

## Revelation of rural realities: Assessing hypertensive disorders and their impact on pregnancy outcomes

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### Abstract

**Background:** In India, hypertensive disorders during pregnancy affect approximately 5-15% of expectant mothers. These conditions are significant contributors to maternal morbidity and mortality, accounting for 10-15% of maternal deaths, particularly in developing regions. This study aimed to examine the incidence of various hypertensive disorders, assess maternal characteristics, and evaluate pregnancy outcomes in a rural setting in India.

**Methods:** A cross-sectional study was carried out from March to June 2023, utilizing data from a single district hospital in Wanaparthy, Telangana. Out of 1,310 deliveries in this period, 167 cases of hypertensive disorders of pregnancy were identified & included. Demographic data was collected. A detailed antenatal history taken, examination done and the women were categorised according to the ACOG criteria. These women were followed up till delivery and the Maternal and Perinatal outcomes were noted. To evaluate the relationships between various independent variables and the outcome, multivariable logistic regression was performed.

**Results:** The prevalence of hypertensive disorders of pregnancy (HDP) was found to be 12.7%. Among those affected, over half were first-time mothers (53.2%). The rate of Gestational hypertension was 70% while Preeclampsia-Eclampsia accounted for 19% of the cases. MgSO<sub>4</sub> infusion was required in 9.6% cases. Nulliparity and a previous history of preeclampsia are linked to a higher risk of HDP. Additionally, underlying conditions such as anaemia, High BMI, extremes of maternal age significantly contributed to this increased risk. Pregnant women with Hypertension faced a higher risk of Preterm delivery (21%), Delivery by Caesarean section (79%), Intrauterine death (1.2%), and babies requiring admission to neonatal intensive care unit (6%).

**Conclusion:** Identifying and addressing hypertensive disorders of pregnancy should be a priority in reducing maternal and infant morbidity and mortality in India, especially in rural areas where limited awareness and delayed diagnosis often lead to adverse outcomes. In developing countries such as India, it is vital to enhance healthcare facilities in rural areas and promote awareness and effective use of these services among pregnant women. The results of the study provide valuable data for public health strategies and clinical practices which can be followed in these resource limited settings.

**Keywords:** Hypertension, Rural, Pre eclampsia, Preterm delivery.

### Introduction

Hypertensive disorders of pregnancy (HDP) are a major cause of maternal morbidity and mortality, especially in developing countries. In India, these disorders affect approximately 5-15% of pregnant women <sup>[1]</sup>. Such conditions can lead to chronic hypertension, which in turn may cause long-term health issues affecting future pregnancies and contribute to the rising prevalence of other cardio metabolic risk factors <sup>[2]</sup>. Additionally, there are significant racial and ethnic disparities in both the incidence and outcomes of hypertensive disorders during pregnancy <sup>[3]</sup>.

Hypertension during pregnancy is diagnosed when the systolic blood pressure is  $\geq 140$  mmHg and diastolic  $\geq 90$  mmHg, measured on two occasions 6 hours apart.

It is classified into four categories as per recommendations of ACOG; 2020 <sup>[26]</sup>

- Gestational hypertension (HDP without proteinuria)
- Pre-Eclampsia (pregnancy after 20 weeks along with proteinuria of more than 30mg/dl or more than 300mg

in 24 hours) and eclampsia syndrome (presence of convulsion or coma)

- Chronic hypertension (hypertension before 20 weeks)
- Chronic hypertension with superimposed preeclampsia (new onset of worsening the symptoms or proteinuria with known hypertension).

FOGSI & NHBPEP also defines the same above four categories for HDP.

The World Health Organization (WHO) estimates that at least one woman dies every seven minutes from complications related to hypertensive disorders of pregnancy.

In India, rural population often lacks awareness about the benefits of antenatal care. Many women in these areas do not receive regular checkups, resulting in missed early diagnoses of high blood pressure. This delay contributes to increased maternal and fetal morbidity and mortality due to complications associated with hypertensive disorders <sup>[4]</sup>.

