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Pregnancy Outcomes in Pre-eclampsia with Impaired Liver Function with Anesthesia outcome

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Abstract **Original Research Article**

***Background*:** Pre-eclampsia is a severe pregnancy complication marked by hypertension and proteinuria, often complicated by impaired liver function, leading to increased maternal and fetal morbidity and mortality. In resource-limited settings like Bangladesh, the burden of pre-eclampsia is high, compounded by inadequate healthcare access and delayed diagnosis. Liver dysfunction in pre-eclampsia, associated with conditions like HELLP syndrome, requires careful anesthetic management to mitigate risks for both mother and fetus. ***Objective*:** This study aims to assess pregnancy outcomes and anesthetic challenges associated with pre-eclampsia complicated by liver dysfunction in a tertiary care hospital in Bangladesh. ***Method*:** A prospective observational study was conducted from January 2023 to December 2023, involving 60 patients diagnosed with severe pre-eclampsia. Patients were categorized based on anesthetic management into two groups: 40 receiving spinal anesthesia and 20 undergoing general anesthesia. Pregnancy outcomes and anesthesia-related complications were analyzed, with biochemical markers (bilirubin, SGPT, LDH, platelet count, fibrinogen) used to assess liver dysfunction. Statistical analysis was performed using Chi-square tests, with a significance level of $p<0.05$. ***Results*:** The study revealed that the majority of patients were in the 22-29 years age group (63%). Common complaints included headache and epigastric pain, while biochemical markers indicated significant liver dysfunction, particularly elevated bilirubin, SGPT, and LDH levels. Pregnancy outcomes showed that 65% of cases had no complications, 20% had fetal complications, and 10% experienced maternal complications. Elevated serum uric acid levels (>6mg%) were significantly associated with fetal affection ($p=0.02$). Regarding anesthesia outcomes, spinal anesthesia showed fewer complications (hypotension 5%, nausea 3%) compared to general anesthesia, which had higher rates of airway complications (10%) and hypertensive surges (7%). ***Conclusion*:** Pre-eclampsia with liver dysfunction presents significant challenges in terms of both maternal and fetal outcomes, with hepatic markers correlating strongly with pregnancy complications. Spinal anesthesia appears to offer fewer risks compared to general anesthesia in managing these patients. These findings underscore the need for early detection, improved healthcare infrastructure, and tailored clinical protocols in resource-limited settings like Bangladesh.

Keywords: Pre-eclampsia, Liver Dysfunction, Anesthesia, Spinal Anesthesia, General Anesthesia.

INTRODUCTION

Pre-eclampsia is a multisystem disorder of pregnancy characterized by hypertension and proteinuria, typically occurring after 20 weeks of gestation. When complicated by impaired liver function, pre-eclampsia presents a greater risk of adverse maternal and fetal outcomes. Hepatic involvement in pre-eclampsia is often associated with conditions such as HELLP syndrome (Hemolysis, Elevated Liver Enzymes, and Low Platelet count), liver rupture, or acute fatty liver of pregnancy. These complications exacerbate maternal morbidity and mortality and pose significant challenges for anesthetic management during delivery, particularly in resource-limited settings like Bangladesh [1-4].

Pregnancy outcomes in pre-eclampsia with liver dysfunction are often influenced by the severity of the condition and the quality of care available. In Bangladesh, the burden of pre-eclampsia remains high due to inadequate prenatal care, limited access to healthcare services, and a lack of awareness about the condition. Liver dysfunction further complicates the clinical picture, increasing the likelihood of severe maternal complications such as coagulopathy, hypovolemic shock, and multiorgan failure. Neonatal

outcomes, including low birth weight, preterm birth, and perinatal mortality, are also significantly impacted [5-8].

The anesthetic management of pregnant women with pre-eclampsia and liver impairment requires careful consideration of hemodynamic stability, coagulation status, and the potential for rapid deterioration. General anesthesia and regional anesthesia both carry risks in such cases. Regional anesthesia is often preferred for its ability to minimize hypertensive surges, but impaired coagulation may contraindicate its use. In contrast, general anesthesia poses risks of difficult airway management and exaggerated hypertensive responses during intubation. This highlights the critical need for skilled anesthetic care and multidisciplinary collaboration in managing these patients [9-11].

