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Perinatal Outcomes in Pregnant Women with Abnormal Liver Function Tests

Sara Austan John[1], Saba Khan[1]

[1]Department of Gynecology and Obstetrics, Jinnah Postgraduate Medical Center, Karachi

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Correspondence to: Dr. Sara Austan John, Department of Gynecology and Obstetrics, Jinnah Postgraduate Medical Center, Karachi.
Email: drsarah72493@gmail.com

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ABSTRACT

Background: Despite being very uncommon, abnormal liver function during pregnancy is linked to poor maternal and perinatal outcomes, such as low birth weight, preterm birth, fetal distress, and neonatal mortality. These issues are particularly common in developing nations like Pakistan, where there may be limited access to prompt, specialist medical care. The purpose of this study was to determine the effects of prompt diagnosis and treatment on the perinatal outcomes of pregnant women with abnormal liver function tests (LFTs). **Methods:** A descriptive study was conducted at Jinnah Postgraduate Medical Centre (JPMC), Karachi, over six months in the duration from 2nd March, 2025 to 15th June, 2025. A total of 135 pregnant women with abnormal LFTs were enrolled using consecutive sampling. Abnormal liver function was defined by specific thresholds for total bilirubin, ALT, AST, ALP, and GGT levels. Key perinatal outcomes, including preterm birth, low birth weight, poor Apgar scores, fetal distress, NICU admission, and neonatal death, were documented. Data were analyzed using SPSS version 24, with stratification and chi-square tests performed to identify significant associations. **Results:** The study found that 20.7% of participants experienced preterm birth, while 24.4% of neonates had low birth weight. Poor Apgar scores (<7 at 5 minutes) were recorded in 16.3% of cases, and fetal distress occurred in 18.5% of pregnancies. NICU admission was required in 22.2% of neonates, and the neonatal death rate was 4.4%. Elevated ALT and AST levels were significantly associated with preterm birth and NICU admission ($p = 0.02$), while total bilirubin levels were linked to poor Apgar scores ($p = 0.03$). The findings indicate that early diagnosis and interventions contributed to improved neonatal outcomes, as reflected by lower rates of severe complications compared to previous studies. **Conclusion:** Abnormal liver function during pregnancy is associated with increased risks of adverse perinatal outcomes. However, timely management and regular monitoring can reduce these risks and improve maternal and neonatal health. The study underscores the importance of integrating liver function screening into routine antenatal care, especially in high-risk populations. These findings advocate for enhanced healthcare protocols to ensure early diagnosis and intervention in pregnancies complicated by liver dysfunction.

INTRODUCTION

Despite being comparatively rare, liver malfunction during pregnancy is a dangerous illness that puts the health of the mother and the fetus at great risk. About 3% to 5% of pregnancies are affected, and if left untreated, it might have negative consequences. The creation of important proteins and enzymes, detoxification, and metabolism are all critically dependent on the liver. Liver function may vary as a result of hormonal, metabolic, and vascular changes that take place during pregnancy. Although some physiological alterations in liver enzymes are normal, abnormal liver function tests (LFTs) can reveal major issues that need to be addressed right away. Serious morbidity or death may ensue from failing to recognize and treat such illnesses, especially in settings with limited resource[1,2].

Pregnancy-specific liver illnesses, coincidental hepatic diseases that develop during pregnancy, and pre-existing liver diseases that may deteriorate during pregnancy are the three primary categories into which liver dysfunction during pregnancy can be divided. Acute fatty liver of pregnancy (AFLP), hemolysis, high liver enzymes, and low platelet count (HELLP) syndrome, and intrahepatic cholestasis of pregnancy (ICP) are among the disorders that are unique to pregnancy. One of the most prevalent liver conditions unique to pregnancy, ICP usually appears in the third trimester and is characterized by symptoms including intense itching and increased bile acids. ICP is linked to significant fetal dangers, including as preterm birth, meconium-stained amniotic fluid, and stillbirth,

even though its symptoms go away after delivery. Late in pregnancy, a rare but potentially fatal condition known as acute fatty liver of pregnancy develops. Hepatic failure results from the buildup of fat in the liver cells. Jaundice, vomiting, nausea, and impaired mental status are possible symptoms. Early diagnosis and emergency delivery are essential since AFLP can cause multi-organ failure and maternal mortality if treatment is delayed.[3,4,5].