Both urban and rural women, regardless of Literacy, frequently lack awareness about the risks of elevated blood

pressure. However, the situation is particularly alarming in rural India, where many women go through their entire pregnancy without having their blood pressure monitored [4]. Factors such as Poverty, Cultural beliefs, Taboos, and Prejudices contribute to this issue. Consequently, hypertensive disorders are often diagnosed late in pregnancy or during labor, when complications are already severe [6]. Added risk factors like increased incidence of Teenage pregnancies, lack of Family Planning and poor Maternal Nutrition which are more prominent in rural population, exacerbate the problems. Challenges peculiar to rural setup like shortages of Trained Health care workers, Lack of Medical equipment and poor Health Education act as fuel to the fire.

This study aimed to explore the rural perspective on hypertensive disorders of pregnancy, which is crucial for implementing targeted interventions and improving maternal and fetal health. It can provide useful insights into the specific challenges faced in rural settings and help the stakeholders to inform better management practices, thereby reducing adverse health outcomes in our state.

**Aims and objectives**

**Aims**

- To study the frequency and clinical outcome of Hypertensive disorders of pregnancy (HDP) in a rural setup of India.

**Objectives**

- To analyze trends and patterns in the incidence of HDP in rural areas.

- To identify and understand the risk factors contributing to the rising prevalence of HDP.
- To evaluate the impact of HDP on maternal and neonatal health throughout the antenatal, intrapartum and postnatal periods.

**Methodology**

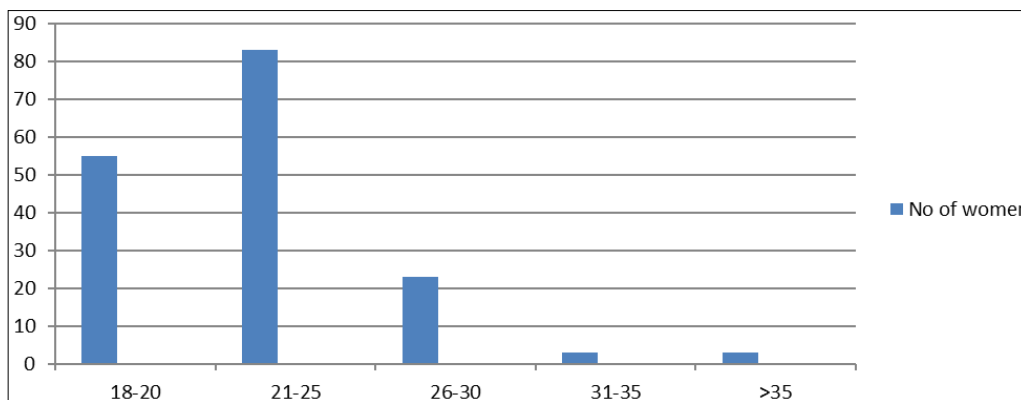
A cross-sectional study was carried out at the Maternal and Child Healthcare Hospital of the District Hospital, Wanaparthy, Telangana, over a three-month period from March to May 2023. During this time, 1,310 women delivered, of which 167 cases of hypertensive disorders were identified and included in the study.

Pregnant women, admitted for delivery, diagnosed with HDP, at any gestation were included in the study.

