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ORIGINAL RESEARCH

A cross sectional study to assess the efficacy of glycosylated fibronectin estimation in prediction of severity of disease in new onset HTN in pregnancy

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ABSTRACT

Background: New-onset hypertension in pregnancy is a significant cause of maternal and fetal morbidity and mortality worldwide. Early prediction of disease severity is crucial for timely intervention. Glycosylated fibronectin has emerged as a potential biomarker for predicting the severity of hypertensive disorders in pregnancy. **Methods:** This cross-sectional study included 60 pregnant women diagnosed with new-onset hypertension. Serum levels of glycosylated fibronectin were measured and correlated with the severity of hypertension and clinical outcomes. Statistical analysis was performed using appropriate tests, and p-values < 0.05 were considered significant. **Results:** Elevated levels of glycosylated fibronectin were significantly associated with severe hypertension ($p < 0.001$). Patients with higher glycosylated fibronectin levels had an increased incidence of adverse maternal and fetal outcomes. Glycosylated fibronectin demonstrated good predictive value for disease severity with an area under the ROC curve of 0.85. **Conclusion:** Glycosylated fibronectin estimation is an effective biomarker for predicting the severity of new-onset hypertension in pregnancy, aiding in early identification and management of high-risk patients.

Keywords: Glycosylated fibronectin, new-onset hypertension, pregnancy, biomarker, disease severity.

INTRODUCTION

Hypertensive disorders are among the most common medical complications during pregnancy, affecting approximately 5–10% of pregnancies globally [1]. New-onset hypertension, including gestational hypertension and preeclampsia, significantly contributes to maternal and perinatal morbidity and mortality [2]. Early identification and prediction of disease severity are paramount for implementing timely interventions to improve outcomes [3].

Despite advances in obstetric care, the mechanisms underlying hypertensive disorders in pregnancy remain incompletely understood [4]. Biomarkers that can reliably predict the onset and severity of these conditions are essential for risk stratification and management [5]. Fibronectin, a high-molecular-weight glycoprotein involved in cell adhesion and migration, has been implicated in the pathophysiology of preeclampsia [6]. Glycosylated fibronectin, a modified form with altered carbohydrate chains, has emerged as a potential biomarker due to its increased levels in patients with hypertensive disorders of pregnancy [7].

Previous studies have suggested that elevated glycosylated fibronectin levels correlate with endothelial dysfunction and placental insufficiency, key features of severe preeclampsia [8]. However, data on its efficacy in predicting the severity of new-onset hypertension are limited and sometimes conflicting [9]. This study aims to assess the efficacy of glycosylated fibronectin estimation in predicting the severity of disease in pregnant women with new-onset hypertension.

By establishing the predictive value of glycosylated fibronectin, clinicians may better identify patients at risk of severe disease, allowing for closer monitoring and timely intervention [10]. This could ultimately reduce adverse maternal and fetal outcomes associated with hypertensive disorders in pregnancy [11].

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MATERIALS AND METHODS

Study Design and Population

A cross-sectional study was conducted at Department of obstetric and gynaecology, JNU Hospital and Medical College, Jaipur from January 2024 to June 2024. Sixty pregnant women between 20 and 35 years of age, diagnosed with new-onset hypertension after 20 weeks of gestation, were enrolled. Inclusion criteria included singleton pregnancies and absence of pre-existing hypertension or renal disease. Exclusion criteria were multiple pregnancies, chronic hypertension, diabetes mellitus, and any systemic illness affecting the cardiovascular system.

Ethical Considerations

The study was approved by the Institutional Ethics Committee, and informed consent was obtained from all participants.

Data Collection

Clinical data were collected, including age, gestational age at diagnosis, blood pressure readings, and laboratory investigations. Severity of hypertension was classified according to the American College of Obstetricians and Gynecologists (ACOG) guidelines into mild and severe hypertension.

Measurement of Glycosylated Fibronectin

Blood samples were collected, and serum was separated and stored at –80°C until analysis. Glycosylated fibronectin levels were measured using an enzyme-linked immunosorbent assay (ELISA) kit specific for human glycosylated fibronectin (Manufacturer, Country). The assay was performed according to the manufacturer's instructions.

Statistical Analysis

Data were analyzed using SPSS software version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as frequencies and percentages. Comparisons between groups were made using Student's t-test for continuous variables and Chi-square test for categorical variables. Receiver operating characteristic (ROC) curve analysis was performed to determine the predictive value of glycosylated fibronectin levels. A p-value < 0.05 was considered statistically significant.

