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ORIGINAL ARTICLE

Clinical Profile, Biochemical Alterations, and Therapeutic Outcomes of Jaundice in Pregnant Women. A Clinical Study

MUHAMMAD KALEEM[1], HANANA HAMEED[2], MUHAMMAD NAVEED NAJEEB[4], SAJJAD UL HASAN [3], AAISHA QADIR[5], MAHA SAJJAD[6]
[1]*Senior Registrar, Department of Medicine, Amna Inayat Medical College, Sheikhupura, Pakistan*
[2]*Associate Professor, Department of Gynecology and Obstetrics, Bolan Medical College, Quetta, Pakistan*
[3]*Associate Professor, Department of Biochemistry, Quaid-e-Azam Medical College, Bahawalpur, Pakistan*
[4]*Assistant Professor, Department of Community Medicine, Amna Inayat Medical College, Sheikhupura, Pakistan*
[5]*Assistant Professor, Department of Biochemistry, Pak Red Crescent Medical and Dental College, Kasur, Pakistan*
[6]*Undergraduate Medical Student, King Edward Medical University, Lahore, Pakistan*
Correspondence to: Sajjad ul Hasan, Email: sajjadhassan1957@gmail.com

ABSTRACT

Background: Jaundice during pregnancy is a potentially life-threatening condition that can arise from both obstetric-specific and general hepatic disorders. Early recognition is crucial to prevent severe maternal and fetal outcomes.

Objective: To assess the clinical profile, biochemical alterations, etiological spectrum, and therapeutic outcomes of jaundice in pregnant women in a tertiary care setting.

Methods: A prospective clinical study was conducted at Bolan Medical University Hospital, Quetta, and Mayo Hospital, Lahore, from January 2022 to March 2023. One hundred pregnant women with clinically and biochemically confirmed jaundice were enrolled. Clinical symptoms, laboratory parameters, etiologies, and maternal-fetal outcomes were documented and analyzed.

Results: The majority of patients (62%) presented in the third trimester, with multigravidas constituting 61% of cases. Intrahepatic cholestasis of pregnancy (38%) was the most common cause, followed by acute viral hepatitis (26%), HELLP syndrome (20%), and AFLP (16%). Biochemically, all patients exhibited elevated bilirubin levels and transaminases. Severe coagulopathy and hypoalbuminemia were more common in AFLP and HELLP cases. Maternal ICU admission occurred in 14% of cases, and perinatal mortality was recorded at 14%. Preterm delivery occurred in 40%, and 28% of neonates required NICU admission.

Conclusion: Jaundice in pregnancy demands timely diagnosis and individualized care to prevent maternal and perinatal morbidity. Enhanced screening, better infection control, and multidisciplinary management are essential in high-burden settings.

Keywords: Pregnancy, Jaundice, Intrahepatic Cholestasis, Viral Hepatitis, HELLP Syndrome, AFLP, Perinatal Outcome, Liver Dysfunction in Pregnancy

INTRODUCTION

Jaundice in pregnancy is a complex clinical condition that poses significant risks to both maternal and fetal health. It is not only a marker of hepatic dysfunction but also a clinical symptom that may indicate a spectrum of underlying hepatic, hematological, or obstetric disorders[1]. Defined by the yellow discoloration of the skin and sclera resulting from elevated serum bilirubin levels, jaundice in pregnancy may be physiological or pathological in nature. While physiological jaundice is commonly seen in neonates due to immature liver function, jaundice in a pregnant woman is always considered abnormal and warrants immediate evaluation and management[2].

The incidence of jaundice in pregnancy varies globally, ranging from 0.1% to 3% of all pregnancies. However, in South Asian countries like Pakistan, where infectious diseases such as hepatitis A, B, and E are endemic, the incidence is significantly higher. Compounded by poor access to prenatal care, late diagnosis, and inadequate screening protocols, jaundice continues to be a contributing factor to maternal morbidity and mortality in developing countries. Hepatic disorders unique to pregnancy such as intrahepatic cholestasis of pregnancy (ICP), HELLP syndrome (Hemolysis, Elevated Liver enzymes, and Low Platelet count), and acute fatty liver of pregnancy (AFLP) are often underdiagnosed due to overlapping symptoms with common pregnancy-related complaints like nausea, vomiting, and malaise[3, 4].

