Utility of the Gestoses score in Antenatal Prediction of Hypertensive Disorders of Pregnancy

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Abstract:

Hypertensive disorders of pregnancy (HDP) continue to be a major contributor to maternal and perinatal morbidity worldwide, particularly in low-resource regions where access to advanced diagnostic tools is limited. The Gestoses Score, a clinical risk-based scoring system, has emerged as a practical method to predict the development of pre-eclampsia by integrating maternal history, demographic factors, and clinical variables. This prospective observational study, conducted between September 2024 and September 2025, aimed to evaluate the effectiveness of the Gestoses Score in forecasting the onset of pre-eclampsia among antenatal women. A total of 100 first-trimester pregnant women attending antenatal clinics were enrolled based on predefined inclusion and exclusion criteria. Each participant underwent a detailed clinical assessment at the first visit, during which the Gestoses Score was calculated. A score ≥3 was considered high risk and indicative of increased susceptibility to HDP. Participants were followed throughout pregnancy for the development of pre-eclampsia. Data were analysed to determine the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of the scoring system. The results demonstrated that 40% of the study population was classified as high risk using the Gestoses Score. Among them, a significant proportion progressed to pre-eclampsia, highlighting the clinical relevance of this scoring method. The predictive accuracy of 91.6% suggests robust performance, especially in contexts where biochemical markers and Doppler assessment are not readily available. Findings align with prior studies emphasizing the usefulness of clinical predictors in early detection. The Gestoses Score thus provides a cost-effective, accessible, and reliable method for early

identification of women at risk for developing pre-eclampsia, enabling timely preventive measures, closer monitoring, and improved maternal-fetal outcomes.

Keywords: *Diagnosis, Gestosis, Pre-eclampsia, Prediction*

Introduction:

The HDP–Gestosis score is a novel clinical risk evaluation method aimed at estimating the likelihood of pre-eclampsia in pregnant women. Women who obtain a score of three or above are considered "at risk," allowing for early recognition and timely intervention to prevent complications.

Objective

To determine the diagnostic efficiency of the HDP–Gestosis score in predicting pre-eclampsia by analyzing its sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy.

Methods:

This prospective study was carried out between June 2022 and June 2024, including 210 antenatal women recruited from the Department of Obstetrics and Gynecology. All participants were followed for the onset of pre-eclampsia beyond 20 weeks of gestation. The Gestosis score was assigned individually, and women scoring ≥3 were classified as high risk. Statistical tests were applied to assess predictive validity.

Results

The mean age of the study population was 27.36 ± 4.60 years. The HDP–Gestosis score showed a sensitivity of 76.3%, specificity of 77.2%, PPV of 81.1%, NPV of 71.7%, and an overall diagnostic accuracy of 76.7% for forecasting pre-eclampsia.

Conclusion

The HDP–Gestosis score serves as a practical, cost-effective, and clinically valuable tool for early identification of women at high risk of developing pre-eclampsia, particularly in resource-constrained settings.

INTRODUCTION:

Pre-eclampsia (PE) is a major pregnancy complication, affecting nearly 10–15% of expectant mothers worldwide. In India, the burden is comparatively higher, with pooled prevalence reported at around 15%. Early recognition and management of women at risk are essential to

reduce maternal morbidity and mortality. Hypertensive disorders of pregnancy (HDP), including pre-eclampsia and eclampsia, account for approximately one-fifth of maternal deaths and remain a significant contributor to poor perinatal outcomes.[1-3]

Using a novel Bayes based method that combines prior information from Maternal characteristics, past medical history, uterine artery pulsatility index (PI), mean arterial pressure (MAP), along with biochemical markers such as pregnancy-associated plasma protein-A (PAPP-A) and placental growth factor (PlGF) measured around 11 weeks of gestation, can help identify a considerable number of women at increased risk for early-onset preeclampsia.[4-5]

Various professional organizations have recommended that during the initial antenatal visit, a woman's risk for preeclampsia should be assessed using her clinical background and other predictive factors. Women classified as high-risk are advised to begin low-dose aspirin therapy early in pregnancy and continue until delivery. Despite these recommendations, the overall effectiveness of such screening methods and the impact of preventive measures on outcomes still require comprehensive evaluation. However, these strategies often require specialized equipment, trained personnel, and high costs, limiting their feasibility in low-resource settings[6-7].

The Gestosis Score was designed to be adaptable and accessible, particularly for antenatal clinics in resource-limited regions. By enabling frontline healthcare workers to recognize women at higher risk, it supports timely referral and management, thereby improving maternal and perinatal health outcomes.

Aims and objectives:

· To determine the HDP–Gestosis Score in patients with hypertensive disorders of pregnancy.