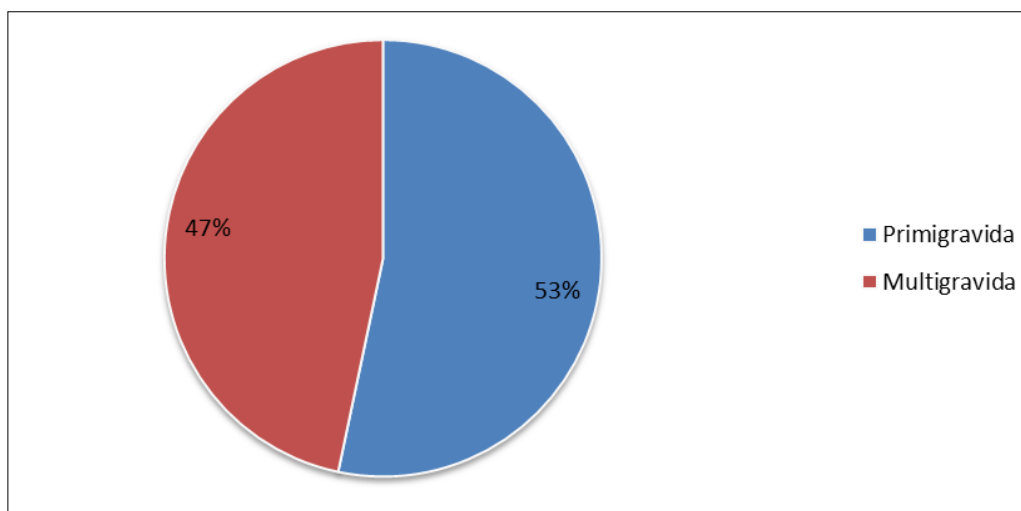
Demographic data of these women was collected. A detailed antenatal history taken, examination done and they were classified into different categories of HDP based on established criteria. The variables studied included maternal Age, Parity, Gestational age, associated Risk factors, History of previous HDP, Need for MgSO4 infusion, Complications, Mode of delivery and Perinatal outcomes. Data collection was done and, multivariable logistic regression was performed to identify significant patterns and relationships among the variables.

**Results**

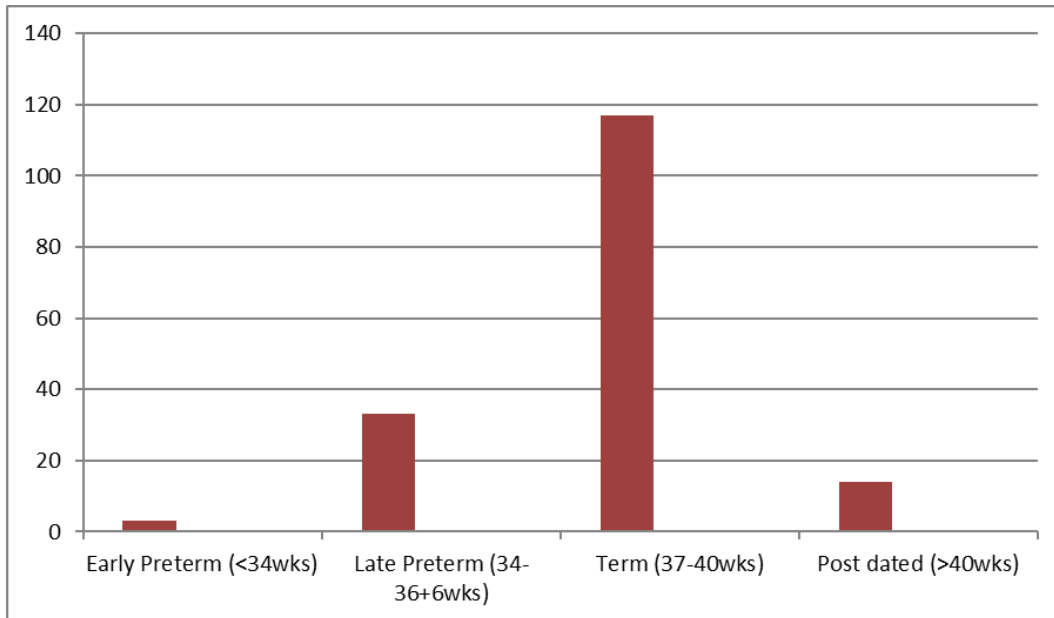
Out of the 1,310 deliveries that occurred over the three-month period, 167 women were diagnosed with hypertensive disorders of pregnancy (HDP).



