

**A Study of Pregnancy Induced Hypertension among Pregnant Women in Field Practice Area of Bahadurpur, Darbhanga****Ankita<sup>1</sup>, Hemant Kumar<sup>2</sup>, Vijay Kumar Chaudhary<sup>3</sup>**<sup>1</sup>Junior Resident, Department of Community Medicine, Darbhanga Medical College & Hospital, Laheriasarai, Darbhanga, Bihar- 846003, India<sup>2</sup>Assistant Professor, Department of Community Medicine, Darbhanga Medical College & Hospital, Laheriasarai, Darbhanga, Bihar- 846003, India<sup>3</sup>Assistant Professor, Department of Community Medicine, Darbhanga Medical College & Hospital, Laheriasarai, Darbhanga, Bihar- 846003, India

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Conflict of interest: Nil

**Abstract**

Pregnancy induced hypertension (PIH) is one of the major complications occurring during pregnancy which is responsible for maternal & perinatal mortality & morbidity. A community based cross-sectional study was carried out from January, 2021 to December, 2022. A pre-tested structured Performa was prepared & the pregnant women were interviewed to collect necessary information such as detailed history, clinical examination findings & investigations performed. Results were analysed using MS Excel and p-value less than 0.05 was considered as statistically significant. In the present study, Proportion of PIH among pregnant women was 6%. The incidence of PIH was found more among teenage pregnancy, those with history of PIH in previous pregnancy, having family history of PIH & those who were found obese. Young pregnant women, families with a history of hypertension, BMI, high cholesterol levels, previous incidents of hypertension, low socioeconomic status, anaemia, etc. were risk factors for PIH. Diastolic blood pressure & high cholesterol level were found to be one of the major significant risk factors among PIH women. Women with PIH were at higher risk of adverse pregnancy outcomes than those which does not have PIH. Therefore, to lessen the negative effects of pregnancy-induced hypertension on the foetus, health care professionals should prioritise prevention, early detection, and timely therapy of the condition.

**Keywords:** Pregnancy induced hypertension (PIH), pregnant women, socioeconomic status, pre-eclampsia, eclampsia

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**Introduction**

The time during pregnancy is vital for both the mother and the foetus. Life-threatening problems are estimated to affect 15% of expectant women at some point during their pregnancy, during delivery, or after giving birth. [1]. Main causes of these consequences are hypertensive diseases [2]. Nearly 10% of pregnancies worldwide are thought to be complicated by hypertension [3, 4]. In women with previously normal blood pressure, pregnancy-induced hypertension (PIH) is hypertension that develops after 20 weeks of pregnancy. Gestational hypertension, pre-eclampsia, and eclampsia are the three conditions that broadly fall under the category of pregnancy-induced hypertension [5]. Systolic blood pressure (SBP) >140 mm Hg and diastolic blood pressure (DBP) >90 mm Hg are the criteria for this condition. SBP 140-149 mm Hg and DBP 90-99 mm Hg are considered mild, SBP 150-159 mm Hg and DBP 100-109 mm Hg are considered moderate, and SBP 160 mm Hg and DBP 110 mm

Hg are considered severe [6]. PIH is a serious pregnancy condition linked to intrauterine death, abruptio placentae, intrauterine growth retardation (IUGR), premature delivery, and maternal morbidity and mortality [7, 8]. One of the main causes of maternal and perinatal morbidity and mortality during pregnancy is pregnancy-induced hypertension. Hypertension is the second greatest cause of maternal mortality in the United States, accounting for 15% of all maternal deaths [9]. The mother's risk of cardiac failure, heart attack, renal failure, and brain vascular accidents is increased by severe hypertension. The foetus is also more likely to experience difficulties such as inadequate oxygen delivery through the placenta, growth restriction, premature delivery, placental abruption, stillbirth, and neonatal death [10]. According to the World Health Organization, complications from pregnancy-related hypertension diseases claim at least one woman's life every seven minutes. The