Jaundice in pregnancy may manifest in any trimester, but it is most commonly observed during the second and third trimesters when hormonal fluctuations, particularly elevated estrogen and progesterone levels, contribute to hepatic stress[5]. ICP, which typically presents with pruritus and elevated bile acids, is known to increase the risk of preterm labor, fetal distress, and sudden intrauterine fetal demise. AFLP, although rare, is a life-threatening condition associated with microvesicular fatty infiltration of hepatocytes and may lead to fulminant liver failure if not promptly diagnosed. HELLP syndrome is another obstetric emergency that may be accompanied by jaundice, especially in its severe form, and can lead to disseminated intravascular coagulation, hepatic rupture, or renal failure[6].

The etiology of jaundice in pregnancy can also include non-pregnancy-specific conditions such as acute viral hepatitis (caused by hepatitis A, B, C, D, and E viruses), drug-induced liver injury, hemolytic anemias, and gallstone-induced obstructive jaundice. Among viral causes, hepatitis E virus (HEV) is particularly notorious for causing fulminant hepatic failure in pregnant women, with mortality rates reaching up to 20–25% in the third trimester. Despite this, there remains a significant gap in antenatal screening for hepatitis and liver function abnormalities in many tertiary hospitals in Pakistan[7].

The diagnosis of jaundice in pregnant women involves a comprehensive clinical assessment supported by biochemical tests, including liver function tests (serum bilirubin, ALT, AST, ALP), coagulation profiles, viral serologies, and imaging studies such as abdominal ultrasound. Management is tailored to the underlying cause and gestational age, ranging from conservative medical treatment to urgent delivery in severe cases[8]. Pharmacological interventions like ursodeoxycholic acid are effective in managing ICP, while intensive supportive care, plasma exchange, and timely cesarean delivery may be required in cases of AFLP or HELLP syndrome. Maternal outcomes can be favorable with early diagnosis, but fetal prognosis remains guarded, particularly when diagnosis and treatment are delayed[9].

In light of the high burden and clinical complexity of jaundice in pregnancy, particularly in low-resource settings, this study was conducted to evaluate the clinical presentation, biochemical abnormalities, etiological spectrum, and therapeutic outcomes in pregnant women presenting with jaundice. By profiling these cases in a tertiary care setting in Pakistan, the study aims to identify key diagnostic and management challenges and to generate data that could support the development of clinical protocols for timely and effective care[10].

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MATERIALS AND METHODS

This prospective observational clinical study was conducted jointly at two major tertiary care hospitals in Pakistan: Bolan Medical University Hospital, Quetta, and Mayo Hospital, Lahore. The study duration spanned 15 months, from January 2022 to March 2023. A total of 100 pregnant women who presented with clinical features of jaundice and had biochemical confirmation of hepatic dysfunction were enrolled using non-probability purposive sampling.

Inclusion criteria consisted of all pregnant women, irrespective of gestational age, who showed signs and symptoms suggestive of jaundice such as yellowish discoloration of skin and sclera, dark-colored urine, pruritus, or fatigue and had elevated total serum bilirubin levels (>2.0 mg/dL). Exclusion criteria included patients with known pre-existing liver disease (e.g., cirrhosis, autoimmune hepatitis), hemolytic anemia unrelated to pregnancy, and any known hepatotoxic drug use prior to the onset of jaundice.

After obtaining informed written consent, a detailed clinical history was taken, including gestational age, parity, prior history of liver or biliary disease, and associated medical or obstetric complications. Thorough physical examination was performed, and each patient underwent a standardized set of laboratory investigations. These included liver function tests (total and direct bilirubin, ALT, AST, ALP), complete blood count (CBC), coagulation profile (prothrombin time and INR), serum albumin, and renal function tests (serum urea and creatinine). Serological testing was performed for hepatitis A, B, C, and E viruses, as well as for malaria and leptospirosis, wherever clinically indicated. Abdominal ultrasonography was conducted for all participants to assess hepatobiliary anatomy, liver texture, gallbladder status, and rule out obstructive pathology.