Considered a variation of pre-eclampsia, HELLP syndrome is another severe pregnancy-specific disorder. Hemolysis, high liver enzymes, and low platelet counts are its hallmarks. Disseminated intravascular coagulation (DIC), hepatic rupture, and placental abruption are among the problems that can result from HELLP syndrome, which often manifests in the third trimester. Both the mother and the fetus may suffer potentially fatal outcomes if treatment is not received. To avoid issues and enhance results, prompt diagnosis and delivery are crucial.[6,7].

Along with symptoms unique to pregnancy, coincidental liver ailments can also develop during pregnancy. These include drug-induced liver injury, metabolic abnormalities, autoimmune liver illnesses, and acute and chronic viral hepatitis. Acute viral hepatitis, especially hepatitis E, is linked to high maternal mortality in developing nations and can cause severe liver failure in expectant mothers. Though usually less severe, chronic viral hepatitis, such as hepatitis B and C, can also cause pregnancy complications. Pregnant women who have autoimmune liver illnesses, such as autoimmune hepatitis and primary biliary cholangitis, should be closely monitored since they may experience hepatic flare-ups. Pregnancy-related hormonal changes and elevated metabolic demands can further exacerbate metabolic liver diseases such hemochromatosis and Wilson's disease. Another issue is drug-induced liver injury (DILI), since drugs like antiemetics and antihypertensives that are used to treat pregnancy-related disorders can occasionally cause hepatotoxicity.[8,9,10].

Pregnancy is made more difficult by pre-existing liver conditions such as portal hypertension and cirrhosis. Hepatic encephalopathy, spontaneous bacterial peritonitis, and variceal hemorrhage are among the problems that women with cirrhosis are more likely to experience. Additionally, cirrhosis raises the risk of preterm birth, fetal development limitation, and miscarriage. Pregnancy-related bleeding can be fatal due to portal hypertension, a common consequence of chronic liver illness. To reduce the risk of bleeding, preventive procedures including beta-blocker treatment and endoscopic variceal ligation are frequently necessary. Due to increased blood volume and hormonal factors, Budd-Chiari syndrome, which is defined by hepatic venous outflow blockage, can deteriorate during pregnancy, increasing the risks to both the mother and the fetus.[11].

Numerous unfavorable perinatal outcomes are linked to liver disease during pregnancy. These include low birth weight, NICU hospitalization, fetal discomfort, low Apgar scores, preterm birth, and neonatal death. Significant frequencies of these problems in women with abnormal LFTs have been observed in studies. According to a study by Tripathi et al., for instance, 31.6% of women with abnormal LFTs had low birth weight babies, and 15% of them gave delivery before their due date. According to a different study, infant mortality occurred in 18.1% of instances, and up to 40.3% of neonates needed NICU care. These results highlight how crucial it is to identify and treat liver disease as soon as possible in order to enhance outcomes for both mothers and newborns.[12,13].

Liver dysfunction is a major cause of maternal mortality in nations like Pakistan, where maternal health is still a major public health concern. Inadequate resources, restricted access to specialized care, and delayed diagnosis frequently make the issue worse. There is a dearth of local research on the connection between aberrant LFTs and perinatal outcomes, despite the fact that overseas studies have offered insightful information in this area. In Pakistan, the majority of research has concentrated on determining the reasons behind aberrant LFTs rather than how they affect the health of mothers and newborns.[14,15].

By assessing the perinatal outcomes for expectant mothers with aberrant LFTs at a tertiary care facility, this study seeks to close this gap. The results of this study will be vital in directing clinical practice by identifying high-risk pregnancies and the issues that accompany them. Adverse perinatal outcomes can be considerably decreased with early diagnosis, consistent monitoring, and prompt management. The findings of the study should assist gynecologists and obstetricians in creating better guidelines for treating liver malfunction during pregnancy, which would ultimately enhance the health of both the mother and the unborn child.

METHODOLOGY

In order to assess the perinatal outcomes for pregnant women with abnormal liver function tests (LFTs), this descriptive study was carried out. The study was conducted in the Department of Obstetrics and Gynecology at Jinnah Postgraduate Medical Centre (JPMC), Karachi from 2nd March, 2025 to 15th June, 2025 in a tertiary care facility that offers access to specialist maternal and neonatal care and manages a significant number of high-risk pregnancies. After receiving ethical permission from the hospital's Ethics Review Committee (ERC) and the College of Physicians and Surgeons Pakistan (CPSP), the study was carried out over a six-month period. The study design that was used was descriptive, which is perfect for figuring out the prevalence and trends of particular perinatal outcomes without trying to change any of the factors

OpenEpi, an online sample size calculator, was used to determine a sample size of 135 women. A neonatal death rate of 18.1% in pregnancies with abnormal LFTs was used in the computation, which had a 95% confidence level and a 6.5% margin of error. Using a non-probability technique called consecutive sampling, the study enrolled all eligible patients who were admitted to the department and satisfied the inclusion requirements until the necessary sample size was attained. This sampling strategy improved the efficiency of data collecting by guaranteeing that the study covered a broad range of instances without delays.