risk of unfavourable foetal, neonatal, and maternal outcomes is raised during pregnancy when hypertension is present [11]. The pathophysiology of PIH remains unknown, despite being one of the primary causes of maternal death and a significant cause of maternal and perinatal morbidity. It has been identified as a syndrome of hypertension which occurs with or without proteinuria and edema, with the clinical manifestation during late pregnancy and regressing after delivery of the conceptus. It is one of the major pregnancy complications, causing premature delivery, foetal growth retardation, abruptio placentae, and foetal death, along with maternal morbidity and mortality. Preeclampsia-related hypertension appears during pregnancy and disappears after birth, implicating the placenta as the primary cause of the condition [12]. Reduced placental perfusion has been hypothesised as an initial event in PIH, and it has been shown to cause extensive maternal vascular endothelial dysfunction through as-yet-unidentified pathways [13–16]. Even though there may be a number of processes responsible for decreased placental perfusion in PIH, the majority of human investigations point to aberrant cytotrophoblast invasion of spiral arterioles as a significant contributor [17].

Pregnancy induced hypertension has remained a substantial public health threat among the expecting mothers of developed as well as developing countries contributing to maternal and perinatal morbidity and mortality worldwide. Though it was observed that, the impact of the disease was more severe developing countries. PIH has been recognized for centuries; however, the etiology of this syndrome remains ambiguous, limiting effective intervention. The problem is confounded by the continued mystery of the etiological unpredictable nature of the disease.

Although pregnancy-induced hypertension is one of the major causes of maternal morbidity and mortality during pregnancy, the prevalence of hypertension during pregnancy is little reported in Indian literature, and research about hypertension in pregnancy in India were primarily hospital-based. Keeping this in mind, the current study was conducted to examine the prevalence to assess pregnancy induced hypertension and its associated factors among women attending delivery service at the field service area of Bahadurpur, Darbhanga, Bihar.

### Material and Methods

A community based cross-sectional study was carried out from January, 2021 to December, 2022. The total sample size of the study was 480. Systematic sampling technique was used to select study participants [9]. P-value less than 0.05 was considered as statistically significant.

### Source of data

Antenatal mothers of  $\geq 20$  weeks of gestation attending the PHC, Bahadurpur, Darbhanga, Bihar.

**Study Area:** Field practice area of PHC, Bahadurpur.

**Study Design:** Community based cross-sectional study design with quantitative data collection method was used.

**Study Period:** From January, 2021 to December, 2022.

**Study Population:** All the Antenatal mothers of  $\geq 20$  weeks of gestation, attending the PHC, Bahadurpur during the period of data collection. The following inclusion and exclusion criteria for gestational hypertension and gestational normotensive, respectively, were used to conduct the study.

### Inclusion Criteria

- Permanent residents field practice area of Bahadurpur.
- Pregnant women with period of gestation 20 weeks or above

### Exclusion Criteria

- Those who were not willing to participate in the study.
- Pregnant women who were diagnosed with chronic hypertension or hypertension as a result of cause other than PIH (i.e. Pheochromocytoma, SLE etc) .

### Sample size and sampling technique

The sample size was calculated by using a single population proportion sample size calculation formula by considering the following assumptions:

$$N = z^2 pq / d^2$$

Where,

n=minimum sample size required

z=critical value and a standard value for the corresponding level of confidence. At 95% CI or 5% level of significance (type- error), it is 1.96

p=expected prevalence or prevalence based on previous research

Here, it is prevalence of PIH in Bihar= 5.4% [18].

q=100-5.4=94.6

d=3% relative error

$N = (1.96)^2 * 5.4 * 94.6 / 9 = 218.04 \sim 218$

For cluster sampling design effect=2

So, sample size=218\*2=436

By considering 10% none response rate, the final sample size became 480.

### Sampling Method

Cluster sampling method was used for current project.

### Data collection

The mother's medical records were reviewed, measurements were taken, and a pretested structured questionnaire was used to collect data. The data for choosing the pregnant women were chosen at random. To ensure that none of the cases were overlooked, it was done very meticulously. The chosen pregnant women were approached and informed of the study's goal.