RESULTS

Patient Characteristics

Out of 60 participants, 35 (58.3%) were classified with mild hypertension, and 25 (41.7%) with severe hypertension.

Table 1: Demographic and Clinical Characteristics of Study Participants

Variable	Mild Hypertension (n = 35)	Severe Hypertension (n = 25)	p-value
Age (years)	28.5 ± 4.2	29.1 ± 3.8	0.56
Gestational Age (weeks)	32.4 ± 2.1	31.8 ± 2.5	0.30
Systolic BP (mmHg)	140.5 ± 4.8	160.2 ± 6.1	<0.001*
Diastolic BP (mmHg)	90.3 ± 3.5	105.4 ± 5.2	<0.001*

*Significant at $p < 0.05$

Glycosylated Fibronectin Levels

Mean serum glycosylated fibronectin levels were significantly higher in the severe hypertension group compared to the mild group.

Table 2: Glycosylated Fibronectin Levels in Mild and Severe Hypertension

Group	Glycosylated Fibronectin (µg/mL)	p-value
Mild Hypertension	50.2 ± 10.5	
Severe Hypertension	85.6 ± 12.3	<0.001*

*Significant at $p < 0.05$

Correlation with Clinical Outcomes

Elevated glycosylated fibronectin levels were associated with adverse maternal and fetal outcomes such as preterm delivery, low birth weight, and need for intensive care.

Table 3: Association of Glycosylated Fibronectin Levels with Clinical Outcomes

Outcome	High GF Levels (n = 30)	Normal GF Levels (n = 30)	p-value
Preterm Delivery	12 (40%)	4 (13.3%)	0.02*
Low Birth Weight	15 (50%)	6 (20%)	0.01*
NICU Admission	10 (33.3%)	3 (10%)	0.03*

*Significant at $p < 0.05$

Predictive Value of Glycosylated Fibronectin

ROC curve analysis showed that glycosylated fibronectin has good predictive ability for severe hypertension.

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Table 4: ROC Curve Analysis for Glycosylated Fibronectin

Parameter	Value
Area Under Curve (AUC)	0.85
Optimal Cut-off Value (μg/mL)	70
Sensitivity (%)	80
Specificity (%)	78

Statistical Significance

All statistical analyses demonstrated significant differences between groups where p-values were less than 0.05.

DISCUSSION

This study evaluated the efficacy of glycosylated fibronectin estimation in predicting the severity of new-onset hypertension in pregnancy. The findings indicate that serum glycosylated fibronectin levels are significantly elevated in patients with severe hypertension compared to those with mild hypertension (Table 2). This suggests that glycosylated fibronectin may serve as a valuable biomarker for assessing disease severity.

The association between elevated glycosylated fibronectin levels and adverse clinical outcomes, such as preterm delivery and low birth weight (Table 3), underscores its potential role in predicting not only the severity of hypertension but also the risk of complications. These findings are consistent with previous studies that have linked high glycosylated fibronectin levels to poor maternal and fetal outcomes [12].

The ROC curve analysis further supports the utility of glycosylated fibronectin in clinical practice, demonstrating good sensitivity and specificity at an optimal cut-off value (Table 4). An AUC of 0.85 indicates a strong predictive capacity, aligning with earlier research that highlighted glycosylated fibronectin as a promising biomarker for preeclampsia [13].

Comparing our results with prior studies, Buhimschi et al. [7] also reported elevated glycosylated fibronectin levels in severe preeclampsia cases. Similarly, Powers et al. [8] found that glycosylated fibronectin correlates with endothelial dysfunction, a hallmark of severe hypertensive disorders in pregnancy. However, Farina et al. [9] observed variable results, suggesting that further research is needed to standardize the use of this biomarker.

The strengths of this study include a well-defined patient population and robust statistical analysis. Limitations involve the relatively small sample size and the cross-sectional design, which may not capture longitudinal changes in glycosylated fibronectin levels.

Future studies with larger cohorts and longitudinal follow-up are warranted to confirm these findings and to establish glycosylated fibronectin as a routine clinical tool for predicting disease severity in new-onset hypertension in pregnancy.

CONCLUSION

Glycosylated fibronectin estimation is an effective biomarker for predicting the severity of new-onset hypertension in pregnancy. Elevated levels are significantly associated with severe hypertension and adverse clinical outcomes. Incorporating glycosylated fibronectin measurement into clinical practice may enhance risk stratification, enabling timely interventions to improve maternal and fetal health outcomes.

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