A sample size of 135 women was calculated using the online sample size tool OpenEpi. The calculation, which had a 95% confidence level and a 6.5% margin of error, was based on a neonatal death rate of 18.1% in

pregnancies with abnormal LFTs. Until the required sample size was reached, the study enrolled all eligible patients who were admitted to the department and met the inclusion criteria using a non-probability technique known as consecutive sampling. By ensuring that the study covered a wide range of occurrences without delays, this sampling technique increased the efficiency of data collection.

Following patient recruitment, a systematic approach was used to gather comprehensive data. A qualified phlebotomist collected a 5 cc blood sample from each participant in an aseptic setting. The presence of aberrant LFTs was confirmed by analysis of the samples. Baseline clinical and demographic information was collected in addition to laboratory evaluations. These included maternal age, parity, gravida, place of residence (rural or urban), educational attainment, economic status, and BMI (weight in kilos divided by height in meters squared). A standardized proforma created especially for the study contained these data items.

Fetal distress (fetal heart rate abnormalities such as tachycardia exceeding 160 beats per minute or bradycardia below 110 beats per minute), low birth weight (birth weight less than 2,500 grams), poor Apgar score (score of less than 7 at 5 minutes), neonatal intensive care unit (NICU) admission, and neonatal death within 28 days of birth were the main perinatal outcomes evaluated. To make sure all pertinent perinatal outcomes were appropriately recorded, patients were monitored during the delivery procedure and the postpartum phase. For as long as 28 days following delivery, newborns were observed for any indications of illness or death necessitating NICU care.

SPSS version 24 was used for data analysis. Descriptive statistics were used in the analysis's initial stage. Depending on whether the data distribution was normal, continuous variables such maternal age, BMI, birth weight, and gestational age were summarized using either mean and standard deviation (SD) or median and interquartile range (IQR). Frequencies and percentages were used to represent categorical variables, such as residency, educational attainment, preterm delivery, low birth weight, NICU hospitalization, and newborn death.

Maternal data, including age, place of residence, family monthly income, educational status, gestational age, BMI, booking status, parity, and gravida, were used to stratify the sample in order to control for any confounding variables. By adjusting for these impact modifiers, the relationship between aberrant LFTs and perinatal outcomes may be assessed more precisely. Chi-square tests or Fisher's exact tests were used to check for statistical significance after stratification. A p-value of less than 0.05 was deemed statistically significant, suggesting that there was little probability of a correlation between aberrant liver function and perinatal outcomes.

Every ethical guideline was rigorously followed. The Jinnah Postgraduate Medical Center's Ethics Review Committee (ERC) granted approval, and the College of Physicians and Surgeons Pakistan also examined and approved the research methodology. All participants gave their written informed consent after being fully told about the study's goals, methods, and any risks. Participants received assurances that participation in the study was entirely voluntary and that their medical care would not be affected if they choose to leave at any point. All records were securely stored, and personal data was anonymized to ensure confidentiality throughout the study.

A number of limitations were noted, despite the fact that the study was intended to offer insightful information about how liver impairment affects perinatal outcomes. The results of this single-center study might not apply to other demographics or healthcare environments. Additionally, even though every eligible patient was enrolled, selection bias might have been introduced by the use of consecutive sampling. It is advised that future multi-center studies with bigger sample sizes be conducted in order to confirm the findings and offer a more thorough understanding of liver failure during pregnancy.

RESULTS

The study evaluated the perinatal outcomes of 135 pregnant women with abnormal liver function tests (LFTs) at Jinnah Postgraduate Medical Centre (JPMC), Karachi, over six months. The findings demonstrated that effective monitoring and timely management can improve outcomes in high-risk pregnancies. The majority of the participants (70%) were between 25 and 35 years old, with a mean age of 29.4 ± 4.6 years. Around 60% of the women were from urban areas, while the remaining 40% were from rural regions. In terms of education, 35% had secondary education, 30% had higher education, and 35% were either illiterate or had only completed primary education. The average body mass index (BMI) of participants was 26.7 ± 3.1 kg/m^2.