### Ethical considerations

Human subjects were not expected to suffer any damage as a result of the study, with the exception of potential benefits. The study received ethical approval from Darbhanga Medical College & Hospital, and permission from the relevant authorities, as well as the respondents' signed agreement, was obtained prior to data collection. Following ethical committee approval, the study's goal was described to antenatal moms in their native tongue, and those who were willing to participate gave their written consent. Data on sociodemographic characteristics and PIH risk factors were collected using an interview technique, which was pretested with a semi-structured questionnaire. Data was gathered and entered into an MS Excel (MS Excel 2013). Throughout the investigation, the data was kept private. All pregnant moms received health education about

pregnancy-induced hypertension, and those who already had PIH received medical counselling about the value of receiving professional care.

### Statistical Analysis

After completion of data collection, the data was entered in Microsoft Excel worksheets (MS-Excel 2013) with the help of PSM Data Entry Officer of PSM Department and frequency of all variables were checked for the completeness and data entry mistakes in data and appropriate correction was done. After that, data was analysed using SPSS (Statistical Package for the Social Sciences) Software for Windows version 20.0 and the percentage of all variables was calculated.

Results were described in percentage and proportions and presented in tabular and graphical form. For continuous variables, descriptive analysis was expressed as Mean and Standard Deviation and P-value < 0.05 was considered significant.

### Results

#### Age Distribution of Pregnant Women

Among the total 480 study participants, the majority of the pregnant women were aged between 21-25 years. These women contribute 50.8% of the total which was 244. Least number of pregnant women was from age group 36-40 years (Table 1).

**Table 1: Age Distribution of Pregnant Women**

Age	Number	Percentage
≤ 20	50	10.4
21-25	244	50.8
26-30	120	25
31-35	52	10.8
36-40	14	2.9
Total	480	100.0

#### Occupation Status of Pregnant Women

Study shows that the women who visited in the hospital had different types of occupations (Table 2). Almost half of the total participants (49.1%) were housewives. Their total number was 236. Service class women were 18.3%, whereas students and unemployed category of pregnant women contributed 18.7% and 9.5%, respectively.

**Table 2: Occupation Status of Pregnant Women**

Occupation	Number	Percentage
Farmer	20	4.1
Housewife	236	49.1
Service	88	18.3
Student	90	18.7
Unemployed	46	9.5
Total	480	100.0

#### Religion-based distribution of pregnant women

Results show that the pregnant women came for the treatment were from both Hindu and Muslim communities. Majority of the subjects were Hindu. Their total number was 316, which contribute 65.8% of the total study participants. Muslim women were 34.1% with 164 in number (Table 3).

**Table 3: Religion-based distribution of pregnant women**

Religion	Number	Percentage
Hindu	316	65.8
Muslim	164	34.1
Total	480	100.0

**Education based distribution of pregnant women**

Majority of the pregnant women (32%) came for the treatment was illiterate. Their total count was 154. Graduates were 146 (30.4%). High school pass and literate pregnant women contribute 25% and 12.5% of the total (Table 4).

**Table 4: Education based distribution of pregnant women**

Education	Number	Percentage
Graduate	146	30.4
High school	120	25
Illiterate	154	32
Literate	60	12.5
Total	480	100.0

**Economic Status of Pregnant Women**

Majority of the pregnant women were belonging to upper middle class i.e; 186 (38.9%). After that, 128 (26.6%) pregnant women were from lower middle class, 100 (20.8%) were from lower class, 42 (8.7%) from upper class and least 24 women (5%) from upper lower class of socio-economic status as per modified Kuppaswamy classification (Table 5).

**Table 5: Economic Status of Pregnant Women**

Socio economic status	Number	Percentage
Lower class	100	20.8
Lower middle class	128	26.6
Upper class	42	8.7
Upper lower class	24	5
Upper middle class	186	38.9
Total	480	100.0

**Pregnant women are distributed according to the prevalence of PIH in their families**

Results show that there were not the history of PIH in the family of majority of the pregnant women came for treatment. 430 (89.6%) out of 480 cases did not show the history of PIH in the family (Table 6). 29 (6%) cases showed the history of PIH in the family.