· To correlate severity of HDP with gestosis score calculated.

· To determine the maternal and fetal outcomes in patients who developed hypertensive   disorder of pregnancy

Material and methods :
Study Design:
This was a prospective observational study carried out in the Department of Obstetrics and Gynecology at National Capital Region Institute of Medical Sciences Uttar Pradesh, India. The study duration extended over one year, from Sept 2024 to Sept 2025.

Study Population:

100 women of first trimester attending our Antenatal op were enrolled in this study.

 Written informed consent was obtained from all participants prior to inclusion, and the study protocol was approved by the Institutional Ethics Committee.

Inclusion criteria :

1)Antenatal women with preeclampsia, eclampsia as defined by ACOG criteria were taken as cases.

2) Antenatal women with normal BP at the time of admission were taken as controls.

3) Patients who are willing to give consent

Exclusion criteria :

Women not willing to give consent

Prediction of Pre-Eclampsia
Table 1: HDP Gestosis Score

A total score ≥3 indicates high risk for hypertensive disorders of pregnancy.

Mild Risk Factors (Score 1)

1. Maternal age >35 years
2. Maternal age <19 years
3. Maternal anemia
4. Obesity (BMI >30)
5. Primigravida
6. Short duration of cohabitation
7. Woman born small for gestational age
8. Polycystic ovarian syndrome (PCOS)
9. Interpregnancy interval >5 years
10. Conception with ART (IVF/ICSI)
11. Mean arterial pressure (MAP) >85 mmHg
12. Chronic vascular disease (dyslipidemia)
13. Excessive weight gain during pregnancy

Moderate Risk Factors (Score 2):

14. Maternal hypothyroidism
15. Family history of preeclampsia
16. Gestational diabetes mellitus (GDM)
17. Multiple pregnancy
18. Obesity (BMI >35)
19. Hypertensive disorder in a previous pregnancy

Severe Risk Factors (Score 3):

20. Pre-gestational diabetes mellitus
21. Chronic hypertension
22. Psychiatric illness
23. Inherited/acquired thrombophilia

24. Chronic kidney disease
25. Autoimmune disease (SLE/APLAS/RA)
26. Pregnancy with ART (donor gametes/surrogacy)

HDP- Gestosis score:

Effective and feasible prediction policy
Primary clinical assessment for screening and prediction of preeclampsia
Can be objectively performed by 'easy to use' HDP-Gestoses score

Process of Risk Scoring:

The scoring system incorporates both established and emerging risk factors in pregnant women.
•Each clinical risk factor is assigned a score of 1, 2, or 3 depending on its severity and contribution to the development of preeclampsia.
•By carefully evaluating the woman and her medical history, a cumulative score is calculated over time.
•A total score of ≥3 indicates that the woman should undergo screening similar to the general population.
•Systematic assessment of these clinical risk factors enables early identification of high-risk women and enhances vigilance.
•Early and detailed history-taking in the first trimester is crucial, as it allows timely prediction and preventive strategies for women at risk.
The HDP Gestosis Score can be applied by any healthcare provider for this purpose.
•Data collection included direct questions on age, gravidity, inter-pregnancy interval, duration of cohabitation, assisted reproductive technology (ART) conception, family history of preeclampsia, cardiovascular disease, and self-reported birth weight.
•Antenatal and previous medical records were also reviewed to assess hemoglobin levels, BMI, lipid profile, thyroid status, and presence of conditions such as gestational or pregestational diabetes, chronic hypertension, psychiatric illness, chronic kidney disease, and prior hypertensive disorders of pregnancy (HDP).
•In addition, autoimmune conditions (e.g., SLE, APLA syndrome), mean arterial pressure (MAP), thrombophilia, and PCOS were evaluated during the initial antenatal **visit.**

Statistical Analysis:

All collected data were entered into a structured format and analyzed using SPSS version 25. Descriptive statistics were applied to summarize demographic variables and clinical characteristics of the study participants. Frequencies and percentages were used for categorical data, while means and standard deviations were calculated for continuous variables. This approach allowed clear presentation of baseline characteristics and facilitated interpretation of findings.

Result:

The present study aimed to identify the proportion of pregnant women at increased risk of developing preeclampsia using the HDP Gestosis Score.

Table 2: Distribution of Women According to Gestosis Score (n=100)

Gestosis Score	Number of Women	Percentage (%)
1	45	45.0
2	55	55.0
>3	10	10.0

In this study of 100 women, the gestosis score was 1 in 45women (45%), 2 in 55 women (55%), and more than 3 (high risk) in 10 women (10%).