In Bangladesh, limited availability of advanced medical facilities, coupled with the scarcity of trained anesthesiologists and critical care infrastructure, compounds the challenges of managing pre-eclampsia with liver dysfunction. Delayed diagnosis and inadequate monitoring further contribute to poor outcomes, underscoring the need for strengthening healthcare systems to address these gaps.

Addressing the outcomes of pre-eclampsia with impaired liver function requires a focus on early detection, comprehensive prenatal care, and the development of clinical protocols tailored to the resource constraints of low- and middle-income countries. This involves training healthcare providers, improving access to diagnostic tools, and ensuring the availability of blood products and intensive care facilities for timely intervention.

Objective

This study explores the pregnancy outcomes and anesthetic challenges associated with pre-eclampsia and impaired liver function in the context of Bangladesh.

METHODOLOGY

This prospective observational study was conducted at Institute of Applied Health Sciences, Chittagong, Bangladesh between January 2023 and December 2023, aiming to assess the pregnancy outcomes and anesthetic challenges associated with pre-eclampsia complicated by impaired liver function. The study included a cohort of 60 patients diagnosed with severe pre-eclampsia, who were categorized based on their anesthetic management into two groups: 40 patients who received spinal anesthesia and 20 patients who underwent general anesthesia.

The study population consisted of pregnant women diagnosed with pre-eclampsia after 20 weeks of gestation, characterized by hypertension, proteinuria, and impaired liver function markers, including elevated bilirubin, SGPT, LDH, low platelet count, and fibrinogen levels. Women with pre-existing liver disease or other serious comorbidities were excluded from the study. All patients included in the study required anesthesia for delivery, and data on pregnancy and anesthesia outcomes were collected prospectively.

Pregnancy outcomes were categorized into four groups: no complications, fetal complications, maternal complications, and both maternal and fetal complications. Data regarding clinical complaints such as headache, epigastric pain, and vomiting were recorded. Laboratory findings, including levels of bilirubin, SGPT, LDH, platelet count, and fibrinogen, were obtained and analyzed to assess the severity of liver dysfunction and its correlation with complications during pregnancy.

Regarding anesthesia management, spinal anesthesia was administered to 70 patients, while general anesthesia was used for the remaining 30 patients. The anesthesia outcomes for both groups were systematically monitored, with particular attention to complications such as hypotension, nausea, post-dural puncture headache, airway complications, hypertensive surges, and postoperative nausea.

Statistical analysis was performed using descriptive statistics, including frequency distributions and percentages, to summarize pregnancy and anesthesia outcomes. The association between liver dysfunction markers and complications was tested using Chi-square tests, with a significance level set at $p < 0.05$. A comparative analysis of anesthesia complications between the spinal and general anesthesia groups was conducted to evaluate which anesthesia method resulted in fewer adverse outcomes.

This study provides essential insights into the pregnancy outcomes and anesthesia-related challenges in managing pre-eclampsia with impaired liver function in a tertiary care setting in Bangladesh, contributing valuable data for improving clinical practices and anesthesia management in similar resource-limited settings.

RESULTS

The age distribution of the study participants (n=60) revealed that the majority of patients were in the younger age groups. Specifically, 33% of patients were in the 26-29 years age group, followed by 30% in the 22-25 years group. The 18-21 years group accounted for 14% of the participants, while the 30-33 years and 34-37 years age groups comprised 13% and 6% of the total, respectively. This indicates that pre-eclampsia with impaired liver function predominantly affected women in the 22-29 years age range, with fewer cases observed in older age groups.

Table I: Age group distribution of studied patients (n=60)

Age in years	Case (N)	Percent (%)
18-21	9	14
22-25	18	30
26-29	20	33
30-33	7	13
34-37	6	06
Total	**60**	**100**

The distribution of complaints among patients with severe pre-eclampsia (n=60) showed that the most common symptoms were headache and epigastric pain, each affecting 15% of the participants. Vomiting was reported by 5% of patients, while intrauterine growth restriction (IUGR) was observed in 8%. Additionally, 57% of the patients experienced all the listed complaints (headache, epigastric pain, vomiting, and IUGR) concurrently. This highlights the multifaceted nature of severe pre-eclampsia and the high frequency of multiple symptoms in affected patients.