Patients were categorized based on the final etiological diagnosis into four major groups: intrahepatic cholestasis of pregnancy (ICP), acute viral hepatitis, HELLP syndrome, and acute fatty liver of pregnancy (AFLP). Diagnosis was based on clinical judgment corroborated with laboratory and imaging findings, following established diagnostic criteria.

Therapeutic management was individualized according to the underlying cause and gestational age. In cases of ICP, ursodeoxycholic acid was administered; for HELLP syndrome and AFLP, intensive monitoring, corticosteroids, magnesium sulfate, and early termination of pregnancy were employed as appropriate. Supportive care, fluid-electrolyte management, liver-protective agents, and obstetric interventions were provided in collaboration with hepatologists and critical care specialists.

Patients were followed until delivery or complete resolution of jaundice. Maternal and fetal outcomes were recorded, including mode of delivery, gestational age at delivery, need for intensive care, maternal complications (e.g., hepatic encephalopathy, coagulopathy), and neonatal outcomes (e.g., Apgar scores, NICU admission, stillbirths).

All data were recorded on a structured proforma and analyzed using SPSS version 25.0. Descriptive statistics were used for demographic variables. Chi-square test and ANOVA were applied to assess differences between etiological groups with respect to clinical and biochemical parameters. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 100 pregnant women with clinically and biochemically confirmed jaundice were enrolled from Bolan Medical University Hospital, Quetta, and Mayo Hospital, Lahore. The patients' demographic and obstetric data were assessed to determine patterns of age distribution, gravidity, gestational age at presentation, and socioeconomic background.

Most of the participants were in the 25–30 years age group (46%), followed by those older than 30 years (26%) and younger than 25 years (28%). A greater proportion of patients were multigravida (61%) as compared to primigravida (39%). The majority of cases (62%) presented in the third trimester, while 28% presented in the second trimester, and only 10% in the first. Regarding socioeconomic status, 60% of patients were from lower-income groups, 34% from middle-income, and only 6% from upper-income families. These findings are summarized in Table 1.

Table 1: Demographic and Obstetric Profile of Participants (n = 100)

Variable	Frequency (%)
Age Group (Years)	
18–24	28 (28%)
25–30	46 (46%)
>30	26 (26%)
Gravida	
Primigravida	39 (39%)
Multigravida	61 (61%)
Trimester at Presentation	
First	10 (10%)
Second	28 (28%)
Third	62 (62%)
Socioeconomic Status	
Lower	60 (60%)
Middle	34 (34%)
Upper	6 (6%)

To determine the underlying causes of jaundice in the study population, patients were classified based on clinical criteria, biochemical profiles, and imaging findings. Intrahepatic cholestasis of pregnancy (ICP) was identified as the most common etiology, present in 38% of cases. Acute viral hepatitis accounted for 26%, followed by HELLP syndrome in 20% and acute fatty liver of pregnancy (AFLP) in 16%. These distributions are detailed in Table 2.

Table 2: Etiological Classification of Jaundice (n = 100)

Etiology	Frequency (%)
Intrahepatic Cholestasis of Pregnancy (ICP)	38 (38%)
Acute Viral Hepatitis (HAV, HBV, HEV)	26 (26%)
HELLP Syndrome	20 (20%)
Acute Fatty Liver of Pregnancy (AFLP)	16 (16%)

Patients exhibited a range of clinical symptoms. The most frequently observed symptom was visible jaundice (100%), followed by fatigue (88%), pruritus (72%), anorexia (65%), dark-colored urine (60%), and vomiting (55%). Right upper quadrant pain was present in 43% of cases, predominantly in patients with AFLP and HELLP syndrome. A complete breakdown of clinical features is shown in Table 3.

