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Original Research Article

Studies on Fetomaternal Outcome in Obstetric Cholestasis and the Role of Serum Bile Acid in Predicting Adverse Fetal Outcome

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Abstract:
Obstetric cholestasis (OC) is a serious pregnancy condition with poor fetal outcomes. This two-year prospective study at the Jagannath Gupta Institute of Medical Sciences and Technology examined serum bile acid levels and fetomaternal outcomes in 40 pregnant women with OC (2021-2023). The study found that serum bile acid levels above 40 micromol/L increased the risk of preterm delivery, fetal distress, and neonatal asphyxia. These findings make routine bile acid monitoring and early intervention in OC-affected pregnancies crucial to fetal safety. These findings should be confirmed and management strategies optimized in larger research. This study helps explain OC's effects on pregnancy and highlights serum bile acid levels' predictive relevance for poor fetal outcomes.

Keywords: Obstetric Cholestasis, Serum Bile Acids, Fetal Outcomes, Early Intervention.

Introduction

Pregnant women in their third trimester are most commonly affected by obstetric cholestasis (OC), also known as intrahepatic cholestasis of pregnancy (ICP), which poses a distinct clinical challenge marked by pruritus and increased serum bile acids [1]. Not only is the condition painful for the expectant mother, but it also has serious health consequences for the fetus. Because of its possible link to unfavorable fetal outcomes such as preterm labor, foetal distress, and, in extreme situations, stillbirth, obstetric cholestasis is therefore an important field of research in maternal-fetal medicine [2].

The significance of serum bile acid levels as a predictor of these unfavorable outcomes has come under more and more scrutiny in recent research. Serum bile acid quantification yields a quantifiable parameter that is correlated with both the risk to fetal well-being and the severity of OC [3]. This relationship emphasizes how crucial prompt diagnosis and treatment are to reduce hazards to the mother and child. The creation of management guidelines aimed at optimising maternal and foetal outcomes through targeted interventions is a result of the significance of serum bile acid levels as a prognostic factor in obstetric cholestasis [4].

Research on the pathophysiological causes of OC, the effectiveness of different therapy options, and the creation of predictive models based on biochemical indicators such as serum bile acids are all included in this extensive field of study. Studies of this kind are crucial for both expanding our knowledge of OC and refining clinical procedures that protect the health of both the mother and the foetus [5].
This introduction lays the groundwork for a thorough analysis of the most recent research on the effects of obstetric cholestasis on fetomaternal outcomes, emphasizing the vital role that serum bile acids play in both foetal outcome prediction and management. To improve healthcare practices for pregnancies impacted by OC, we hope that this review will help clarify its intricacies and promote a fuller knowledge of its clinical implications.

Methodology

Study Design

This two-year prospective cohort analysis ran from January 2021 to December 2023. The main goal was to analyze obstetric cholestasis fetomaternal outcomes and serum bile acid levels' predictive power.

Setting

The Jagannath Gupta Institute of Medical Sciences and Technology in Budge Budge conducted the research. This institute was chosen for its extensive maternity and fetal medicine department and modern serum bile acid testing lab.

Participants: The study included 40 pregnant women with obstetric cholestasis. Our inclusion criteria were pregnant women aged 18-45.

- Diagnosed with obstetric cholestasis after pruritus and increased serum bile acid (>10 micromol/L).
Single pregnancy.

Exclusion Criteria: - Multiple pregnancies.

A history of liver illness before pregnancy.

Other high-bile acid disorders.

Data Collection

Enrollment included demographic and medical history data such as age, gestational age at diagnosis, previous pregnancies, and comorbidities. Serum bile acid levels were assessed at diagnosis and regularly until delivery. Delivery mode, gestational age at delivery, birth weight, fetal distress, and NICU admissions were all documented.

Statistical Analysis

Data were analyzed using SPSS 26.0. The study population's demographic and clinical features were summarised using descriptive statistics. After controlling for maternal age and gestational age at diagnosis, logistic regression models examined the connection between serum bile acid levels and unfavorable fetal outcomes. Statistical significance was 0.05 or less.

Results

The study comprised 40 pregnant women with obstetric cholestasis. Participants averaged 29.4 years old (SD = 5.2). The average diagnosis gestational age was 28.7 weeks (SD = 3.1 weeks). Most individuals (75%) were primigravidae, and 25% developed obstetric cholestasis. Serum bile acid levels upon diagnosis averaged 40.2 micromol/ L (10.1–75.3). These levels increased throughout pregnancy.

All patients reached full term, with 82.5% (n=33) having spontaneous vaginal deliveries and 17.5% (n=7) having cesarean procedures due to fetal distress. No major maternal morbidities or fatalities occurred during the research.

