

A retrospective observational study on HDP gestosis score as a predictor of PIH

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ABSTRACT

Objectives: To assess the association of various risk factors enclosed in HDP gestosis score with the development of pregnancy induced hypertension. **Methodology:** This study was done at Sri Guru Ram Das Institute of Medical sciences and Research on patients who developed PIH (Pregnancy induced hypertension) from January 2020 to December 2020. Patients were analysed according to gestosis score given by Indian gestosis association. Based on elaborate history, clinical examination and investigations gestosis score was calculated. **Results:** Factors that have been found to have statistical significance in the development of HDP in the terms of p value < 0.05 are maternal anemia and primigravida. There were 17 patients who developed preeclampsia and 4 patients developed eclampsia. The major risk factors in patients with eclampsia were primigravidas with mild - moderate anaemia with short duration of co - habitation. Maximum patients who developed preeclampsia and eclampsia had gestosis score of >3 but there were 2 such patients who had gestosis score of 2 but still developed eclampsia. Patients who developed PIH, 11 patients have gestosis score of <3, 39 patients have gestosis score >3. One eclamptic patient with gestosis score of 4 suffered subacute intracranial haemorrhage and 1 preeclamptic patient with gestosis score 5 developed post partum cardiomyopathy. **Conclusion:** Adolescent primigravidas are more prone for eclampsia, the severe form of disease. Avoiding early marriage and explaining need for contraception to this group can reduce adolescent pregnancies and its dreaded complications. Gestosis score can be used as an effective predictor of PIH, as it is simple and cost-effective.

Keywords: Gestosis, HELLP, post partum cardiomyopathy, subacute intracranial haemorrhage, primigravida, maternal anaemia.

Pregnancy induced hypertension (PIH) is a common and important medical problem. It complicates about 5% of all pregnancies worldwide¹, ranks second to haemorrhage (27%) as a specific direct cause of maternal death. In the current scenario, preeclampsia/ eclampsia related morbidity and mortality appears to be increasing over the years. Thus, necessary steps have to be taken to hasten the reduction of maternal mortality.

HDP includes: ² Gestational hypertension: Blood pressure $\geq 140/90$ mmHg, detected beyond 20 weeks of gestation and returns to normal within 42nd postpartum day and is not associated with any other features of preeclampsia.

Chronic hypertension: Known case of hypertension or a case of hypertension detected before 20 weeks of gestation in absence of neoplastic trophoblastic disease and multiple pregnancies.

Preeclampsia: It is a multisystem inflammatory disorder beyond 20 weeks of pregnancy with significant proteinuria characterized by de novo onset of hypertension (BP $\geq 140/90$ mmHg). More recently, atypical variant of preeclampsia is recognized which is accompanied by neurological, hematological, hepatic, renal manifestations or fetal growth restriction, in absence of proteinuria.

Eclampsia: It is occurrence of seizures in association with

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preeclampsia. It can also occur as atypical eclampsia.

Superimposed preeclampsia: it is the occurrence of preeclampsia in women with chronic hypertension.

Keeping the disease burden in view, universal screening is recommended by FIGO (International Federation of Gynaecology and Obstetrics).³ FIGO recommends one step procedure for preeclampsia screening. This includes maternal risk factors, measurement of mean arterial pressure (MAP), serum placental growth factors (PLGF) and uterine artery pulsatility index (UTPI)^{4, 5}, due to lack of resources the baseline screening test should be a combination of maternal risk factors with MAP.

Currently, approach to screening for preeclampsia was developed by National Institute for Health and Clinical Excellence (NICE) and American College of Obstetrics and Gynaecology (ACOG) to identify risk factors from maternal demographic characteristics and medical history⁶. NICE and ACOG guidelines have a good detection rate of early onset preeclampsia where the resources are limited and non-availability of biomarkers is an issue. Also, a simple structured risk model has been restructured as HDP Gestosis Score by Indian Gestosis Association⁷ for Indian subcontinent (table 1). The mild, moderate and severe risk factors for Indian population are quantified as 1, 2 and 3 respectively. Total of ≥ 3 score, pregnant women is labelled as "At Risk of HDP".

