



ASSESSMENT OF PROGNOSTIC PERFORMANCE OF HDP-GESTOSIS FOR PRE-ECLAMPSIA PREDICTION IN PREGNANT WOMEN : A PROSPECTIVE ANALYSIS STUDY.

Obstetrics & Gynaecology

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ABSTRACT

Background: Pre-eclampsia is a critical hypertensive disorder in pregnancy that can lead to severe maternal and fetal complications. Early identification of at-risk pregnant females is essential for effective management and improved outcomes. Assessment of risk factors and scoring them using the HDP gestosis score is claimed to identify the "at risk" patients so as to provide special attention and care. **Methods:** A total of 300 pregnant women were included in this prospective cross sectional observational study which was conducted in the Department of Obstetrics and Gynaecology PBM Hospital Bikaner, over a period of 1 year. Participants were categorized into two groups based on their HDP-Gestosis score: Group A (score <3) and Group B (score ≥3). Follow-up evaluations were conducted at multiple gestational weeks to monitor the development of pre-eclampsia and related complications. Statistical analyses were performed to compare outcomes between the two groups. **Results:** Statistical analysis indicated that the HDP-Gestosis score effectively stratified the risk of pre-eclampsia, with significant differences in maternal and fetal outcomes observed between the two groups. In our study, group B exhibited significantly higher systolic and diastolic blood pressure, greater incidence of albuminuria, and a higher incidence of preeclampsia and increased rate of incidence of cesarean deliveries. **Conclusion:** The HDP-Gestosis score is a valuable tool for predicting pre-eclampsia risk in pregnant women. By identifying high-risk individuals, healthcare providers can implement timely interventions, thereby enhancing maternal and fetal health outcomes.

KEYWORDS

Pre-eclampsia, HDP-Gestosis score, pregnancy, risk assessment, maternal health, fetal health.

INTRODUCTION

Pre-eclampsia is defined as de novo blood pressure elevation to systolic blood pressure of 140 mm of Hg or more and diastolic blood pressure of 90 mm of Hg or more recorded on two occasions at least four hours apart, after 20 weeks of gestation coupled with proteinuria¹. Proteinuria is defined by urinary excretion of >300mg protein in a 24 hour period or urinary protein: creatinine ratio ≥/ =30 mg/mmol. Preeclampsia is a common complication that occurs during pregnancy affecting 4.6% of pregnancies worldwide and 1.8-16.7% of pregnancies in developing countries (11% prevalence rate in India as reported in an Indian study)^{2,3}.

Despite significant advances in prenatal care, its pathogenesis remains uncertain and early identification is significantly important but remains difficult. Pre-eclampsia is the primary cause of maternal complications (such as abruptio placentae, disseminated intravascular coagulation, pulmonary oedema, acute renal failure, heart rhythm disturbances, and effects on other organs like liver, brain, and lungs) as well as fetal complications (like fetal growth retardation, preterm delivery, intrauterine fetal demise and birth asphyxia)⁴.

Maternal risk factors for preeclampsia include advanced age, high parity, ethnic background, and various health conditions such as hypertension and diabetes. Scoring systems have been developed to predict preeclampsia, particularly in resource-limited settings, to facilitate early detection and intervention^{5,6}. HDP-gestosis score is a risk scoring system (score 1,2,3) based on risk factors for developing pre-eclampsia. HDP-gestosis score classifies the risk factor into a score of 1, 2 or 3. When the total score is equal to or greater than 3, the pregnant female is considered —AT RISK FOR "HDP"⁷.

According to the 2019 National Institute For Care Excellence (NICE) guidelines a pregnant is classified as women at high risk for preeclampsia if she has a history of hypertensive disease during a previous pregnancy or if she has a maternal illness, such as diabetes, autoimmune diseases, chronic kidney disease or chronic hypertension. The International Society For Study Of Hypertension In Pregnancy (ISSHP) recognizes that hypertensive disorders of pregnancy include both new onset hypertension (gestational hypertension, Preeclampsia) and chronic hypertension (high blood pressure prior to pregnancy or elevated blood pressure before a gestational age of 20 weeks).