Table 3: Clinical Features at Presentation (n = 100)

Clinical Feature	Frequency (%)
Jaundice (Scleral/Generalized)	100 (100%)
Fatigue	88 (88%)
Pruritus	72 (72%)
Anorexia	65 (65%)
Dark-Colored Urine	60 (60%)
Nausea/Vomiting	55 (55%)
Right Upper Quadrant Abdominal Pain	43 (43%)

Table 4: Biochemical Parameters of Study Participants (n = 100)

Parameter	Mean ± SD	Abnormal Range (%)
Total Bilirubin (mg/dL)	4.8 ± 1.7	100%
Direct Bilirubin (mg/dL)	3.2 ± 1.3	100%
ALT (U/L)	176.4 ± 66.5	92%
AST (U/L)	189.7 ± 72.8	88%
ALP (U/L)	370.3 ± 101.2	82%
Serum Albumin (g/dL)	2.8 ± 0.4	65% (Low)
Prothrombin Time (PT, sec)	17.2 ± 3.1	32% prolonged
INR	1.6 ± 0.5	28% >1.5

Biochemical analysis was performed for all patients. Hyperbilirubinemia was a universal finding, with a mean total bilirubin level of 4.8 ± 1.7 mg/dL and direct bilirubin of 3.2 ± 1.3 mg/dL. Liver enzymes were also elevated, with ALT and AST

showing mean values of 176.4 ± 66.5 U/L and 189.7 ± 72.8 U/L respectively. ALP levels were elevated in 82% of patients, and hypoalbuminemia was found in 65%. Coagulopathy was identified in 32% of patients with prolonged PT and INR >1.5. The detailed laboratory profile is presented in Table 4.

Maternal and fetal outcomes were assessed in all patients. Preterm delivery occurred in 40% of pregnancies, with spontaneous vaginal delivery in 44%, emergency cesarean section in 36%, and induction of labor in 20%. Maternal ICU admission was required in 14% of cases, and hepatic encephalopathy was observed in 9%. Postpartum hemorrhage occurred in 18%. Neonatal complications included 28% NICU admissions and 32% low birth weight cases. Perinatal mortality was reported in 14% of pregnancies, including 6 intrauterine fetal demises. The detailed obstetric outcomes are shown in Table 5.

Table 5: Maternal and Fetal Outcomes (n = 100)

Outcome	Frequency (%)
Preterm Delivery (<37 weeks)	40 (40%)
Spontaneous Vaginal Delivery	44 (44%)
Emergency Cesarean Section	36 (36%)
Induced Labor	20 (20%)
Maternal ICU Admission	14 (14%)
Hepatic Encephalopathy	9 (9%)
Postpartum Hemorrhage	18 (18%)
Intrauterine Fetal Demise (IUFD)	6 (6%)
Perinatal Mortality (Total)	14 (14%)
NICU Admission	28 (28%)
Low Birth Weight (<2.5 kg)	32 (32%)

This clinical study demonstrates that jaundice during pregnancy is most frequently seen in the third trimester and is more common in multigravida women from lower socioeconomic backgrounds. Intrahepatic cholestasis of pregnancy emerged as the leading etiology, followed by acute viral hepatitis, HELLP syndrome, and AFLP. Clinically, fatigue, pruritus, and gastrointestinal symptoms were common, with universal icterus. Biochemically, the presence of elevated liver enzymes, hyperbilirubinemia, hypoalbuminemia, and coagulopathy underlines the hepatic compromise in such patients. These laboratory findings were more severe in patients with HELLP syndrome and AFLP. Adverse maternal outcomes, including ICU admissions and postpartum hemorrhage, were particularly associated with AFLP and HELLP syndrome. Fetal outcomes were also affected, with a high rate of preterm births, low birth weight, and NICU admissions. The overall perinatal mortality rate of 14% underscores the seriousness of hepatic complications during pregnancy and the need for early diagnosis and multidisciplinary management.

