and imaging investigations, is essential in differentiating physiological adaptations of pregnancy from pathological liver involvement. Advances in maternal-fetal medicine emphasize the role of multidisciplinary management involving obstetricians, hepatologists, and neonatologists to optimize outcomes [8]. Recent studies highlight that timely interventions such as early delivery in ICP and HELLP, antiviral therapy for viral hepatitis, and aggressive supportive care in AFLP significantly reduce morbidity and mortality [9].

Given the burden of maternal and perinatal complications correlated with hepatic disorders, it is imperative to study their prevalence, clinical spectrum, and outcomes in institutional settings. The present study was undertaken to evaluate liver disease in pregnancy from both a clinical medicine and gynecology perspective, with emphasis on maternal and fetal outcomes.

## Methodology

**Study Design:** This was a hospital-based prospective observational study.

**Study Setting:** The study was carried out at Darbhanga Medical College & Hospital, Laheriasarai, Bihar, a tertiary care teaching hospital providing specialized services in both medicine and obstetrics & gynecology.

**Study Duration:** The duration of the study was 12 months, extending from September 2024 to August 2025.

**Participants:** A total of 115 pregnant women presenting with clinical features or laboratory evidence suggestive of liver disease were enrolled during the study period. Patients were recruited from both the Department of Medicine and the Department of Obstetrics & Gynecology.

### Inclusion Criteria

- Pregnant women of any trimester diagnosed with liver disease based on clinical presentation, laboratory findings, or imaging.
- Age group between 18–40 years.
- Patients who provided informed consent for participation.

### Exclusion Criteria

- Pregnant women with pre-existing chronic systemic illnesses unrelated to liver disease (e.g., chronic kidney disease, cardiac failure).
- Women with pregnancy complications not correlated with liver disease (e.g., gestational diabetes without hepatic involvement).
- Patients who were unwilling or unable to provide informed consent.

**Bias:** To minimize selection bias, all eligible patients presenting during the study duration were consecutively recruited. Observer bias was reduced by using standardized diagnostic criteria and validated data collection tools. Data entry was cross-checked by two independent investigators to reduce information bias.

**Data Collection:** Data were collected through structured case record forms. Detailed clinical history, physical examination findings, laboratory investigations (liver function tests, viral markers, coagulation profile), and relevant imaging reports were documented. Maternal and fetal outcomes were followed until delivery.

**Procedure:** After obtaining informed consent, eligible participants were enrolled. A thorough history and clinical examination were performed, followed by relevant investigations. Patients were categorized according to the type of liver disease (e.g., viral hepatitis, intrahepatic cholestasis of pregnancy, preeclampsia/eclampsia with HELLP syndrome, acute fatty liver of pregnancy). The management approach, maternal complications, and perinatal outcomes were recorded prospectively.

**Statistical Analysis:** All data were entered into Microsoft Excel and analyzed using (SPSS) version 23.0. Descriptive statistics (mean, standard deviation, percentages) were used for baseline variables. Chi-square test and Fisher's exact test were applied for categorical data, while Student's t-test was used for continuous variables. A p-value $<0.05$ was considered statistically significant.

## Results

A total of 115 pregnant women with liver disease were enrolled in the study. The mean age of participants was 26.8 ± 4.3 years (range: 18–38 years). The majority of patients (54.8%, n=63) were

in the age group of 21–30 years. Most patients (61.7%, n=71) belonged to rural areas, while 38.3% (n=44) were from urban regions.

**Table 1: Baseline Characteristics of Participants (N = 115)**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age Group (years)** | | |
| 18–20 | 14 | 12.2 |
| 21–30 | 63 | 54.8 |
| 31–40 | 38 | 33.0 |
| **Residence** | | |
| Rural | 71 | 61.7 |
| Urban | 44 | 38.3 |
| **Gravida** | | |
| Primigravida | 49 | 42.6 |
| Multigravida | 66 | 57.4 |
| **Trimester of Diagnosis** | | |
| First | 12 | 10.4 |
| Second | 41 | 35.7 |
| Third | 62 | 53.9 |

Most cases were diagnosed in the third trimester (53.9%), followed by the second trimester. Multigravida women were slightly more affected than primigravida.

**Types of Liver Disease:** Among the 115 participants, the most common diagnosis was (ICP) (30.4%), followed by viral hepatitis (26.9%), HELLP syndrome (21.7%), (AFLP) (13.9%), and other hepatic disorders (7.0%).

**Table 2: Distribution of Liver Diseases among Participants**

| Type of Liver Disease | Frequency (n) | Percentage (%) |
|---|---|---|
| (ICP) | 35 | 30.4 |
| Viral hepatitis | 31 | 26.9 |
| HELLP syndrome | 25 | 21.7 |
| AFLP) | 16 | 13.9 |
| Others (cirrhosis, autoimmune, etc.) | 8 | 7.0 |

ICP was the leading diagnosis, particularly in the third trimester. Viral hepatitis was the second most common, with hepatitis E being predominant.

**Maternal Complications:** Maternal complications were observed in 42 patients (36.5%). The most frequent complication was preterm labor (17.4%), followed by postpartum hemorrhage (10.4%) and hepatic encephalopathy (8.7%). Maternal mortality was recorded in 4 cases (3.5%).

**Table 3: Maternal Complications in Study Participants**

| Complication | Frequency (n) | Percentage (%) |
|---|---|---|
| Preterm labor | 20 | 17.4 |
| Postpartum hemorrhage | 12 | 10.4 |
| Hepatic encephalopathy | 10 | 8.7 |
| Disseminated intravascular coagulation (DIC) | 6 | 5.2 |
| Maternal mortality | 4 | 3.5 |
| **Total with complications** | 42 | 36.5 |

Maternal complications were significantly higher among women with HELLP syndrome and AFLP compared to ICP (p=0.03, Chi-square test).

