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Original Research Article

Improvement in the cases of hypertensive disorder of pregnancy with help of HDP-gestosis score

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ABSTRACT

Background: An assessment tool for the risk of pre-eclampsia is the HDP-gestosis score, which has a range of scores from 1 to 3. A pregnant woman is classified as "at risk for pre-eclampsia" and treated appropriately if her overall score is 3 or higher. In order to predict pre-eclampsia, it is necessary to assess the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of the HDP-gestosis score.
Methods: From January 2022 to December 2022, 109 pregnant patients who presented at the obstetrics and gynaecology department were included in this prospective research. The patients' risk of developing pre-eclampsia was evaluated after 20 weeks of pregnancy. We collected information on the patient's age, gravida, obstetric history, menstrual cycle regularity, polycystic ovarian disease history, length of marriage, parity, prior medical and surgical intervention, prior/current pharmaceutical use, and family history. Gestosis score was determined and grouped into three risk categories: mild (score of 1), moderate (score of 2), and high risk (score of 3). For predicting the onset of pre-eclampsia, the HDP-gestosis score's sensitivity, specificity, PPV, NPV, and diagnostic accuracy were assessed.
Results: The mean age, gestational age, and BMI of the women were 25.71±5.9 years, 11.9±2.19 weeks, and 24.9±3.6 kg/m^2, respectively. The gestosis score was 2 in 47.70% (n=52) of the participants, 1 in 38.53% (n=42), and ≥3 in 13.77% (n=15) of the women. Pre-eclampsia developed in 17.43% (n=19) participants. The sensitivity, specificity, PPV, NPV, and diagnostic accuracy of HDP-gestosis score for predicting pre-eclampsia were 86.66%, 96.49%, 86.91%, 97.98% and 96.12%, respectively.
Conclusions: Gestosis score is a brand-new early marker for pre-eclampsia development that enables patients to receive quick care, reducing the negative effects.

Keywords: Diagnosis, Gestosis, Pre-eclampsia, Prediction

INTRODUCTION

Pre-eclampsia (PE), one of the most frequent pregnancy problems, affects 4.6% of pregnancies globally and 2-17% of pregnancies in underdeveloped nations.[1,2] After 20 full weeks of pregnancy, it is recognised by systolic blood pressure (SBP) and diastolic blood pressure (DBP) more than 140 mm Hg and 90 mm Hg, correspondingly.

PE is the leading cause of perinatal (foetal growth retardation, preterm deliveries, and foetal deaths) as well as maternal (abruptio placentae, disseminated intravascular coagulation, pulmonary oedema, acute renal failure, heart rhythm disturbances, and impacts on some other organs like liver, brain, and lungs) complications globally.[3]

The severity of the illness continues to confound us, making it difficult to employ early-stage prediction indicators to detect pregnant women who are likely to acquire PE and initiate the necessary preventative steps for its prevention and treatment. According to a research

conducted in India, the country's total pooled prevalence of PE was 11%.[4]

A wide range of maternal risk factors, including older age, parity, comorbidities, family background, prior personal history, ethnic background, as well as investigative indicators like thyroid profile, uterine artery Doppler velocimetry, PAPP-A levels, placental IGF levels and specific systemic conditions, have indeed been formed to be linked positively with both the advancement of PE.[5]

A straightforward risk model called the HDP-gestosis score for efficient PE screening and prognosis. This grade considers all known and potential risk factors for the pregnant lady. The severity of each clinical risk factor's role in the onset of PE is indicated by a score of 1, 2, or 3. A comprehensive history and assessment of the lady yield a final score. A pregnant woman is classified as "at risk for PE" and treated appropriately if her overall score is 3 or higher.

The main objective of this research was to observe the positive impact of gestosis score in early detection of PE prone females attending ANC-OPD at JLNMCH.

Hypertension during pregnancy

PE/eclampsia, gestational hypertension (GH), chronic hypertension, and PE/eclampsia variations superimposed over chronic hypertension are the four types of hypertensive diseases during pregnancy (HDP).