Thus, our study aims to correlate the association of various parameters of HDP - Gestosis score with the development of hypertensive disorder of pregnancy such that vigilant monitoring of such patients can be possibly done and to spread awareness regarding such high risk factors. This may further help in educating poor socioeconomic strata as well as educated strata thus reducing the maternal mortality and morbidity related to hypertensive disorder of pregnancy.

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.

Materials and methods

This is a retrospective observational study done at Sri Guru Ram Das Hospital, Amritsar, conducted for a period of 1 year (January 2020 - December 2020). 50 patients developed hypertensive disorders of pregnancy.

Inclusion criteria -

1. All pregnant females that developed hypertensive disorder of pregnancy that includes: preeclampsia, eclampsia, HELLP syndrome, gestational hypertension, and chronic hypertension superimposed preeclampsia.
2. All booked and unbooked cases delivered at or outside Sri Guru Ram Das Hospital, Amritsar.

Table 1: Risk factors

Risk factor	Score
Age >35 years	1
Age <19 years	1
Maternal anaemia	1
Obesity (BMI>30)	1
Primigravida	1
Short duration of marriage (cohabitation)	1
Women born as small for gestational age	1
Family history of cardiovascular disease	1
Polycystic ovary syndrome	1
Interpregnancy interval >5 years	1
Conceived with ART (IVF/ICSI)	1
MAP >85 mmHg	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 disorder in 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/RA/APLA	3
Pregnancy with ART (OD/Surrogacy)	3

Elaborate history and examination of patient was noted.

For all cases, routine investigations and special investigations (if done) were noted. HDP-Gestosis Score was calculated based on different parameters that includes: age, gravidity, inter pregnancy interval, duration of cohabitation, conceived on ART or not, family history of PE or cardiovascular disease and birth weight of self. ANC records were analysed to detect Hb%, BMI, serum lipid profile, thyroid status, pregestational and gestational diabetes mellitus, chronic hypertension, mental disease, chronic kidney disease, history of HDP in previous pregnancy, diagnosed autoimmune disease like SLE, or APLA syndrome, MAP, thrombophilia and PCOS. Different scores are given to each parameter according to Indian Gestosis Association. HDP score association with its parameter was analysed.

Data analysis: Data were entered in Microsoft Excel 2007 and analysed in IBM SPSS version 20. All the categorical variables were expressed in terms of number and

percentages. Association between the two variables was determined by using chi-square test. P value less than 0.05 was considered statistically significant.

Results

A total of 50 patients developed hypertensive disorder of pregnancy. The association of various factors with gestosis score has been shown in table 2. Maternal anaemia was observed in 56% of the patients. According to our study, 46% patients were found to be primigravida. 28% patients were having MAP > 85 mmHg. 1 of our patients was

Table 2: Distribution of cases according to risk factors

Risk factors	No. of patients
Age <19 years	1
Age >35 years	8
Primigravida	23
Maternal anaemia	28
Short duration of cohabitation	13
Family h/o preeclampsia	3
Interpregnancy interval > 5 years	11
Chronic hypertension	10
Hypertension during previous pregnancy	11
Pregestational diabetes mellitus	2
BMI > 30 Kg/m ²	1
Maternal hypothyroidism	7
Excessive weight gain	11
MAP > 85 mmHg	14
Multiple pregnancy	2
Autoimmune disease (APLA)	2
Chronic kidney disease	1
Gestational diabetes mellitus	2

GDM and 1 of our patient was APLA positive. None of the patients we studied had mental disorders, had undergone IVF, and none of the patients had a previous history of PCOS. There was no patient with a family history of CVS.