**Table 6: Pregnant women are distributed according to the prevalence of PIH in their families.**

History of PIH in family	Number	Percentage
Yes	29	6
No	430	89.6
Nil	21	4.4
Total	480	100

**Socio-Demographic profile of pregnant women with PIH**

The socio-demographic profile of the participants showed that, out of 29 pregnant women with PIH, 27 (93.1%) of them were in the age group of > 25 years and 20 (69%) were unemployed (Table 7). Regarding their educational level, 22 (75.9%) of the respondents were literate, the majority 21 (72.4%) were from low socio-economic status. As far as their religion is concerned, 20 (69%) were Hindus.

**Table 7: Socio-Demographic profile of pregnant women with PIH**

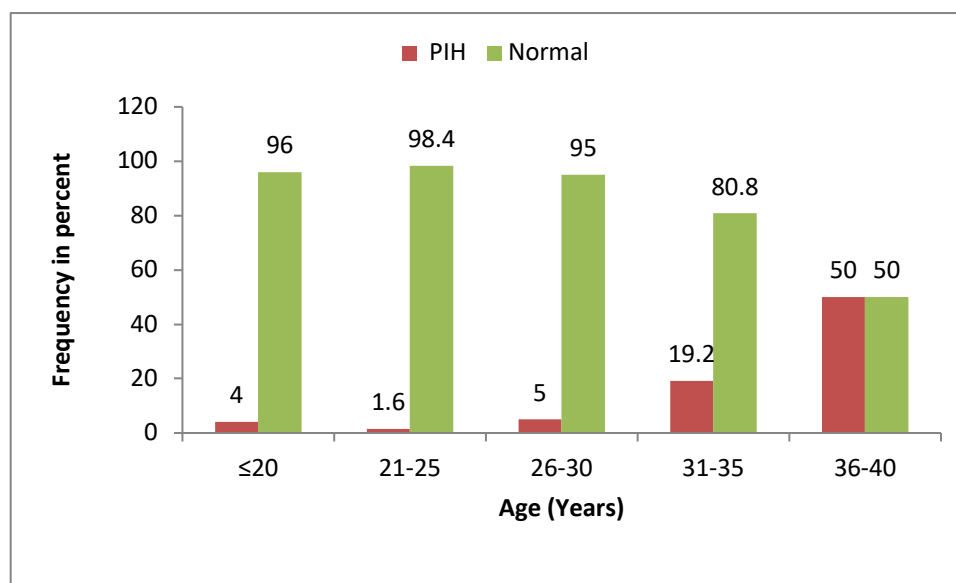
Variables		Total Number of women	Total number of women with PIH	Percentage	Total Percentage
Age (years)	≤25	2	29	6.9	100
	>25	27		93.1	
Occupation	Unemployed	20	29	69	100
	Employed	9		31	
Education	Illiterate	7	29	24.1	100
	Literate	22		75.9	
Socio economic status	Upper class	8	29	27.6	100
	Lower class	21		72.4	
Religion	Hindu	20	29	69	100
	Muslim	9		31	

### Age-specific distribution of PIH in pregnant women

It was observed that, proportion of pregnant women with PIH were in the age group of ≤20 years i.e; 2 (4%) and 10 (33.3%) of pregnant women were in age group of 31-35 years (Table 8 and Figure 1).

**Table 8: Age-specific distribution of PIH in pregnant women**

Age	Pregnant women with PIH	Pregnant women without PIH	Total
≤ 20	2 (4%)	48 (96%)	50 (100%)
21-25	4(1.6%)	240 (98.4%)	244(100%)
26-30	6 (5%)	114 (95%)	120 (100%)
31-35	10 (19.2%)	42(80.8)	52(100%)
36-40	7 (50%)	7 (50%)	14(100%)
Total	29 (6%)	451 (94%)	480 (100%)

**Figure 1: Bar graph showing Age-specific distribution of PIH in pregnant women**

### Pregnant women with PIH are distributed according to their level of education

Proportion of pregnant women with PIH was more among the participants were maximum, 11 (18.3%) as literate. 3 (43.3%) out of 146 were graduate and 10 (46.3%) were illiterate pregnant women (Table 9 and Figure 2).