PE

PE has been described as de novo blood pressure (BP) elevations (SBP of 140 mm Hg or more or DBP of 90 mm Hg or more on two separate occasions at least 4 hours off from each other) after 20 weeks of pregnancy combined with proteinuria (300 mg or more per 24 hours of urine sample or protein/creatinine ratio of 0.3 mg/dL or more or dipstick reading of 2+). PE along with seizures is known as eclampsia.[6,7]

GH

De novo hypertension that appears at more than 20 weeks without PE-like symptoms is GH.

Chronic hypertension

Early 20 weeks of pregnancy or after 12 weeks after delivery, elevated blood pressureis called chronic hypertension.

Chronic hypertension with PE superimposed

It is increased blood pressure together with newly developed proteinuria or other end-organ dysfunction.

METHODS

A total 109 patients who came to the obstetrics and gynecology department attending ANC-OPD at JLNMCH, during 12 months, from January 2022 to December 2022, were included in prospective research.

Inclusion criteria

Patients aged over 18 and scheduled births with the first prenatal appointment during the first 11 weeks of pregnancy were included.

Exclusion criteria

Patients who were expecting and had COVID-19 illness, drug abuse, cancer, liver disease, alcohol consumption, or smoking habits were excluded.

Table 1: HDP-gestosis score.

Risk factors	Score
Age >35 years	1
Age <19 years	1
Maternal anaemia	1
Obesity (BMI >30)	1
Primigravida	1
Short duration of sperm exposure (cohabitation)	1
Woman born as small for gestational age	1
Family history of cardiovascular disease	1
Polycystic ovary syndrome	1
Inter pregnancy interval more than 7 years	1
Conceived with assisted reproductive (IVF/ ICSI) treatment	1
MAP > 85 mm of Hg	1
Chronic vascular disease (dyslipidemia)	1
Excessive weight gain during pregnancy	1
Maternal hypothyroidism	2
Family history of preeclampsia	2
Gestational diabetes mellitus	2
Obesity (BMI > 35 kg/m^2)	2
Multifetal pregnancy	2
Hypertensive disease during previous pregnancy	2
Pregestational diabetes mellitus	3
Chronic hypertension	3
Mental disorders	3
Inherited/acquired thrombophilia	3
Maternal chronic kidney disease	3
Autoimmune disease (SLE/APLAS/RA)	3
Pregnancy with assisted reproductive (OD or surrogacy)	3
Treatment for hypertensive disease of pregnancy	3

All patients were required to sign a written consent. For the research, Institutional Ethical Approval was received.

Following a standard clinical obstetric examination per hospital protocol, a thorough demographic background regarding age, gravida, obstetric history, menstrual cycle regularity, polycystic ovarian disease history, length of marriage, parity, past medical and surgical interference, and previous/current medication was obtained. Based on the body mass index calculation, height and weight were assessed. During the antenatal visit (between 11 and 18 weeks of gestation), a venous blood sample (5 ml) had been taken to evaluate the patient's complete blood counts, thyroid profile, blood sugar levels, blood grouping, and autoantibodies, which also included anti-TPO, antinuclear antibody (ANA), rheumatoid factor, anti-dsDNA, SS-A, and SS-B antibodies for the purpose of determining the precise diagnosis of autoimmune conditions.

With the help of Table 1, the gestosis score was computed and divided into three categories: mild (score of 1), moderate (score of 2), and high risk (score of equal to or greater than 3) for the development of pre-eclampsia. From the history and the results of the investigations, the gestosis score's parameters were all evaluated, and for each patient, a total score was put in the master chart. Also, there is an app which can also predicts HDP-gestosis score can be used by interns (https://play.google.com/store/apps/details?id=hdp.gestosis.score).

Measures of results

The end results were the percentage of pregnant women with "at high risk" gestosis scores and those who experienced PE.

SPSS (statistical package for the social sciences) version 21.0 was used to analyse the final data, which were entered into a Microsoft Excel spreadsheet. Statistical significance was defined as a p value 0.05.

Quantitative analysis

Frequency figures or percentages with mean (SD) and median values were used to show the data. The connection among variables were evaluated using the Fisher's Exact test or the Chi square test. Determined were the HDP-gestosis score's sensitivity (Sn), specificity (Sp), PPV, NPV, and diagnostic performance for predicting the onset of PE. Statistics were deemed significant at $p<0.05$.