Table 3 represents the association of gestosis score with development of preeclampsia, eclampsia, HELLP, gestational HTN only, atypical HELLP and chronic hypertension superimposed preeclampsia. Out of 50 patients, 13 patients developed gestational hypertension only, 9 patients had a score of 3-5. 17 patients developed preeclampsia. Maximum pre-eclamptic patients were primigravida and anaemic patients. Maximum patients have gestosis score of 4 and 1 patient had

categorical gestosis score of 7. 1 preeclamptic patient with gestosis score

Table 3: The association of gestosis score with severity of HDP

Gestosis score	Gestational hypertension only	Pre-eclampsia	Eclampsia	HELLP	Atypical HELLP	Chronic HTN superimposed pre-eclampsia
0	1	0	0	0	0	0
1	1	1	0	0	1	0
2	2	1	2	0	2	0
3	3	5	1	2	1	0
4	3	7	1	0	0	2
5	3	2	0	0	0	3
6	0	0	0	0	0	2
7	0	1	0	0	0	0
8	0	0	0	0	0	2
11	0	0	0	0	0	1
Total	13	17	4	2	4	10

5 developed post partum cardiomyopathy. 4 patients developed eclampsia and maximum association was seen with primigravida suffering from mild -moderate maternal anemia with short duration of co-habitation. 2 eclamptic patients have a score of 2, 1 patient had a score of 3 and 1 patient had a score of 4. 1 eclamptic patient with gestosis score of 4 suffered subacute intracranial haemorrhage. 2 patients who developed HELLP syndrome had a score of 3, 2 were primigravida with maternal anaemia out of which 1 had previous h/o hypertension during previous pregnancy. 4 patients were labelled atypical HELLP on the basis of deranged liver function test (LFT) with a score of 1, 2, 2 and 3. 10 patients developed superimposed preeclampsia over chronic hypertension having scores 4-11.

Table 4 showed the significant factors that are major risk factors in development of HDP are maternal anaemia (56%)

Table 4: Significance of different parameters in the development of HDP

Parameters	Total n=50		Gestosis score < 3 n=11		Gestosis score ≥ 3 n=39		Chi-square statistic	P value
	n	%	n	%	n	%		
Maternal anemia	28	56%	3	27%	25	64%	4.723	0.029
Age > 35 years	8	16%	1	9%	7	18%	0.5	0.479
Age < 19 years	1	2%	0	0%	1	3%	0.951	0.329
BMI > 30 Kg/m ²	1	2%	0	0%	1	3%	0.951	0.329
Primigravida	23	46%	8	73%	15	38%	4.055	0.044
Short duration of marriage	13	26%	3	27%	10	26%	0.011	0.913
Family h/o of preeclampsia	3	6%	0	0%	3	8%	0.022	0.879
IP interval > 5 years	11	22%	1	9%	10	26%	1.369	0.241
IVF/ICSI	1	2%	1	9%	0	0%		
Maternal hypothyroidism	7	14%	1	9%	6	15%	0.282	0.595
Excessive wt gain in pregnancy	11	22%	3	27%	8	21%	0.228	0.632
MAP > 85 mmHg	14	28%	0	0%	14	36%	2.936	0.086
GDM	2	4%	0	0%	2	5%	0.238	0.625
Multiple pregnancy	2	4%	0	0%	2	5%	0.238	0.625
HTN in previous pregnancy	11	22%	0	0%	11	28%	1.718	0.189
Pregestational DM	2	4%	0	0%	2	5%	0.238	0.625
Chronic hypertension	10	20%	0	0%	10	26%	0.238	0.625
Inherited/acquired thrombophilia	2	4%	0	0%	2	5%	0.238	0.625
Chronic kidney disease	1	2%	0	0%	1	3%	0.951	0.329

and primigravida (46%). 66% of patients underwent LSCS and 18% had normal vaginal delivery thereby depicting the

increasing incidence of LSCS with hypertensive disorder of pregnancy (table 5). 54% of the neonates were admitted in NICU which depicted the impact of hypertensive disorder of pregnancy on the fetal status (table 6).