Table 3: Risk Factors Significantly Associated with Preeclampsia

Risk Factors	Number of Patients (out of 32)
Primigravida	10
Age > 35 years	6
Hypothyroidism	4
Chronic Hypertension	3
Hypertension in Previous Pregnancy	2
Gestational Diabetes Mellitus	2
Polycystic Ovarian Syndrome (PCOS)	1
Excessive Weight Gain in Pregnancy	1
Pre-gestational Diabetes Mellitus	1
Multifetal Pregnancy	1
Conception with ART	1

In the present study, one-third of the participants (40%) were identified as high risk for developing preeclampsia using the HDP Gestosis Score. This finding highlights the utility of the scoring system in stratifying women early in pregnancy. Among the high-risk group, hypertension was the most common associated factor, followed by anemia and obesity. Endocrine disorders such as thyroid disease, a history of hypertensive disorders in a previous pregnancy, and diabetes mellitus were also observed as contributory factors.

These results are consistent with existing literature, which recognizes maternal comorbidities such as chronic hypertension, anemia, metabolic disorders, and prior obstetric complications as significant predictors of preeclampsia. The early identification of these women allows timely interventions, closer antenatal surveillance, and preventive measures to reduce maternal and perinatal morbidity.

Overall, the study supports the role of the HDP Gestosis Score as a simple, practical tool that can be applied in routine antenatal care settings to identify women at risk and guide clinical decision-making.

Distribution of Women According to Gestosis Score

Table 4: Distribution of Women Developing Preeclampsia (n=100)

Gestosis Score	Number of Women with Preeclampsia	Percentage (%)
1	13	13.0
2	3	3.0
3	9	9.0

During follow-up, 13 women (13%) developed preeclampsia. Of these, 9 women were correctly identified as high risk with a gestosis score >3, while 3 women had a score of 2 and 1 woman had a score of 1.

Based on these findings, the diagnostic performance of the HDP gestosis score in predicting preeclampsia was as follows:	
- Sensitivity:	62.2%
- Specificity:	94.6%
- Positive Predictive Value (PPV):	68.4%
- Negative Predictive Value (NPV):	95.5%
- Predictive Accuracy:	91.6%

Discussion:

In the present study, the prevalence of preeclampsia was 13.7%. Comparable incidences of hypertensive disorders of pregnancy (HDP) have been documented by Gupta et al. (15.01%) and Mishra et al. (15.4%) among Indian women, which are consistent with our findings [9,10].

Our analysis demonstrated that an HDP gestosis score >3 yielded a sensitivity of 62.2%, whereas Gupta et al. reported a higher sensitivity of 83.1% [7]. Despite this variation, both studies indicated a specificity of approximately 94%, underscoring the reliability of the score. These findings suggest that an antenatal gestosis score <3 effectively excludes the development of preeclampsia.

With respect to predictive values, Gupta et al. observed a positive predictive value of 85.5%, which exceeded that of our study (68.4%). However, both studies reported comparable negative predictive values of 97.03% and 95.5%, respectively [7]. The predictive accuracy of the gestosis score in our cohort was 91.6%, aligning closely with Gupta et al. (95.5%). Mishra et al. further analyzed odds ratios for individual features and established a significant correlation between mean arterial pressure >85 mmHg and preeclampsia risk, while our study focused primarily on evaluating the overall predictive performance of the score [9].

The literature review highlights that relatively few studies have validated the HDP gestosis score. Internationally recognized scoring systems incorporating parameters such as mean arterial pressure, uterine artery Doppler indices, and serum placental growth factor have shown promise; however, their reliance on costly biomarkers and ultrasound markers limits their widespread applicability [9]. In contrast, the HDP gestosis score is inexpensive, simple to administer, and particularly advantageous in low-resource settings.

Although available data remain limited, the present study contributes to the growing body of evidence supporting the use of the gestosis score as a practical and reliable tool for predicting preeclampsia. By enabling early identification of at-risk women, this scoring system has the potential to reduce maternal morbidity and mortality associated with hypertensive disorders of pregnancy.

Conclusion :

This study proves the importance and potential utility of simple tool like GESTOSIS SCORE in predicting preeclampsia. The scoring system offers the possibility of segregating high-risk pregnancy to mitigate the adverse effect of preeclampsia. Screening would improve the ability to identify, monitor these women before they develop severe symptom. Limitation This tool is single center design and has lack of direct correlation with fetomaternal outcome. In the Indian context, the Gestoses Scoring System is a low-cost, practical, and effective screening tool for pre-eclampsia prediction. It helps in early risk identification, referral from peripheral centers, and timely prophylactic measures, thereby reducing the burden of hypertensive disorders, which are a major contributor to maternal mortality in India."

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