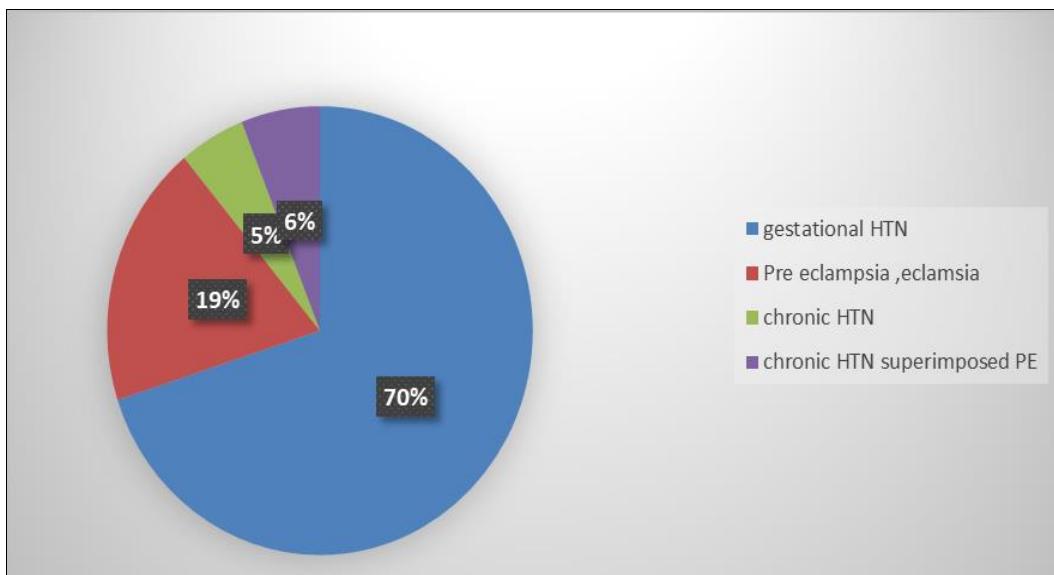
**Fig 1:** Distribution based on age



**Fig 2:** Distribution based on parity



**Fig 3:** Distribution based on gestational age



**Fig 4:** Distribution Based on Categories of HDPS

The majority (49.1%) of these women were in the 21-25-year age group. (Fig 1) Primigravida accounted for 53.2% of the cases. (Fig 2) 21% of the hypertensive patients delivered preterm (early

pre-term-1.8%, late preterm-19.7%) while 8.4% of the patients presented after 40weeks. (Fig 3) The majority of the HDP patients belonged to the category of GHTN (70%). (Fig 4) Only 2 patients presented with eclampsia.

**Table 1:** Distribution based on BMI

BMI	No of women	Percentage
<18.5	24	14.3%
18.5-24.5	91	54.6%
25-29.9	43	25.7%
>30	9	5.4%

**Table 2:** Distribution based on socioeconomic status

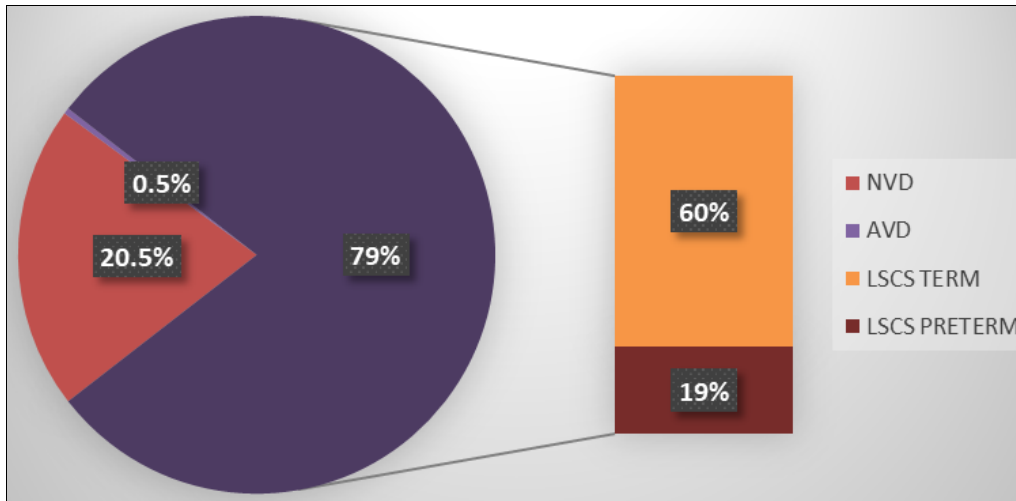
Socioeconomic status	No of women	Percentage
CLASS I	0	0
CLASS II	8	4.8%
CLASS III	31	18.6%
CLASS IV	108	64.7%
CLASS V	20	11.9%