Table 5: Mode of delivery in patients with HDP

Mode of delivery	Total (n=50)	
	n	%
LSCS	33	66%
Instrumental delivery	6	12%
Normal vaginal delivery	9	18%
Preterm delivery	2	4%
Total	50	100%

Table 6: Neonatal outcome in patients with HDP

Neonatal outcome	n	%
Bedside	17	34%
IUD	3	6%
NICU	27	54%
Still birth	3	6%
Total	50	100%

Table 7: Diagnostic efficacy of Gestosis score as predictor of PIH

Parameters	Value	95% CI
Sensitivity	38.46%	23.36% to 55.38%
Specificity	81.82%	48.22% to 97.72%
Positive predictive value	88.24%	66.82% to 96.54%
Negative predictive value	27.27%	20.52% to 35.26%

Discussion

Hypertensive disorders of pregnancy have serious implications on maternal and fetal health. Maternal anaemia showed the maximum association with the development of HDP. 56% of patients in our study had anaemia that developed HDP. In a study done at Kasala hospital, 3.1% of patients have severe anaemia and risk of preeclampsia increased only in cases of severe anaemia⁸. Also, nulliparity being a major risk factor showed significant association with development of HDP i.e. 46% of patients were primigravidas in our study. In a study done on HDP score as a predictor of PIH where 100 patients were taken as cases and 100 patients as controls and primigravidas have 4.5 times more risk of developing HDP⁹. This can be due to first exposure to chorionic villi (which is of fetal origin) and related maternal immunological incompetence is more likely during the first pregnancy and can increase risk of preeclampsia. Our study revealed 26% of patients had short duration of co-habitation whereas other studies showed lower risk of developing HDP. In the study¹⁰ risk of preeclampsia increases with age whereas in our study only 16% of patients were of age > 35 years. 28% of patients had MAP > 85 mmHg and 22% of them had interpregnancy interval of > 5 years in our study, whereas study mentioned above did not show any significant association.

22% of patients were hypertensive in previous pregnancy that developed HDP in our study whereas in a study done on gestosis score as a predictor of PIH where 100 cases and 100 controls were taken revealed no association of hypertension during previous pregnancy with development of preeclampsia⁹. GDM in preeclampsia patients have been supported by many studies, Garner PR et al did study on incidence of preeclampsia in diabetic women in 334 patients as compared to nondiabetic patients which showed 9.9% incidence in development of preeclampsia. Our study only had 2 patients of GDM which showed development of preeclampsia. This is biologically plausible because insulin resistance and high levels of insulin cause increased sympathetic activity and abnormal tubular sodium absorption, which eventually lead to endothelial cell damage and thus increased risk of preeclampsia. Mishra SS et al study shows 5 fold risk of developing preeclampsia in patients with multifetal pregnancy whereas in our study only 2 patients with multifetal pregnancy developed HDP. Covet et al revealed that in 2117 pregnant women the odds ratio was 4.56 for patients with history of DM-2 and 7.48 for patients with chronic hypertension¹¹ and in our study, 20% of patients were chronic hypertensive.

According to our study, highest association is seen with maternal anaemia, primigravida, MAP > 85 mmHg, short duration of marriage, interpregnancy interval of > 5 years, excessive weight gain during pregnancy, hypertension during previous pregnancy.

Our study revealed that maximum association of preeclampsia was with gestosis score of 4. Patients who developed eclampsia maximum of them had gestosis score 2 and all of them were primigravidas. Thus, it reveals that primigravidas are at maximum risk of developing complications of HDP. The patients who developed HELLP in our study have gestosis score of 3. This show even at gestosis score being on lower side, still patients are at risk of developing HDP.

Conclusion

PIH contributes to a major chunk of maternal and perinatal morbidity and mortality. Early detection as a milder form of disease, judicious decision of timing of delivery can improve the outcome. There are many factors which are modifiable and with the help of pre-conceptual counselling, these factors can be modified and thus can reduce maternal and perinatal morbidity and mortality. In cases of anaemia, identifying the cause and adequate management can prevent the development of complications

during pregnancy. Lifestyle modifications can be advised to obese females. Pre-conceptional counselling regarding the need for spacing of births can be done. Treatment of PCOS becomes essential. Previous known cases of type 2 DM, hypertension should be adequately managed beforehand. Patients should be counselled properly about the risks of undergoing IVF treatment. Gestosis score as given by Indian Gestosis Association being a simple structured risk model can even be used by health workers. ASHA workers, ANM and paramedical staff can be trained to identify the risk factors especially rural population where negligence is the major factor in development of complications. Thus, training can significantly reduce maternal morbidity and mortality.

Conflict of interest: None. **Disclaimer:** Nil.

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