**Table 9: Pregnant women with PIH are distributed according to their level of education.**

Education	Pregnant women with PIH	Pregnant women without PIH	Total
Graduate	3 (2%)	143 (98%)	146(100%)
High school	5(4.2%)	115(95.8%)	120(100%)
Illiterate	10(6.5%)	144(93.5%)	154(100%)
Literate	11(18.3%)	90(81.7%)	60 (100%)
Total	29(6%)	451(94%)	480(100%)

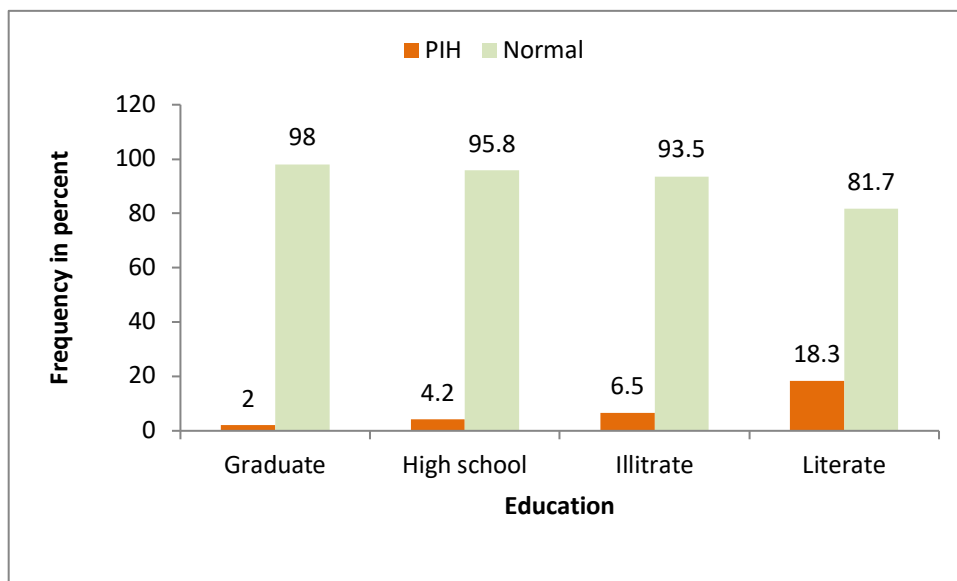


Figure 2: Bar graph showing the pregnant women with PIH are distributed according to their level of education

**Pregnant women with PIH are distributed according to their occupation**

According to a study that looked at the employment status of pregnant women with PIH, 15.2% of them were out of work (Table 10 and Figure 3). Their total number was 7 out of total 46. Service class women were 6.8 % whereas students and housewife category of pregnant women with PIH contributed 11.1% and 2.1% respectively.

**Table 10: Pregnant women with PIH are distributed according to their occupation**

Occupation	Pregnant women with PIH	Pregnant women without PIH	Total
Farmer	1 (5%)	19 (95%)	20(100%)
Housewife	5 (2.1 %)	231 (97.9%)	236(100%)
Service	6(6.8%)	82(93.2%)	88(100%)
Student	10 (11.1%)	80 (88.9%)	90(100%)
Unemployed	7 (15.2%)	39 (87.8%)	46(100%)
Total	29 (6%)	451 (94%)	480 (100%)

