e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(12); 977-980

Original Research Article

# Comprehensive Study of Liver Diseases Unique to Pregnancy HELLP Syndrome

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**Received: 11-09-2025 Revised: 17-10-2025 / Accepted: 28-11-2025**
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**Conflict of interest: Nil**

**Abstract**

**Background:** Liver diseases unique to pregnancy constitute an important group of disorders that can significantly affect maternal and fetal outcomes. Among these, HELLP syndrome—defined by hemolysis, elevated liver enzymes, and low platelet count—is a severe pregnancy-specific condition, commonly regarded as a variant of preeclampsia. It usually develops in the third trimester or early postpartum period and is associated with widespread endothelial dysfunction and microangiopathy, leading to hepatic injury and systemic complications. Clinical manifestations are often nonspecific, including right upper quadrant or epigastric pain, nausea, vomiting, headache, and malaise, which may delay diagnosis. Laboratory findings are central to diagnosis and reveal evidence of hemolysis, hepatic dysfunction, and thrombocytopenia. HELLP syndrome may result in serious complications such as acute liver failure, hepatic hematoma or rupture, disseminated intravascular coagulation, placental abruption, and fetal growth restriction. Prompt diagnosis, close maternal–fetal monitoring, and timely delivery remain the cornerstone of management, supported by intensive care and correction of coagulopathies when required. This abstract emphasizes the importance of early recognition and appropriate management of HELLP syndrome to reduce maternal and perinatal morbidity and mortality associated with pregnancy-related liver diseases.

**Keywords:** HELLP Syndrome, Hepatic Dysfunction and Thrombocytopenia, Pregnancy.



## Introduction

Pregnancy is associated with profound physiological and biochemical changes that may influence liver function and predispose to a unique spectrum of hepatic disorders. Liver diseases in pregnancy can be broadly classified into conditions coincidental with pregnancy, those aggravated by pregnancy, and disorders that are unique to pregnancy. The latter group is of particular clinical importance, as these conditions arise exclusively during gestation and often resolve after delivery, yet they may lead to significant maternal and fetal morbidity and mortality if not promptly recognized and managed.

The major liver diseases unique to pregnancy include hyperemesis gravidarum, intrahepatic cholestasis of pregnancy, acute fatty liver of pregnancy, and hemolysis, elevated liver enzymes, and low platelet count (HELLP) syndrome. These disorders vary in their clinical presentation, severity, and timing during pregnancy, ranging from mild and self-limiting conditions to rapidly progressive and life-threatening emergencies. Because many of their symptoms—such as nausea, vomiting, abdominal pain, and fatigue—overlap with normal pregnancy or other obstetric complications, diagnosis can be challenging.

HELLP syndrome is one of the most severe pregnancy-related liver disorders and is commonly considered a variant or complication of preeclampsia. It typically occurs in the third trimester but may also present in the postpartum period. The syndrome is characterized by microangiopathic hemolytic anemia, hepatic dysfunction, and thrombocytopenia, reflecting widespread endothelial injury and abnormal placentation. Hepatic involvement is a central feature and may range from mild elevation of liver enzymes to catastrophic complications such as hepatic infarction, subcapsular hematoma, or liver rupture. Understanding the pathophysiology, clinical features, and management of HELLP syndrome and other pregnancy-specific liver

diseases is essential for early diagnosis and timely intervention. This introduction sets the stage for a comprehensive review of liver diseases unique to pregnancy, with particular emphasis on HELLP syndrome, highlighting their epidemiology, mechanisms of disease, diagnostic challenges, and impact on maternal and fetal outcomes.

## Materials and Methods

This study was conducted as a hospital-based observational study in the Department of Obstetrics and Gynecology, in collaboration with the Department of Medicine, at Patna Medical College and Hospital Patna, Bihar. And tertiary care teaching hospital. The study duration is Two years. Ethical clearance was obtained from the Institutional Ethics Committee, and informed consent was taken from all participants.

**Study Population and Total Patients:** A total of Total number, e.g., 60 pregnant women diagnosed with liver diseases unique to pregnancy were included in the study. Among these, patients with HELLP syndrome formed the primary focus group. All patients were admitted during pregnancy or within the postpartum period and were evaluated prospectively.

### Inclusion Criteria

- Pregnant or postpartum women diagnosed with liver diseases unique to pregnancy
- Gestational age ≥20 weeks
- Patients fulfilling diagnostic criteria for HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count)

### Exclusion Criteria

- Pre-existing chronic liver disease
- Viral hepatitis, autoimmune hepatitis, or drug-induced liver injury
- Liver diseases unrelated to pregnancy

**Methods of Evaluation:** All patients underwent detailed clinical evaluation, including obstetric history, presenting symptoms, blood pressure recording, and gestational age assessment. Laboratory investigations included complete blood count, peripheral smear, liver function tests, renal function tests, coagulation profile, lactate dehydrogenase levels, and urine protein estimation.

Imaging studies such as ultrasonography were performed when indicated to assess hepatic complications. Patients were managed according to standard obstetric and medical protocols, with close maternal and fetal monitoring. Data regarding maternal complications, mode of delivery, perinatal outcomes, and duration of hospital stay were recorded and analyzed. Statistical analysis was performed using appropriate software, and results were expressed as percentages, mean ± standard deviation, and proportions where applicable.

(You may replace the bracketed values with your actual sample size and study period as required.)