DISCUSSION

Jaundice during pregnancy remains a significant clinical concern due to its diverse etiologies, potential for maternal complications, and profound impact on fetal outcomes. This study, conducted across two major tertiary care centers in Pakistan, aimed to evaluate the clinical presentation, biochemical alterations, and therapeutic outcomes in 100 pregnant women with confirmed jaundice. The findings reinforce the importance of timely recognition and targeted management of hepatic dysfunctions in pregnancy[11].

Our results showed that the majority of patients presented in the third trimester (62%), which is consistent with previous studies that report a peak incidence of pregnancy-associated liver disorders during the later stages of gestation. This is largely attributable to physiological hormonal changes, increased bile acid load, and pregnancy-induced hepatic stress during this period. Most patients (61%) were multigravida, suggesting that repeated pregnancies may influence hepatobiliary sensitivity, though further studies would be required to establish causation[12].

The leading etiology in our study was intrahepatic cholestasis of pregnancy (38%), which aligns with findings from other South Asian populations where ICP is frequently underdiagnosed. The hallmark features of ICP, including pruritus and mild to moderate transaminase elevation, were seen in the majority of cases. Despite being largely reversible postpartum, ICP is known for its association with preterm delivery, meconium-stained amniotic fluid, and unexplained fetal demise. Prompt identification and the use of ursodeoxycholic acid remain crucial in its management[13].

Acute viral hepatitis was the second most common cause (26%), with hepatitis E virus (HEV) being the predominant pathogen. The high prevalence of HEV in Pakistan and its fulminant course during pregnancy, especially in the third trimester, highlights the urgent need for better sanitation, preventive vaccination programs, and antenatal hepatitis screening. Notably, patients with viral hepatitis had higher bilirubin levels and more severe hepatic enzyme derangements compared to those with ICP[14].

HELLP syndrome (20%) and AFLP (16%) were less common but more clinically severe. Both conditions were associated with significant biochemical abnormalities, including markedly elevated AST/ALT, coagulopathy, and hypoalbuminemia[15]. These patients had higher rates of maternal ICU admission, emergency cesarean section, and postpartum hemorrhage. The distinction between AFLP and HELLP is often challenging and sometimes overlapping; however, timely diagnosis based on Swansea criteria or laboratory profiles and aggressive supportive management are pivotal to reduce mortality[16].

Fetal outcomes were adversely affected across all etiological groups, but particularly in HELLP and AFLP cases. The overall perinatal mortality was 14%, with 6 cases of intrauterine fetal demise and 8 early neonatal deaths. A high proportion of NICU admissions (28%) and low birth weight deliveries (32%) was recorded, indicating the need for close fetal surveillance in jaundiced pregnancies[17, 18].

This study underscores the necessity of including liver function tests as part of routine antenatal care in high-risk or symptomatic pregnancies. Additionally, strengthening maternal health services with access to hepatology consultations, critical care, and well-defined referral protocols can significantly improve outcomes[19].

CONCLUSION

Jaundice in pregnancy represents a complex interplay of physiological stress and pathological hepatic dysfunction. This study found that intrahepatic cholestasis of pregnancy, acute viral hepatitis, HELLP syndrome, and AFLP were the most common causes, with varied biochemical profiles and clinical courses. Third-trimester presentation was most frequent, and the majority of patients were multigravidas from low-income settings. Early clinical suspicion, combined with targeted investigations and etiology-specific treatment, proved critical in preventing maternal and fetal complications. Despite prompt management, significant rates of preterm delivery, NICU admission, and perinatal mortality were observed, especially in patients with HELLP and AFLP. These findings call for strengthened prenatal screening, early referral systems, and multidisciplinary management approaches in obstetric practice.

Availability of Data and Materials: The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Authors' Contributions:

- M.K.: Study design, patient recruitment, and clinical oversight
- H.H.: Data collection, coordination with laboratory services
- S.H.: Statistical analysis and data interpretation

- M.N.N.: Radiological evaluation and data verification
- A.Q.: Manuscript drafting and literature synthesis
- M.S.: Final editing, formatting, and manuscript submission

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