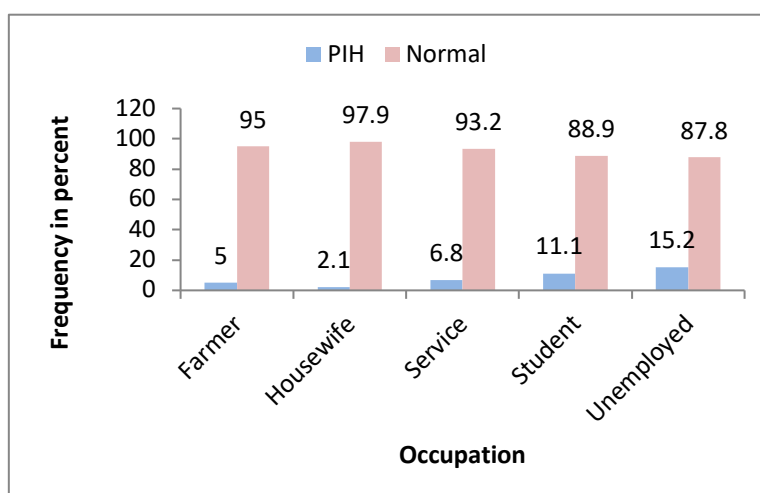


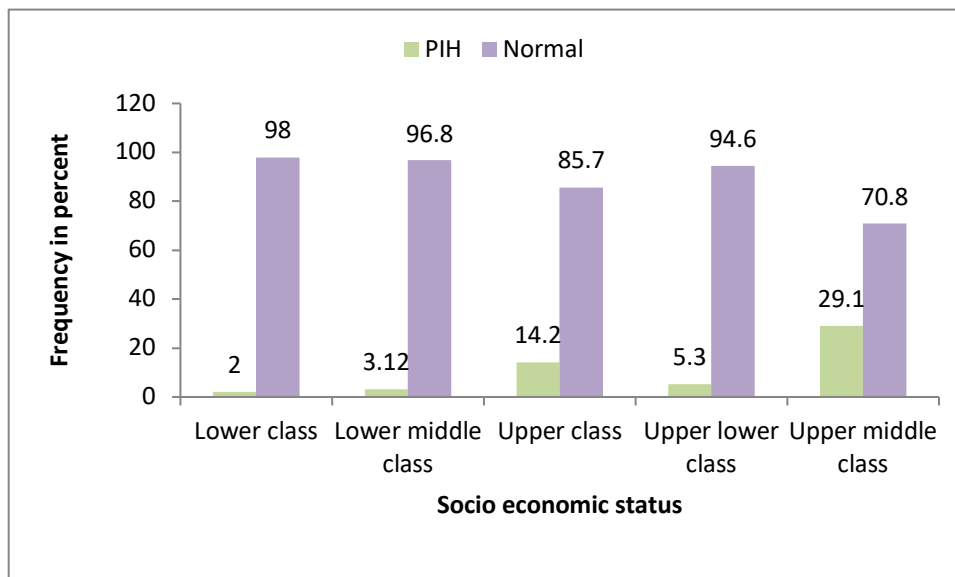
Figure 3: Bar graph showing pregnant women with PIH are distributed according to their occupation

**Distribution of pregnant women with PIH according to their Socio-economic status**

The proportion of pregnant women with PIH was less among those who were belonging to upper lower class i.e; 2 (8.3%) when compared to upper class, 14 (33.3%) and upper middle class, 45 (24.2%) (Table 11 and Figure 4).

**Table 11: Distribution of pregnant women with PIH according to their Socio-economic status**

Socio economic status	Pregnant women with PIH	Pregnant women without PIH	Total
Lower class	24 (24%)	76 (76%)	100 (100%)
Lower middle class	32(25%)	96 (75%)	128(100%)
Upper class	14(33.3%)	28 (66.7%)	42(100%)
Upper lower class	2 (8.3%)	22 (91.7%)	24(100%)
Upper middle class	45 (24.2%)	141 (75.8%)	186(100%)
Total	29(6%)	451 (94%)	480



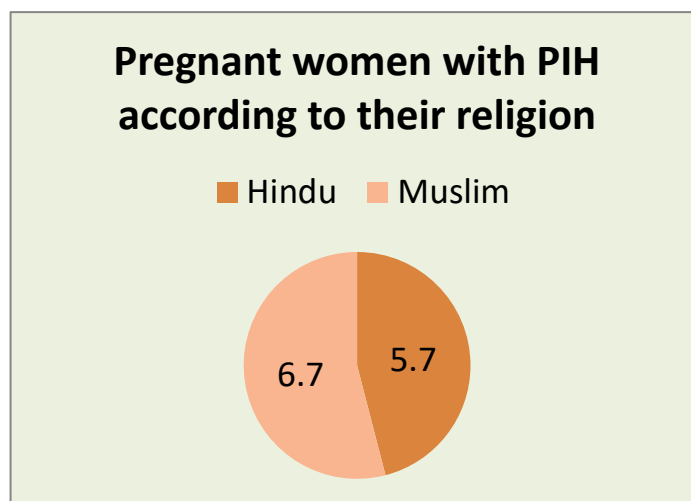
**Figure 4: Bar graph showing the distribution of pregnant women with PIH according to their SES**

**Distribution of pregnant women with PIH according to their religion**

The proportion of pregnant women with PIH among Hindus was 82 (55.4%), and Muslim religion was 35 (48.6 %) (Table 12 and Figure 5).