**Table 3:** Distribution based on associated risk factors

<b>Previous History of PE</b>	<b>4</b>	<b>2.4%</b>
GDM	1	0.6%
Anaemia	8	4.8%
Epilepsy	3	1.8%
Multiple pregnancy (twins)	1	0.6%

31.1% of women with PE had high BMI. (Table 1) Majority of the women belonged to low SE status. (Table 2) Among the women diagnosed with hypertensive disorders of pregnancy, 4 (2.4%) had PE in previous pregnancy as well

& 8 women (4.8%) were found to have moderate to severe anaemia. Of the 167 patients of PE, only 1 patient was found to have co-existing GDM. (Table 3)



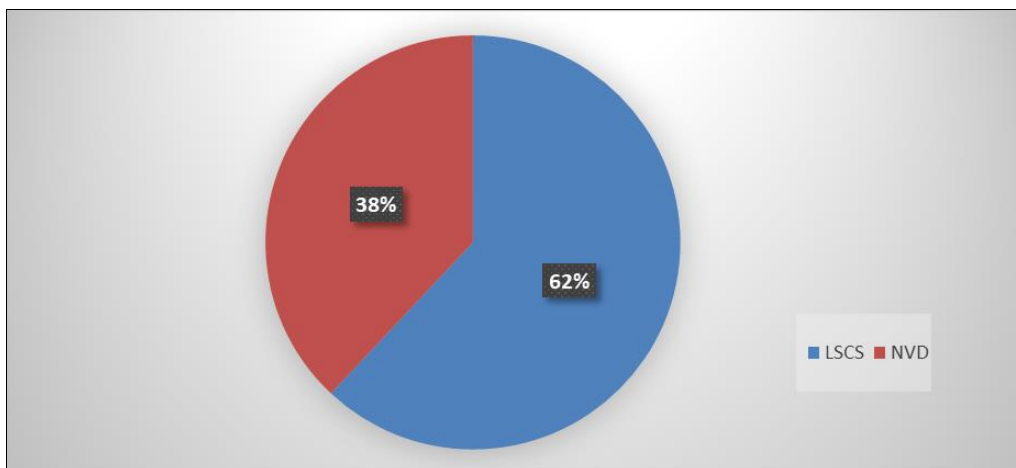
**Fig 5:** Distribution according to mode of delivery

A significant proportion of the women (79%) delivered by lower segment cesarean section (LSCS), with 60% of these being term cesarean deliveries. (Fig 5) The increased rate of LSCS was primarily attributed to a previous history of LSCS.

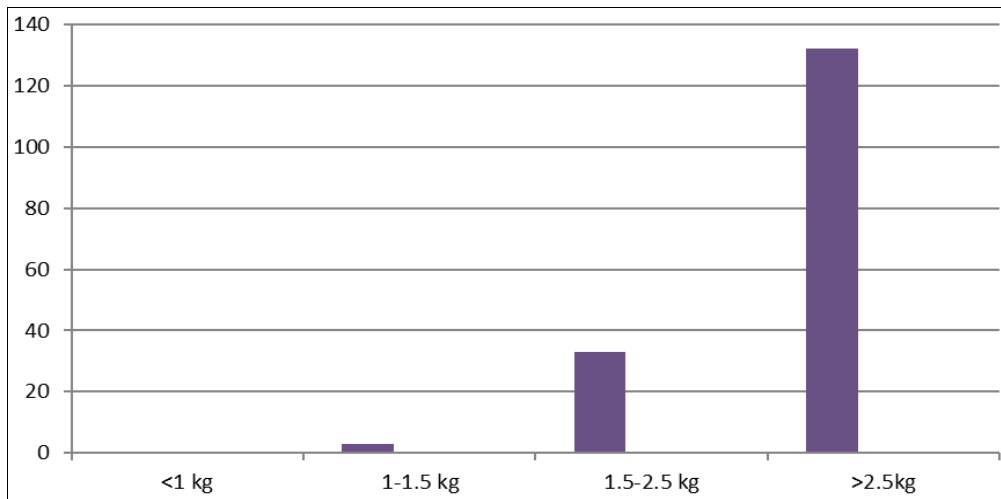
**Table 4:** Distribution based on complications