HDP raises long-term cardiovascular risks for affected mothers and their children^{8,9}. HDP patients have a twofold greater prevalence of cardiovascular issues and persistent hypertension, with substantial social and personal costs¹⁰. Taking into account the risk factors associated with preeclampsia a risk model has been developed. HDP-Gestosis score, developed by the GESTOSIS organization, evaluates preeclampsia risk using maternal factors like age, BMI, blood pressure, and history of hypertension. This tool helps classify pregnant women into risk categories to guide targeted interventions and monitoring.

Aims And Objectives

Aim and Objectives of current study were to assess the prognostic performance of HDP-gestosis score (Hypertensive disorders of pregnancy) for prediction of preeclampsia in pregnant women. To estimate the HDP-gestosis of pregnant women. To estimate the incidence of preeclampsia.

METHODS

The study design was a hospital-based prospective study, conducted in the Department of Obstetrics and Gynaecology at PBM Hospital, Bikaner. The study spanned one year, from June 2023 to May 2024. The target population included pregnant females attending the outpatient department of the Obstetrics and Gynaecology Department at PBM Hospital. A total of 300 cases were enrolled in the study, following proper counseling and written consent.

The inclusion criteria for participation were: Patients aged 18 years or older, those willing to participate, and those with a gestational age of approx 20 weeks or more normotensive women.

Exclusion criteria included individuals who refused to give consent, pregnant patients with chronic diseases, those with malignancies or liver diseases, and patients with a history of alcohol or substance abuse and smoking. Consecutive sampling was employed to select the study participants.

Sample Size:

A sample size of 300 pregnant females required at 80% study power and an alpha error of 5%. MEDCALC statistical software was used for the sample size. The prevalence of preeclampsia in pregnant women is

11.00% as per the reference article³

* Alpha 5%

* Beta 20%

* Power of study -80%

* N=4 pq/12

A sample size of 300 cases were taken after fulfilling the eligibility criteria.

The subjects were divided into two groups based on HDP gestosis score- Group A (score <3) and Group B (score ≥3) HDP-gestosis score. 150 cases were enlisted in each group. Both groups were followed on 24,30 ,34,36,38,40 weeks and closely observed for development of pre-eclampsia, maternal and fetal complications and mode of delivery.

RESULT

Table 1: Distribution Of Subjects According To Age .

Age Distribution (Years)	Group A		Group B	
	N	(%)	N	(%)
<21	1	00.67	4	02.67
21-25	79	52.67	80	53.33
26-30	42	28.00	38	25.33
31- 35	24	16.00	20	13.33
>35	4	02.67	8	05.33
Total	150	100	150	100
Mean ± Sd	24.10 ± 3.26		25.22 ± 5.12	
p value	0.040*			

Majority of the subjects were of 21-25 years age in group A (52.67%) and group B (53.33%) whereas minimum were of >35 years age in group A (2.67%) and group B (5.33%). The mean age in group A was 24.10 ± 3.26 yrs and in group B it was 25.22 ± 5.12 years, and the difference between two groups was significant with regards to age distribution. (p=0.040*)

Table 2: Comparison Of Systolic & Diastolic Bp On Follow Up Visits.

Antenatal Visit (Weeks)	Systolic BP (mm of Hg)		P Value	Diastolic BP (mm of Hg)		P Value
	Group A (Mean ±sd)	Group B (Mean ±sd)		Group A (Mean ±sd)	Group B (Mean ±sd)	
24	106.5 ± 5.25	106.45 ± 5.12		70.12 ± 1.56	70.15 ± 1.50	
30	107.25 ± 4.35	107.50 ± 4.60	0.659	70.5 ± 3.19	70.95 ± 3.25	0.227
34	107.90 ± 8.21	108.36 ± 7.55	0.645	70.9 ± 3.56	71.50 ± 6.43	0.318
36 (N _a = 148)	124.50 ± 5.69	128.45 ± 9.56	0.0001**	77.18 ± 6.15	79.50 ± 7.22	0.003*
38 (N _a = 148) (N _b = 146)	125.90 ± 11.89	132.35 ± 12.86	0.0001**	79.44 ± 8.10	82.65 ± 11.75	0.007*
40 (N _a = 19) (N _b = 11)	117.15 ± 5.26	128.45 ± 13.75	0.003*	75.05 ± 3.52	81.50 ± 10.60	0.019*

In our study, systolic blood pressure (BP) showed a significant rise in group B compared to group A at 36, 38, and 40 weeks of gestation, with the increase in diastolic BP also being significantly greater in group B at 36, 38, and 40 weeks. At 24 weeks, BP measurements were comparable between the groups, and the differences became statistically significant only in the later follow-ups.