**Table 12: Distribution of pregnant women with PIH according to their religion**

Religion	Pregnant women with PIH	Pregnant women without PIH	Total
Hindu	18 (5.7%)	298 (94.3%)	316 (100%)
Muslim	11 (6.7%)	153 (93.3%)	164 (100%)
Total	29 (6%)	451 (94%)	480 (100%)



**Figure 5: Pie chart showing the distribution of pregnant women with PIH according to their religion**

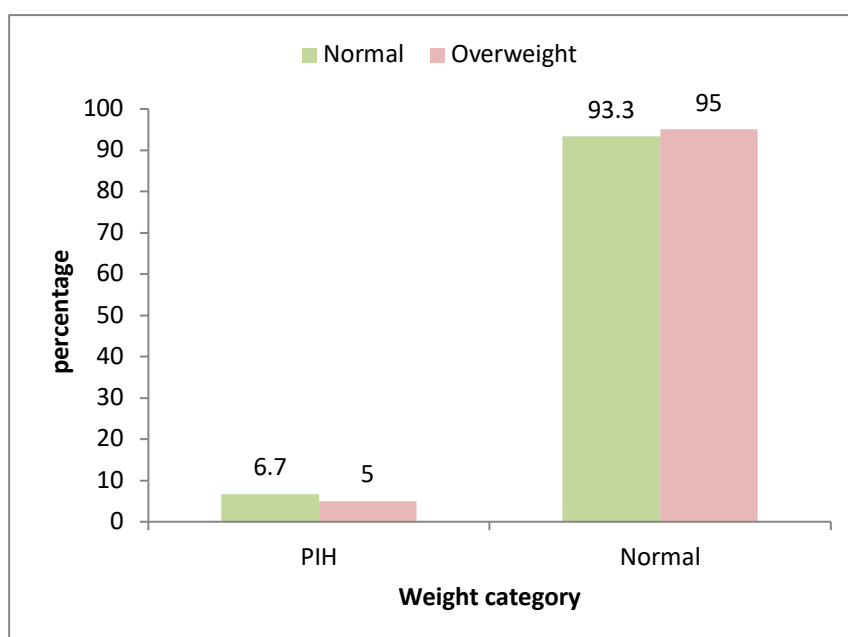
**Distribution of pregnant women with PIH according to their Body Mass Index**

The body mass index of pregnant women with PIH was only in two categories; (1) Normal and (2) Overweight (Table 13 and Figure 6). No one was in the underweight and obese categories. 20 (6.7%) expecting mothers with PIH had normal weight status whereas 9 (5%) out of 180 were in overweight category.

**Table 13: Distribution of pregnant women with PIH according to their Body Mass Index**

BMI	Weight status	Pregnant women with PIH	Pregnant women without PIH	Total
< 18.5	Underweight	0 (0%)	0	0 (100%)
18.5-24.9	Normal	20 (6.7%)	280 (93.3%)	300(100%)
25-29.9	Overweight	9 (5%)	171 (95%)	180(100%)
≥30.0	Obesity	0 (0%)	0	0 (100%)
Total		29	451	480 (100%)

Significance level, P value is 0.5.



**Figure 6: Bar graph showing distribution of pregnant women with PIH according to their BMI**

**Distribution of pregnant women with PIH according to their gestational week**

The proportion of pregnant women with PIH was more among the expecting mothers who were in their 31-35 weeks of gestation i.e; 10 (44 %) compared to those who were in their 36-40 weeks of gestation 7(5.5%) (Table 14).

**Table-14 Distribution of pregnant women with PIH according to their gestational week**

Gestational week	Pregnant women with PIH	Pregnant women without PIH	Total
≤20	0 (0%)	2 (100%)	2 (100%)
21-25	0 (0%)	2 (100%)	2 (100%)
26-30	8 (8%)	92 (92%)	100 (100%)
31-35	10 (44%)	240 (56%)	250 (100%)
36-40	7 (5.5%)	119 (94.5%)	126 (100%)
Total	29 (6%)	451 (94%)	480 (100%)

Significance level, P value is 0.1.