**Fetal Outcomes:** Of the 115 pregnancies, live births occurred in 92 cases (80.0%), while stillbirths/intrauterine deaths were 23 cases (20.0%). Preterm birth occurred in 28 (24.3%) cases, and (NICU) admission was required in 19 (16.5%) cases.

**Table 4: Fetal Outcomes in Study Participants**

| Fetal Outcome | Frequency (n) | Percentage (%) |
|---|---|---|
| Live birth | 92 | 80.0 |
| Stillbirth/IUFD | 23 | 20.0 |
| Preterm birth (<37 weeks) | 28 | 24.3 |
| NICU admission | 19 | 16.5 |
| Neonatal death (within 7 days) | 7 | 6.1 |

Stillbirths were significantly higher in mothers with AFLP (31.2%) and viral hepatitis (25.8%) compared to ICP (11.4%) ($p=0.04$).

**Statistical Summary**

- Mean gestational age at delivery: 35.2 ± 3.1 weeks.
- Mean birth weight: 2.48 ± 0.7 kg.
- Preterm births were significantly correlated with maternal HELLP syndrome and AFLP ($p<0.05$).
- Maternal complications correlated strongly with poor fetal outcome ($p=0.01$).

**Discussion**

Out of 115 pregnant women enrolled, the majority were in the 21–30 years age group, with a mean age of 26.8 years. More than half of the participants were multigravida, and most cases were detected during the third trimester. This highlights that liver disease in pregnancy tends to manifest later in gestation and is slightly more common among multiparous women.

In terms of distribution, (ICP) was the most common condition, affecting nearly one-third of the participants, followed by viral hepatitis and HELLP syndrome. (AFLP) and other less frequent hepatic disorders were also noted. The predominance of ICP reflects findings from previous studies, which suggest a strong trimester-related association, while viral hepatitis continues to remain a significant contributor to morbidity in endemic regions.

Maternal complications were observed in over one-third of the cases, with preterm labor being the most common, followed by postpartum hemorrhage and hepatic encephalopathy. Maternal mortality was recorded in 3.5% of patients, predominantly among those with HELLP syndrome and AFLP. The higher complication rates in these groups reinforce the fact that pregnancy-specific hepatic conditions carry substantial risks for maternal health if not identified and managed early.

Fetal outcomes revealed that 80% of pregnancies resulted in live births, whereas 20% ended in stillbirths or intrauterine deaths. Preterm deliveries accounted for nearly one-fourth of all births, with a considerable proportion requiring NICU admission. Neonatal mortality within the first week was recorded in 6.1% of cases. Importantly, adverse fetal outcomes were strongly correlated with maternal complications, particularly in cases of AFLP and viral hepatitis, where stillbirth rates were higher.

Liver disease in pregnancy remains a critical cause of maternal and fetal morbidity, with conditions such as (ICP), (AFLP), and HELLP syndrome representing the most significant clinical entities. Liver dysfunction occurs in approximately 3% of pregnancies, and each condition demonstrates distinct histopathological and clinical features, necessitating careful diagnosis and management [10]. Management strategies emphasize the importance of a multidisciplinary approach, involving hepatologists, obstetricians, anesthetists, and neonatologists to improve maternal and neonatal outcomes. Timely recognition and intervention are essential, particularly in AFLP and HELLP, which can progress rapidly and require immediate delivery in severe cases [11,12].

Advances in imaging modalities, including ultrasound and MRI, have proven vital for the diagnosis of pregnancy-related liver diseases, especially in cases of AFLP where early detection is critical to reduce risks of maternal morbidity and fetal mortality [13,14]. These imaging techniques provide non-invasive tools to distinguish liver-specific conditions from other pregnancy complications. Pathogenesis studies highlight the role of fetal fatty acid oxidation defects in AFLP and the overlap between HELLP syndrome and severe preeclampsia, where endothelial dysfunction and microangiopathic thrombosis play key roles [15]. Similarly, intrahepatic cholestasis of pregnancy is increasingly understood as a multifactorial condition involving genetic, hormonal, and environmental contributors [10]. Recent updates in management reflect the evolving role of non-invasive diagnostic tools and therapeutic agents previously avoided in pregnancy. This has expanded safe treatment options for pregnant women with chronic liver disease or coincidental liver conditions such as viral hepatitis or autoimmune hepatitis [16].

Population-based prospective studies further support these findings. In a 2018–2020 cohort of 184 women, intrahepatic cholestasis of pregnancy emerged as the most common diagnosis (66.8%), followed by viral hepatitis and HELLP syndrome. These conditions were significantly correlated with adverse outcomes such as preterm birth, stillbirth, and maternal ICU admission, reinforcing the need for early detection and comprehensive care [17].

Broad reviews continue to emphasize the dual nature of liver disease in pregnancy—conditions unique to pregnancy such as ICP, HELLP, and AFLP, and coincidental diseases such as viral hepatitis or autoimmune hepatitis. Both categories substantially affect maternal and fetal prognosis, underscoring the complexity of clinical management [18].

## Conclusion

Liver diseases in pregnancy posed significant risks for both mother and fetus, with intrahepatic cholestasis being the most common but relatively less severe, while HELLP syndrome, AFLP, and viral hepatitis were linked to higher maternal and perinatal morbidity and mortality. Early diagnosis, multidisciplinary management, and timely intervention remain essential to improving outcomes.

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