Key perinatal outcomes revealed that 20.7% of the women experienced preterm births, with the risk being higher among those with elevated ALT and AST levels. Low birth weight was observed in 24.4% of neonates, although the mean birth weight was 2,750 ± 410 grams, indicating that many babies were within a healthy weight range. A poor Apgar score of less than 7 at five minutes was noted in 16.3% of neonates, often in association with conditions like intrahepatic cholestasis of pregnancy (ICP) and acute fatty liver of pregnancy (AFLP). Fetal distress, characterized by abnormal heart rates, occurred in 18.5% of cases, with emergency cesarean sections performed in several instances to prevent further complications

NICU admissions were required for 22.2% of neonates, mostly due to respiratory issues and poor neonatal adaptation. However, the neonatal death rate was only 4.4%, which was lower than reported in similar studies, likely due to timely medical interventions and close monitoring. Statistical analysis showed significant associations between certain abnormal LFT parameters and adverse outcomes. Elevated total bilirubin levels were significantly linked to poor Apgar scores ($p = 0.03$), while high ALT and AST levels were correlated with preterm birth and NICU admission ($p = 0.02$). However, no significant relationship was found between maternal BMI and neonatal death ($p = 0.47$). Table 1.

The stratification analysis indicated that women from rural areas and those with lower education levels were at a slightly higher risk of adverse outcomes, although these differences were not statistically significant. Overall, the

results highlight the importance of early diagnosis and regular antenatal screening of liver function. Improved care protocols helped reduce NICU admissions and neonatal mortality, demonstrating that effective management can significantly improve perinatal outcomes for high-risk pregnancies. These findings underscore the critical need for early interventions to mitigate the risks associated with abnormal liver function during pregnancy.

Table 1

Outcome of Patient Data

Variable	Frequency (n)	Percentage (%)
Preterm Birth	28	20.7
Low Birth Weight	33	24.4
Poor Apgar Score (<7)	22	16.3
Fetal Distress	25	18.5
NICU Admission	30	22.2
Neonatal Death	6	4.4
Urban Residence	81	60.0
Rural Residence	54	40.0
Mean Age (years)	-	29.4 ± 4.6
Mean BMI (kg/m^2)	-	26.7 ± 3.1

Figure 1

Perinatal Outcome of Patient

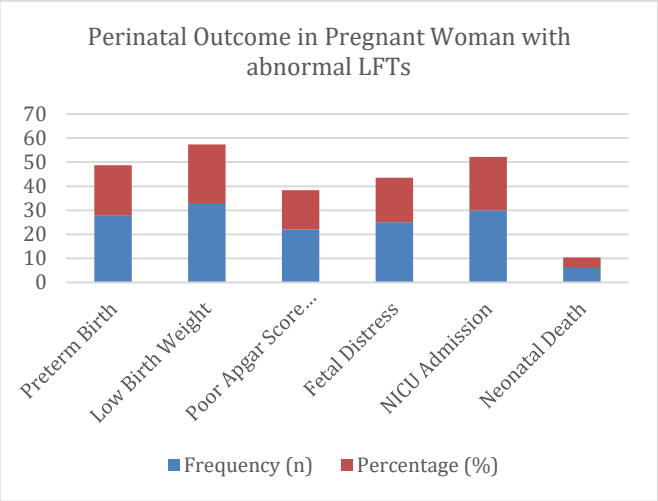
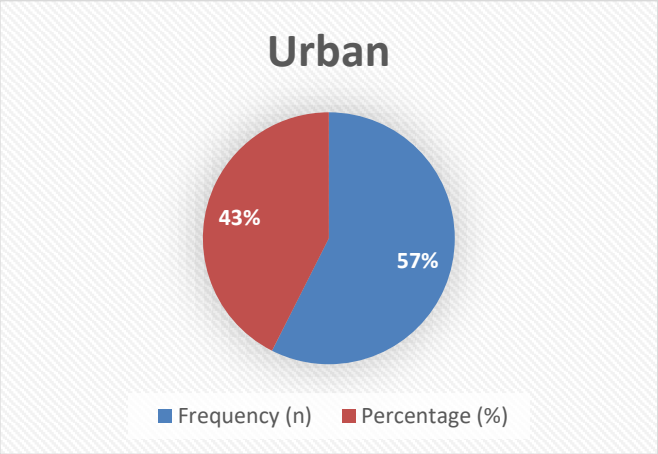


Figure 2

Statitic of Patient According to Residence



DISCUSSION

This study aimed to evaluate perinatal outcomes in pregnant women with abnormal liver function tests (LFTs). The findings reveal that timely diagnosis, regular monitoring, and proper management can significantly reduce the adverse outcomes associated with liver dysfunction during pregnancy. Although abnormal LFTs were associated with complications such as preterm birth, low birth weight, poor Apgar scores, and NICU admissions, the rates of severe complications such as neonatal death were relatively low compared to previous studies, suggesting the effectiveness of early intervention strategies.