Thrombocytopenia	2	1.2%
Oligohydramnios	2	1.2%
Polyhydramnios	1	0.6%
PROM	2	1.2%
Abruptio placentae	4	2.4%
Antepartum Eclampsia	1	0.6%
Postpartum Eclampsia	1	0.6%
Foetal Growth Restriction	10	6%
LBW	36	22%
Atonic PPH	6	3.6%
Blood transfusion	8	4.8%

The Complications of PE seen in our study are shown in Table 4.



**Fig 6:** Distribution based on induction of labour & mode of delivery



**Fig 7:** Distribution based on birth weight

Induction of labour was performed for 84 women, with 52 subsequently undergoing LSCS (62%), primarily due to non-progression of labour and foetal distress. (Fig 6) No maternal mortality was observed in our study.

The babies born weighing less than 2.5 kg were 36 (21.4%). (Fig 7)

6% of the newborns were admitted to the NICU, indications being foetal growth restriction (FGR), low birth weight (LBW), and respiratory distress.

### Discussion

Hypertension is a significant non-communicable disease and a preventable risk factor for cardiovascular conditions worldwide [6]. Hypertensive disorders of pregnancy (HDP) constitutes one of the most common medical complication of pregnancy and is considered to be one of the major cause of Maternal & Perinatal morbidity & mortality, making timely follow-up and early prediction crucial [7].

The occurrence of Hypertensive disorders of pregnancy, in our study was 12.8% (167 out of 1310 deliveries), which is within the range given for Indian population 11% (95% confidence interval, 5-17%) [28]. These findings were comparable with various studies done globally, Ford *et al* (16%)<sup>5</sup> and Lo Jo *et al* (10%) [7]. But studies done in rural centres of India showed wide variation in incidence rates 6.9%<sup>8</sup> & 31.5% [20]

Younger age (<25yrs) were found to have a higher incidence of HDP (83%) in our study, similar to study by Shireen *et al*, where incidence was 90% & Manjusha *et al* [10] 80.7%

A well known theory postulated in the literature for higher incidence of HDP seen in Primigravida is the first-time exposure to chorionic villi. MacGillivray *et al* [11] observed that primigravida were 15 times more likely to be affected. Study by Swaroop *et al* [4] showed 60% of Primigravida to have HDP. In contrast, our study showed the occurrence of HDP to be relatively similar between primigravida and multigravida, (53% & 47%).

The incidence of preterm deliveries in our women was 21%, similar to the 23% observed by Kapoor *et al* [18], who also identified prematurity as a major risk factor for perinatal mortality in cases of hypertensive disorders of pregnancy. Gestational hypertension accounted for 70% of all HP, which is consistent with the findings of Gandhi *et al* [12] (74%). However, this differs from studies by Swaroop *et al*

[4], where Pre-eclampsia had the highest incidence among the categories of HDP (71%). Among the other cases diagnosed with HDP in our study, 19% had Pre-eclampsia-Eclampsia, 5% had Pre Eclampsia superimposed on Chronic HTN. 6% were known cases of chronic HTN.

Use of MgSO<sub>4</sub> as prophylaxis in severe PE can help in prevention of progression to Eclampsia. 16 women with severe PE (9.6%) were given MgSO<sub>4</sub> infusion in our study.

In our study 31% of the patients, who developed HDP, had high BMI. Women who were obese (OR 4.44; 95% CI 1.84-10.72) before becoming pregnant are more likely to develop gestational hypertension compared to those who have normal pre-pregnancy BMI. Additionally, having excessive gestational weight gain is positively and significantly associated with development of gestational hypertension (OR 2.70; 95% CI 1.19-6.13) [21].