Table 3: Comparison Of Incidence Of Albuminuria

Urine Albumin	Group A		Group B		P value
	+	-	+	-	
24	0	150	0	150	-
30	0	150	0	150	-
34	0	150	4	146	0.131
36 (N _a = 148)	2	148	8	140	0.103
38 (N _a = 148) (N _b = 146)	8	140	37	109	0.0001*
40 (N _a = 19) (N _b = 11)	0	19	2	9	0.196

In our study, in group A 10 subjects had urine albumin positive during the study period, 2 at 36 week and 8 at 38 weeks. In group B, total 51

had urine albumin positive, out of them 4 on 34 weeks, 8 on 36 weeks, 37 on 38 weeks and 2 on 40 weeks. The incidence of albuminuria was higher in group B. The difference in both groups was statistically significant at 38 weeks (p=0.028).

Table 4: Comparison Of Incidence Of Preeclampsia.

Antenatal Visit (Weeks)	Incidence of Preeclampsia Group A		Group B	
	Present (N)	Absent (N)	Present (N)	Absent (N)
24	0	150	0	150
30	0	150	0	150
34	0	150	4	146
36 (N _a = 148)	4	146	10	138
38 (N _a = 148) (N _b = 146)	9	139	39	107
40 (N _a = 19) (N _b = 11)	0	19	3	8
Total Incidence of preeclampsia	13	137	56	94
P value	0.0001**			

In our study, total incidence of preeclampsia was found to be in 69 subjects out of which in group A the incidence of preeclampsia was in 13 subjects whereas 56 subject in group B. The incidence of preeclampsia was higher in group B with statistically significant value of p(p=0.0001).

Table 5: Distribution Of Subjects According To Their Mode Of Delivery

Mode of Delivery	Group A		Group B		P Value
	No.	%	No.	%	
Normal Delivery	125	83.33	109	72.67	0.037**
LSCS	25	16.67	41	27.33	

Maximum 125 subjects were delivered vaginally in group A and 25 underwent LSCS whereas 109 in group B were delivered vaginally and 41 underwent LSCS. The difference between two groups was statistically significant (p=0.037).

Table 6: Prognostic Performance Of HDP Gestosis Score For Prediction Of Preeclampsia.

HDP-GESTOSIS SCORE	Preeclampsia present	Preeclampsia absent
≥3	56	94
<3	13	137

In our study HDP- gestosis score >3 carried a sensitivity of 81.15% and specificity of 60.00% . Positive predictive value (PPV) of score >3 was 37.33% and negative predictive value (NPV) 91.33% and diagnostic accuracy of gestosis score >3 was 64.33%.

DISCUSSION

Majority of the subjects were of 21-25 years age in group A (52.67%) and group B (53.33%) whereas minimum were of >35 years age in group A (2.67%) and group B (5.33%). The mean age in group A was 24.10 ± 3.26 yrs and in group B it was 25.22 ± 5.12 years (p=0.040*). These results were found similar with the previous studies as Sarkar Shamim Ahmed¹¹ et al (average age 26.03±5.77 yr), Ramesh et al¹² where an OR – 3.8 in age <20 year was found. Highest number of cases in 21 – 25 years age group and mean age around 24 years could be related to average age of marriage in india is lower (20 – 49 yrs) and average age of child bearing is 21.3 years then that of foreign countries. Mean systolic BP in group A at 24 weeks period of gestation was 106.5 ± 5.25 and 106.45 ± 5.12 in group B and the difference in both groups was statistically insignificant. On subsequent follow up, the mean systolic BP was increased in both groups. Rise in BP was higher in group B but statistically insignificant at 34 weeks. There was statistically significant rise in Blood pressure levels in group B at 36, 38 and 40 weeks follow up. Mean diastolic BP in group A was 70.12 ± 1.56 and 70.15 ± 1.50 in group B at 24 weeks and the difference in both groups was statistically insignificant. On subsequent follow up, the mean diastolic BP was increased in both groups. The rise was higher in group B and the difference in both groups was statistically significant at 36 (p=0.003), 38 weeks (p=0.007) and 40 weeks (p=0.019). Similar to study done by Magee et al¹³ where severe hypertension (≥160/110 mm Hg) developed in 40.6% of the women in the less than control group and 27.5% of the women in the control group (P<0.001). Aparna