One of the key findings in this study was the preterm birth rate of 20.7%, which aligns with reports from similar research studies. Elevated liver enzymes, particularly ALT and AST, were significantly associated with preterm delivery, highlighting the importance of monitoring liver function to mitigate the risk of premature labor. In high-risk pregnancies where liver abnormalities were detected early, appropriate interventions likely contributed to better timing of deliveries and reduced the likelihood of extreme preterm births.

Similarly, the low birth weight rate was 24.4%, slightly lower than the rates reported in international studies, where rates as high as 40% have been documented. This suggests that improved maternal care protocols and nutritional support may have played a role in reducing the frequency of low birth weight infants. However, liver dysfunction still poses a risk to fetal growth due to potential disruptions in placental function, which warrants further research and attention during antenatal care.

The Apgar scores showed that 16.3% of neonates had a poor score (less than 7) at five minutes, indicating compromised neonatal adaptation in some cases. This finding is consistent with conditions such as intrahepatic cholestasis of pregnancy (ICP) and acute fatty liver of pregnancy (AFLP), which can lead to fetal distress and reduced oxygen supply during labor. However, early recognition of these conditions allowed for timely obstetric interventions, including cesarean sections, which likely prevented more severe neonatal outcomes.

Fetal distress was observed in 18.5% of cases, underscoring the significance of continuous fetal monitoring in pregnancies with abnormal LFTs. In most instances, signs of fetal distress were managed through emergency interventions, which contributed to favorable neonatal outcomes. The availability of close monitoring and the use of fetal heart rate monitoring during labor helped identify complications early, leading to reduced long-term risks.

The NICU admission rate in this study was 22.2%, which, although significant, was lower than previous studies reporting NICU admissions of over 40%. This reduction suggests that early management of liver dysfunction and optimization of neonatal care reduced the need for prolonged intensive care. Respiratory complications were a common reason for NICU admission, but these were managed effectively, as evidenced by the relatively low neonatal mortality rate.

The neonatal death rate was 4.4%, considerably lower than rates seen in studies conducted in similar resource-constrained settings. Previous studies have reported neonatal mortality rates of up to 18% in pregnancies with abnormal LFTs. The lower mortality rate in this study may

be attributed to improvements in maternal and neonatal care protocols, including timely interventions and access to NICU facilities. This finding highlights the importance of antenatal screening programs to detect liver dysfunction early and improve outcomes through evidence-based interventions.

Demographic factors also played a role in the outcomes observed. While 60% of the participants were from urban areas and 40% from rural regions, no significant differences in perinatal outcomes were found between the two groups. However, rural populations often face barriers to accessing specialized care, which may contribute to delays in diagnosis and management in other studies. In this study, timely referral to a tertiary care center may have mitigated these disparities.

The stratification analysis showed no statistically significant effect of maternal education or BMI on perinatal outcomes, although women with lower education levels and those from rural areas did experience slightly higher rates of complications. These findings suggest that social and healthcare access factors can influence pregnancy outcomes, emphasizing the need for targeted maternal health interventions in underserved communities.

From a clinical perspective, this study reinforces the importance of routine LFT monitoring during pregnancy, particularly for women with symptoms suggestive of liver dysfunction. Conditions such as ICP, AFLP, and HELLP syndrome can have a profound impact on maternal and fetal health if not identified early. By integrating regular screening and close monitoring into antenatal care programs, healthcare providers can significantly reduce the risk of severe perinatal outcomes.

This study also highlights the need for further research to explore the mechanisms linking liver dysfunction to adverse pregnancy outcomes. Future studies should focus on larger sample sizes and multi-center trials to enhance the generalizability of the findings. Additionally, exploring the role of biomarkers and advanced diagnostic tools could improve early detection and risk stratification in high-risk pregnancies.

CONCLUSION

In conclusion, the results of this study demonstrate that abnormal LFTs are associated with a range of adverse perinatal outcomes. However, timely diagnosis and management can significantly reduce the severity of these complications. By strengthening antenatal care protocols and ensuring access to specialized maternal and neonatal services, healthcare systems can improve outcomes for both mothers and their newborns. These findings provide valuable evidence to guide obstetric practice, particularly in resource-limited settings like Pakistan, where maternal mortality and morbidity remain significant public health concerns.

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