RESULTS

Demographic result

The mean age, gestational age, and BMI of the women were 25.71±5.9 years, 11.9±2.19 weeks, and 24.9±3.6 kg/m^2, respectively.

Table 2: Demographics.

Demographic characteristics	Mean±SD
Age (years)	25.71±5.9
Gestational age (in weeks)	11.9±2.19
Primigravida (%)	66.72
Multigravida (%)	33.28
BMI (kg/m^2)	24.9±3.6
Systolic blood pressure (mm Hg)	116.8±12.4
Diastolic blood pressure (mm Hg)	75.8±6.7

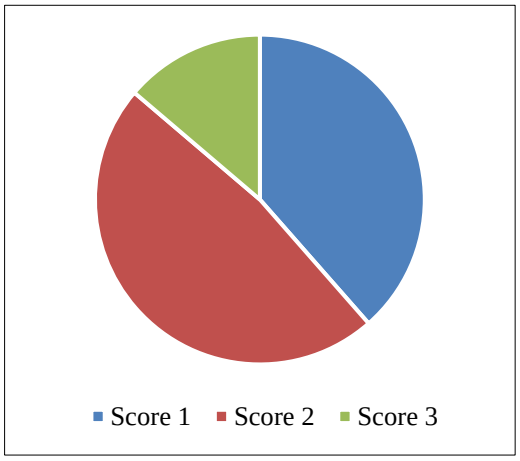

Figure 1: Distribution of gestosis score.

The mean SBP and DBP were 116.8±12.4 and 75.8±6.7 mm Hg, respectively. 66.72% of the women were primigravida, and 33.28% were multigravida.

The gestosis score was 2 in 47.70% (n=52) of the participants, 1 in 38.53% (n=42) , and ≥3 in 13.77% (n=15) of the women.

Among the 19 women developing pre-eclampsia, 13 were correctly predicted by HDP-gestosis score ≥3, while among the remaining 5 cases of PE, had HDP-gestosis score of 2 and one patients had HDP-gestosis score of 1.

Table 3: Accuracy of gestosis score.

Variables	Sensitivity (95% CI)	Specificity (95% CI)	AUC (95% CI)	PPV (95% CI)	NPV (95% CI)	Diagnostic accuracy (%)
Gestosis score ≥3	86.66	96.49	0.9	86.91	97.98	96.12

DISCUSSION

PE was prevalent in our sample at 17.43%. PE rates were lower in developed nations like Sweden, at 3.98%. According to Mishra et al 15.4% of Indian women had HDP.[8] PE often varied from 4 to 16% and was particularly prevalent in underdeveloped nations.

The research was crucial for increasing public knowledge of PE prevalence and the potential use of a straightforward scoring system for PE prediction, which allowed for more effective patient care and the reduction of PEs negative effects.

We discovered that a score of ≥3 or higher on the HDP-gestosis scale had a sensitivity of 86.66% for diagnosing PE. This was still relevant since high numbers for screening might be significant from a managerial standpoint.

Given that an optimal screening test must compromise between sensitivity and specificity, the HDP-gestosis score (≥3) appeared to be a stronger indicator of PE. Nevertheless, those who were at intermediate risk (HDP-gestosis score=2) may choose to take preventative steps and undergo routine monitoring.

Numerous mechanisms, including arterial stiffening, uterine vessel compliance and endothelial dysfunction, placental functioning, placental maladaptation, depletion of maternal nutrients, maternal inflammatory response, increased lipid oxidation products or decreased levels of antioxidants, antipaternal immune response, and genetic or epigenetic influences, underlie the increased risk for developing pre-eclampsia in connection with these variables.

The research had merit in that it supported a score system that may be used often in obstetric practise. The original study single-center design and lack of a correlation between fetomaternal outcomes and gestosis score must always be taken into consideration when interpreting the study's findings.

CONCLUSION

In predicting the onset of PE, gestosis score (≥3) had sensitivity, specificity, PPV, and NPV of 86.66%, 96.49%, 86.91%, 97.98% and 96.12%, respectively. Altogether, it appears to be a unique early signal with diagnostic specificity of 95.35 percent for prediction of the onset of PE, enabling for appropriate patient care and reducing the negative effects.

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