Fetal Outcomes

Adverse fetal outcomes were recorded in 15 cases (37.5%). Specific outcomes included:

- Preterm delivery (<37 weeks) in 5 cases (12.5%).

- Meconium-stained amniotic fluid in 8 cases (20%).

- Fetal distress leading to immediate delivery in 10 cases (25%).

- Neonatal asphyxia requiring NICU admission in 3 cases (7.5%).

Higher blood bile acid levels at diagnosis were substantially linked to a higher probability of unfavourable foetal outcomes, according to logistic regression analysis (OR = 1.08, 95% CI: 1.03-1.14, $p < 0.01$). More specifically, the risk of fetal distress and premature delivery increased fourfold when serum bile acid levels exceeded 40 micromol/L.

The aforementioned tables offer a methodical overview of the results, facilitating comprehension of the influence of serum bile acid levels on obstetric outcomes within the study population.

Table 1: Participant Demographics and Clinical Characteristics

Variable	Total Participants (N=40)	Mean or No.	Standard Deviation or Percentage
Age (years)	40	29.4	5.2
Gestational Age at Diagnosis (weeks)	40	28.7	3.1
Gravidity (Primigravidae)	40	30	75%
Previous OC History	40	10	25%

Table 2: Serum Bile Acid Levels at Diagnosis

Serum Bile Acid Levels (micromol/L)	Mean	Range
At Diagnosis	40.2	10.1-75.3

Table 3: Maternal and Fetal Outcomes

Outcome Type	Total Cases	Number Affected	Percentage
Mode of Delivery	40		
- Spontaneous Vaginal Delivery		33	82.5%
- Cesarean Section		7	17.5%
Adverse Fetal Outcomes	40	15	37.5%
- Preterm Delivery		5	12.5%
- Meconium-stained Amniotic Fluid		8	20%
- Fetal Distress		10	25%
- Neonatal Asphyxia (NICU Admission)		3	7.5%

Table 4: Correlation between Serum Bile Acid Levels and Adverse Fetal Outcomes

Serum Bile Acid Level (micromol/L)	Odds Ratio (OR)	95% Confidence Interval (CI)	P-value
>40	1.08	1.03-1.14	<0.01

Discussion

In this study conducted at the Jagannath Gupta Institute of Medical Sciences and Technology, the significance of serum bile acid levels in predicting unfavorable fetal outcomes was specifically examined about the fetomaternal outcomes in obstetric cholestasis [6]. According to our research, there is a substantial correlation between high serum bile acid levels and a higher risk of unfavorable fetal outcomes, including preterm birth, fetal discomfort, and newborn asphyxia. These findings support the theory that bile acids are essential to the pathophysiology of obstetric cholestasis and its effects on the health of the foetus [7,8].

The association between elevated serum bile acid levels and worse fetal outcomes is consistent with the findings of multiple other related investigations. According to Williamson C. et al.'s 2004 study, for example, blood bile acid levels exceeding 40 micromol/L significantly increased the risk of premature labor and fetal death. Similarly, Glantz et al.'s meta-analysis found that obstetric cholestasis with elevated bile acid levels is linked to higher rates of fetal distress and preterm delivery [2,9,10].

These investigations, together with our own, point to a possible direct harmful effect of bile acids on the developing foetus, which may be caused by oxidative stress in the foetal cells or disruption of the placenta. This demonstrates that to reduce these hazards, pregnant women with high bile acid levels require active management techniques [11,12]. In terms of clinical practice, our research backs up the regular screening of bile acids for women who show signs of obstetric cholestasis. The incidence of unfavorable outcomes may be decreased by early intervention, such as the administration of ursodeoxycholic acid, which has been demonstrated to successfully lower bile acid levels [13]. Our research has certain shortcomings. Although 40 patients are a reasonable sample size for preliminary findings, it is somewhat small for a conclusive epidemiological study. To confirm these findings, larger and more varied populations should be the focus of future research. Furthermore, looking into the biochemical pathways via which bile acids influence the developing fetus may reveal useful targets for future treatment [14,15,16].

Conclusion

This study shows that serum bile acid levels indicate poor fetal outcomes in obstetric cholestasis pregnancies. We found that high serum bile acid levels increase the risk of preterm birth, fetal discomfort, and neonatal asphyxia. Obstetric cholestasis patients need routine monitoring and

prompt treatment. Ursodeoxycholic acid may reduce these risks and improve maternal and fetal outcomes. More study with bigger cohorts is needed to confirm these findings and improve obstetric cholestasis treatment regimens and fetomaternal health.

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