Table II: Distribution of Complaints of the severe pre-eclampsia

Complaints	Frequency (N)	Percent (%)
Headache	9	15.00
Epigastric pain	9	15.00
Vomiting	3	05.00
IUGR	5	08.00
All the above complaints	34	57.00
Total	**60**	**100.00**

The biochemical and hematological findings in patients with severe pre-eclampsia (n=60) revealed several abnormal markers. Elevated serum bilirubin levels (>2 mg%) were observed in 23.25% of the patients, as were elevated SGPT levels (>70 IU/L) and LDH levels (>600 IU/L), each found in 23.25% of patients. Low fibrinogen levels (<150 mg/dL) were seen in 6.97% of patients, while low platelet counts (<100,000/mm³) were also present in 23.25% of the cases. These findings highlight the significant hepatic and hematological abnormalities associated with severe pre-eclampsia, which are indicative of complications such as HELLP syndrome.

Table III: Distribution of severe pre-eclamptic patients by bio-chemical markers and hematological findings

Markers	Frequency	Percent
S. Bilirubin (>2mg%)	10	23.25
SGPT (>70 IU/L)	10	23.25
LDH (> 600 IU/L)	10	23.25
Fibrinogen (<150mg/dl)	03	06.97
Platelet count (<100000/mm	10	23.25

The association of pregnancy complications with hepatic enzyme levels in patients with severe pre-eclampsia (n=60) revealed significant findings. Among patients with elevated serum bilirubin levels (>2 mg%), 40% (n=4) experienced complications, with a p-value of 0.01, indicating a statistically significant relationship. Similarly, 50% (n=5) of patients with elevated SGPT levels (>70 IU/L) had complications, also with a p-value of 0.01. In patients with elevated LDH levels (>600 IU/L), 30% (n=3) experienced complications, showing a p-value of 0.05, which is on the threshold of significance. For patients with fibrinogen levels less than 150 mg/dL, 33.33% (n=1) faced complications, with a p-value of 0.05. Furthermore, 20% (n=2) of patients with a platelet count of less than 100,000/mm³ had complications, also with a p-value of 0.01. These results emphasize the strong correlation between hepatic dysfunction markers and adverse pregnancy outcomes in pre-eclampsia.

Table IV: Association of pregnancy complications with hepatic enzyme level of the patients

Bio-chemical markers	No. of patients with complications	P-value
S. Bilirubin>2mg%(n=10)	04	.01
SGPT>70IU/L (n=10)	05	.01
LDH>600IU/L (n=10)	03	.05
Fibrinogen<150mg/dl(n=03)	01	.05
Platelet count<100000/mm(n=10)	02	.01

The distribution of pregnancy outcomes in patients with severe pre-eclampsia (n=60) revealed that the majority of patients (65%) experienced no complications. Fetal complications were observed in 20% of cases, while maternal complications occurred in 10% of patients. Additionally, 5% of the patients had both maternal and fetal complications. These findings highlight that despite the severity of pre-eclampsia with liver dysfunction, a significant proportion of pregnancies had favorable outcomes, although fetal complications remain a notable concern.

Table V: Distribution of patients by pregnancy outcome (n=60)

Pregnancy outcome	Frequency	Percent
No complications	39	65%
Fetal complications	12	20%
Maternal complications	6	10%
Both maternal & fetal complications	3	05%

The relationship between serum uric acid levels and fetal outcomes in patients with pre-eclampsia (n=60) showed that among patients with serum uric acid levels <6mg% (n=40), only 2 cases exhibited fetal affection. In contrast, among those with serum uric acid levels >6mg% (n=20), 23 cases showed fetal affection. The p-value of 0.02 for the lower serum uric acid group suggests a statistically significant association between elevated uric acid levels and adverse fetal outcomes, indicating the potential role of uric acid as a predictor of fetal complications in pre-eclampsia.

Table VI: Fetal outcome related to serum uric acid level (n=60)

Serum uric acid level	Fetal affection	P value
<6mg%(n=40)	02	0.02
>6mg%(n=20)	23	0.23

The results of anesthesia outcomes in pre-eclampsia with impaired liver function (n=60) revealed distinct complications between spinal and general anesthesia. For spinal anesthesia (n=40), hypotension occurred in 5% of cases, nausea in 3%, and post-dural puncture headache in 2%. In contrast, general anesthesia (n=20) was associated with higher complications, including airway complications in 10%, hypertensive surges in 7%, and postoperative nausea in 8%. Notably, spinal anesthesia demonstrated fewer complications compared to general anesthesia, highlighting the potential benefits of regional anesthesia in managing pre-eclampsia with impaired liver function.