When grouped by income, the highest incidence rates of preeclampsia are observed in upper middle-income countries, whereas eclampsia appears to be more frequent in lower middle-income countries [22]. In our study, majority of the women belonged to low SE status (class 4 and 5) which is in consistent with a study by Vijna *et al* [20].

The rural residential area itself is said to be one of the risk factors of HDP [23]. Among the women diagnosed with HDP, 8 were found to have moderate to severe anaemia, necessitating blood transfusion either before or after delivery. One patient of PE had co-existing GDM and another one patient had twin pregnancy. Women with these risk factors need to be monitored closely for the development of HDP.

Oligohydramnios as a complication is common in HDP owing to uteroplacental insufficiency. In our research, 3 women (1.8%) had moderate to severe oligohydramnios whereas 2 had polyhydramnios. Abruption placenta was observed in 2.4% of patients in our study in gross contrast to 14.1% seen by Khan *et al* [24].

No maternal mortality was reported in our study.

FGR was diagnosed antenatally in 6% women, while after delivery, 22% of babies were found to be Low birth weight (LBW), emphasizing the need for careful anticipation & diagnosis of FGR in PE. Two patients with HDP were admitted with IUD.

74% of women underwent caesarean sections for Delivery. These results are consistent with studies by Oladokun *et al* (60%)<sup>14</sup>, Miguil *et al* (71%) [15], and Dissanayake *et al*

(78%).<sup>16</sup> The increased rate of caesarean sections was primarily attributed to a previous history of caesarean delivery, similar to the finding by Nirmalan *et al*<sup>[17]</sup>. Delivery is the only definitive treatment for preeclampsia, which can help prevent severe complications & hence induction is indicated at 37 weeks. This has a high chance of resulting in failed induction and so end in Cesarean delivery<sup>[26]</sup>. Induction of labour was performed for 84 women, with 52 subsequently undergoing LSCS, primarily due to non-progression of labour. This calls for a relook in need for induction at 37 weeks, which is routinely being followed for all patients with HDP.

As mentioned in the literature, the seeds of this organ dysfunction is laid down in early pregnancy itself & it is pertinent to detect in 1st trimester or early 2<sup>nd</sup> trimester<sup>[27]</sup>. Unfortunately, it is extremely difficult and certainly not cost effective for the huge number of general obstetric patients, especially in the rural areas to be screened<sup>[25]</sup>. None of the patients of HDP were screened using any of the existing methods in our rural setup.

GESTOSIS scoring given by FOGSI-ICOG can now serve as a cost effective method for diagnosing HDP, especially in resource limited settings. By utilizing simple clinical indicators, which can be done by nurses and midwives also, early identification of high risk cases can be done, reducing the need for more expensive diagnostic tools. This will also help in validation of the above tool. This can be easily started in low resource settings.

Only 18% of patients received Aspirin as prophylaxis. The lesser number attributed to late booking of pregnancy & lack of set protocol.

By contextualizing our results in rural India, we aim to highlight how systemic issues like healthcare infrastructure, socio-cultural factors, and limited resources can shape the prevalence and outcomes of HDP. Recognizing these factors allows for early diagnosis and intervention, mitigating the risks associated with HDP to avoid magnanimous hazards.

## Conclusion

Hypertensive disorders of pregnancy are a significant global cause of morbidity & mortality (both maternal and foetal). In an era of advancing screening methods for early diagnosis, Awareness is the need of the hour for timely interference to avoid serious complications and improve both maternal and foetal outcomes.

Community-based interventions and the strengthening of local healthcare systems are keys to improving the early detection and management of hypertension in pregnancy. In rural areas, a multifaceted approach is essential, including enhancing healthcare access, improving education, and implementing targeted interventions. This comprehensive strategy will help achieve better results.

Hence in developing countries like India, it is crucial to not only improve the health facilities in the rural regions but also to improve the knowledge and utilization of these facilities among pregnant women. Recognizing HDP as a priority area especially in rural India can help reduce maternal and neonatal morbidity and mortality of our country.

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