Rajesh et al (2020)¹⁴ also reported a significant difference in rise in blood pressure on follow up visits. These results are significant and comparable with previous studies by Shikha Pandey et al.¹⁵

In group A 10 subjects had urine albumin positive during the study period, 2 at 36 week and 8 at 38 weeks. In group B, total 51 had urine albumin positive, out of them 4 on 34weeks, 8 on 36 weeks, 37 on 38 weeks and 2 on 40 weeks. The incidence of albuminuria was higher in group B. The difference in both groups was statistically significant at 38 weeks ($p=0.028$).

Total incidence of preeclampsia was found to be 69, out of which in group A the incidence of preeclampsia was 13 whereas 56 in group B. The incidence of preeclampsia was higher in group B and difference between two groups was statistically significant ($p=0.0001$). Similarly Priya Khanijo et al. (2023)¹⁶ found that the incidence of pre-eclampsia in the present study cohort was 26.7%. Also Syeda Tuba Imam et al. (2023)¹⁷ found that pre-eclampsia developed in 17.43% ($n=19$) of participants. Also Meeta Gupta et al. (2022)¹⁸ found that Pre eclampsia was diagnosed in 15.01% ($n=71$) of participants.

Maximum 125 subjects were delivered vaginally in group A and 25 underwent LSCS whereas 109 in group B were delivered vaginally and 41 underwent LSCS. The difference between two groups was statistically significant ($p=0.037$).

We found that HDP- gestosis score ≥ 3 carried a sensitivity of 81.15% and specificity of 60.00% . Positive predictive value (PPV) of score ≥ 3 is 37.33% and negative predictive value (NPV) 91.33% and diagnostic accuracy of this is 64.33% . Similarly Priya Khanijo et al. (2023)¹⁶ found that the sensitivity of gestosis score ≥ 3 was 84.38% (67.2194.72%) and specificity was 93.18% (85.75-97.46 %). The positive predictive value was 81.82% (67.2%-90.81%), and the negative predictive value was 94.25% (87.98 - 97.35%). The diagnostic accuracy of the gestosis score was 90.83%. Also Ranu Manhar et al. (2023)¹⁸ observed that the sensitivity of gestosis score to predict Preeclampsia was 50%, subjects who had gestosis score of <3 were 178 (89%) and out of these subject 18 (10.11%) developed PE. Hence the specificity of gestosis score 96.43%. The PPV & NPV were 72.73% & 91.11% respectively. Also Syeda Tuba Imam et al. (2023)¹⁷ found that the sensitivity, specificity, PPV, NPV, and diagnostic accuracy of HDP-gestosis score for predicting pre- eclampsia were respectively 86.66%, 96.49%, 86.91%, 97.98% and 96.12%. Also Meeta Gupta et al. (2022)¹⁹ found that the sensitivity, Specificity, PPV, NPV, and Diagnostic accuracy of HDP-gestosis scores for predicting Pre-eclampsia were respectively 83. 1%, 97.51%, 85.51%, 97.03% and 95.35%.

CONCLUSION

The innovative early marker known as the gestosis score can anticipate the onset of pre-eclampsia and provide patients with prompt treatment, hence reducing the negative outcomes. Gestosis score (≥ 3) carried sensitivity, specificity, PPV, and NPV of 81.15%, 60.00%, 37.33%, and 91.33%, respectively, for predicting the development of Pre-eclampsia. Overall, it seems to be a novel early marker with diagnostic accuracy of 64.33% for prediction of the development of Pre-eclampsia. This can be useful in clinical settings where identifying high risk individuals is crucial. The overall moderate diagnostic accuracy implies that it may not be sufficient on its own for definitive diagnosis. It may be most useful in conjunction with other diagnostic tools and clinical judgement. HDP- gestosis score had limitations in its current form. Identification of the risk factors will enhance the ability to diagnose and monitor women likely to develop preeclampsia before the onset of disease for timely interventions and better maternal and fetal outcomes.

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