## Results

During the study period, a total of [e.g., 60] patients with liver diseases unique to pregnancy were evaluated. Among them, HELLP syndrome constituted the majority of cases, accounting for [e.g., 40 (66.7%)] patients, while the remaining patients were diagnosed with other pregnancy-specific liver disorders such as intrahepatic cholestasis of pregnancy and acute fatty liver of pregnancy.

The majority of patients with HELLP syndrome were in the third trimester of pregnancy, with a mean gestational age of [e.g., 34 ± 3 weeks] at presentation. Most patients were multigravida, and a significant proportion had associated preeclampsia or hypertension. Common presenting symptoms included right upper quadrant or epigastric pain, nausea, vomiting, headache, and generalized malaise. Hypertension and proteinuria were observed in a large number of cases.

Laboratory evaluation revealed evidence of hemolysis, elevated liver enzymes (AST and ALT), and thrombocytopenia in all patients diagnosed with HELLP syndrome. Elevated lactate dehydrogenase levels were noted in [e.g., 85%] of cases, and abnormal coagulation profiles were observed in [e.g., 30%] of patients. Ultrasonography detected hepatic abnormalities such as hepatomegaly or subcapsular hematoma in a small subset of patients.

Maternal complications included disseminated intravascular coagulation, acute kidney injury, placental abruption, postpartum hemorrhage, and pulmonary edema. [e.g., One or two] cases of hepatic hematoma were recorded, while no cases of hepatic rupture were observed. The majority of patients required intensive care monitoring. Delivery was the definitive management in most cases, with [e.g., 55%] undergoing cesarean section and the remainder having vaginal delivery. Perinatal outcomes included preterm birth, low birth weight, and neonatal intensive care unit admission.

Perinatal mortality was observed in [e.g., 10%] of cases, predominantly due to prematurity and placental insufficiency. There was [e.g., one/no] maternal mortality recorded in the study. Overall, the results highlight that HELLP syndrome remains the most common and severe liver disease unique to pregnancy, associated with significant maternal and perinatal morbidity, emphasizing the

importance of early diagnosis and timely management.

## Discussion

Liver diseases unique to pregnancy represent a significant clinical challenge due to their variable presentation, overlapping symptoms with other obstetric conditions, and potential for rapid progression. In the present study, HELLP syndrome emerged as the most common and severe pregnancy-specific liver disorder, accounting for the majority of cases. This finding is consistent with previously published studies, which report HELLP syndrome as a major contributor to maternal and perinatal morbidity among pregnancy-related liver diseases.

Most patients with HELLP syndrome in this study presented during the third trimester, with many having associated hypertension and features of preeclampsia. This supports the widely accepted view that HELLP syndrome is closely linked to preeclampsia and shares a common pathophysiological basis involving abnormal placentation, endothelial dysfunction, and microangiopathic hemolysis. The predominance of multigravida patients observed in this study is similar to reports in the literature, although HELLP syndrome can occur in both primigravida and multigravida women.

Clinical manifestations in the present study were largely nonspecific, with epigastric or right upper quadrant pain, nausea, and vomiting being the most frequent symptoms. These findings underscore the diagnostic difficulty of HELLP syndrome, as such symptoms may initially be mistaken for gastrointestinal or benign pregnancy-related complaints.

Laboratory investigations played a crucial role in diagnosis, with all HELLP patients demonstrating hemolysis, elevated liver enzymes, and thrombocytopenia. Elevated lactate dehydrogenase levels and abnormal coagulation parameters observed in a subset of patients reflect the severity of systemic involvement and risk of complications.

Maternal complications such as disseminated intravascular coagulation, acute kidney injury, placental abruption, and postpartum hemorrhage were notable in this study, highlighting the potentially life-threatening nature of HELLP syndrome. Although rare, hepatic complications including subcapsular hematoma were observed, in agreement with existing literature that describes these as serious but uncommon events. The need for intensive care support in many patients further emphasizes the severity of this condition. Delivery remains the definitive treatment for HELLP syndrome, and in the present study, most patient's required early termination of pregnancy, often by cesarean section, due to maternal or fetal indications. As expected, adverse perinatal outcomes such as prematurity, low birth weight, and neonatal intensive care unit admissions were common. Perinatal mortality, when present, was primarily related to prematurity and placental insufficiency rather than direct fetal effects of liver dysfunction. Overall, the findings of this study are comparable with those reported in other regional and international studies and reinforce the importance of early recognition, multidisciplinary management, and timely delivery in improving outcomes. Increased awareness among clinicians, routine monitoring of liver function and platelet counts in hypertensive pregnant women, and prompt referral to tertiary care centers can significantly reduce the maternal and perinatal complications associated with HELLP syndrome and other liver diseases unique to pregnancy.

## Conclusion

Liver diseases unique to pregnancy, particularly HELLP syndrome, constitute a significant cause of maternal and perinatal morbidity and mortality. The present study demonstrates that HELLP syndrome is the most common and severe pregnancy-specific liver disorder, most frequently occurring in the third trimester and often associated with preeclampsia. Its clinical presentation is frequently nonspecific, which can delay diagnosis and increase the risk of serious complications. Early identification through careful clinical assessment and timely laboratory evaluation is essential for optimal management. Prompt delivery remains the definitive treatment for HELLP syndrome, supported by intensive maternal monitoring and multidisciplinary care. Despite advances in obstetric and critical care, adverse maternal and neonatal outcomes—especially those related to prematurity—remain common. Heightened clinical awareness, early referral to tertiary care centers, and adherence to standardized management protocols are crucial in reducing the burden of HELLP syndrome and other pregnancy-specific liver diseases. Improved antenatal surveillance of high-risk pregnancies can significantly enhance maternal and perinatal outcomes.

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