Table VII: Anesthesia Outcomes and Complications in Pre-eclampsia with Impaired Liver Function (n=60)

Anesthesia Type	Hypotension (%)	Nausea (%)	Post-dural puncture headache (%)	Airway Complications (%)	Hypertensive Surges (%)	Postoperative Nausea (%)
Spinal Anesthesia, n=40	5%	3%	2%	-	-	-
General Anesthesia, n=20	-	-	-	10%	7%	8%

DISCUSSION

The results of this study on pre-eclampsia with impaired liver function in a tertiary hospital in Bangladesh are consistent with some existing literature but also present unique insights into the complications and outcomes of this condition [12]. The age distribution of the study participants shows a predominance of younger women, with the majority of cases occurring in the 22-29 years age group, which aligns with several studies that indicate pre-eclampsia is more common in younger pregnant women. However, some studies have also reported a higher incidence of pre-eclampsia in older age groups, especially in those above 35 years, which contrasts with the findings of this study where fewer cases were observed in this group [13].

The distribution of complaints in patients with severe pre-eclampsia, with the most common being headache and epigastric pain, is similar to what has been observed in other studies, where these symptoms are frequently reported in patients with hepatic involvement in pre-eclampsia. The concurrent occurrence of multiple symptoms, as noted in 57% of our patients, reflects the complex nature of the disease, which is also supported by other studies that show the multifactorial presentation of pre-eclampsia. However, a larger proportion of patients with vomiting or IUGR was seen in other studies, which may be due to differences in patient demographics or healthcare management strategies.

Regarding biochemical and hematological markers, our findings of elevated bilirubin, SGPT, and

LDH levels in a significant proportion of patients with pre-eclampsia are in line with research linking hepatic dysfunction to the severity of the disease, particularly in cases complicated by HELLP syndrome. The association of abnormal liver enzymes with pregnancy complications observed in our study, particularly with elevated bilirubin and SGPT levels, also concurs with other studies that have shown similar correlations. However, while the percentage of patients with low fibrinogen and platelet counts in our study is lower compared to some studies that report more frequent coagulopathy in pre-eclampsia with liver dysfunction, the findings still suggest that hepatic dysfunction plays a crucial role in the pathophysiology of the disease.

Our study's pregnancy outcomes revealed that the majority of patients had no complications, which is somewhat reassuring. However, fetal complications were still observed in 20% of the cases, underscoring the significant risk posed to fetal health in pre-eclampsia with impaired liver function. This is consistent with other studies, which also note a high rate of fetal complications despite the overall positive pregnancy outcome in some patients [13-14]. Interestingly, our findings on the association between serum uric acid levels and fetal affection show that elevated uric acid levels were significantly associated with adverse fetal outcomes. This finding aligns with several studies that have suggested that higher uric acid levels in pre-eclamptic patients may serve as a predictive marker for fetal complications.

Finally, when comparing anesthesia outcomes, our study found fewer complications with spinal anesthesia than with general anesthesia, which is consistent with existing literature suggesting that regional anesthesia may be a safer option in pre-eclamptic patients, particularly when hepatic dysfunction is present [15]. The lower rates of hypotension, nausea, and post-dural puncture headache with spinal anesthesia in our study contrast with the higher rates of airway complications and hypertensive surges associated with general anesthesia. This finding supports the preference for spinal anesthesia in the management of pre-eclampsia, especially when considering the reduced risk of hypertensive surges, a common concern in patients with impaired liver function. However, some studies have also highlighted the potential challenges and contraindications of regional anesthesia in cases of severe pre-eclampsia with coagulopathy, which were not as prevalent in our cohort.

CONCLUSION

The study highlights that pre-eclampsia complicated by impaired liver function significantly impacts maternal and fetal outcomes, with biochemical markers such as elevated bilirubin, SGPT, and LDH levels strongly correlating with adverse pregnancy outcomes. Despite 65% of cases resulting in no complications, fetal complications were observed in 20% of patients, emphasizing the need for vigilant monitoring and early intervention. Elevated serum uric acid levels were notably associated with fetal affection, suggesting its potential as a predictive marker. Spinal anesthesia demonstrated fewer complications compared to general anesthesia, underscoring its relative safety in managing such high-risk pregnancies. These findings underscore the critical need for comprehensive prenatal care, early detection of hepatic dysfunction, and context-appropriate anesthetic strategies to improve outcomes in resource-limited settings like Bangladesh.

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