**Gestational weeks**

The mean gestational weeks of the study participants was 31.45 ± 5.0 weeks.

**Height of expecting mothers**

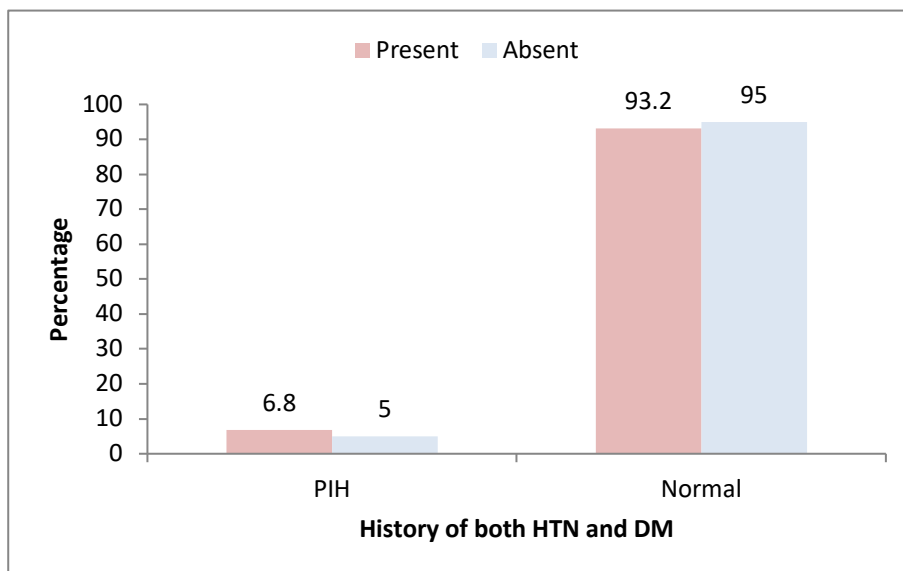
The mean height of the expecting mothers was 154.52 cm.

**Distribution of pregnant women with PIH according to their history of hypertension and diabetes mellitus:** Proportion of pregnant women with PIH was less among those expecting mothers who had the history of hypertension and diabetes i.e; 19 (6.8%) compared to those who had no history of hypertension and diabetes 10 (5%) (Table 15 and Figure 7).



**Table 15: Distribution of pregnant women with PIH according to their history of hypertension and diabetes mellitus**

History of both HTN & DM	Pregnant women with PIH	Pregnant women without PIH	Total
Present	19 (6.8)	261 (93.2)	280 (100%)
Absent	10 (5%)	190 (95%)	200 (100%)
Total	29 (6%)	451 (94%)	480 (100%)



**Figure 7: Bar graph showing distribution of pregnant women with PIH according to their history of both HTN and DM**

**Distribution of pregnant women with PIH according to presence of edema**

It was observed during the study that out of 29 pregnant women with PIH, 18 (6 %) were suffering from edema, while 11 (6.1%) did not show the signs of edema.

**Table 16: Distributions of pregnant women with PIH according to the presence of edema**

Edema	Pregnant women with PIH	Pregnant women without PIH	Total
Yes	18 (6%)	282 (94%)	300 (100%)
No	11(6.1%)	169 (93.9)	180 (100%)
Total	29(6%)	451 (94%)	480 (100%)

**Distribution of pregnant women with PIH according to the presence of pallor**

Results show that out of 29 pregnant women with PIH, 19 (5.9 %) were suffering from pallor, while 10 (6.2%) did not show these signs (Table 17).

**Table 17: Distributions of pregnant women with PIH according to the presence of pallor**

Pallor	Pregnant women with PIH	Pregnant women without PIH	Total
Yes	19 (5.9%)	301 (94.1%)	320 (100%)
No	10 (6.2%)	150 (93.8%)	160 (100%)
Total	29 (6%)	451(94%)	480 (100%)

**Distribution of pregnant women with PIH according to their history of Edema/ Pedal edema**

It was observed from the study that out of 29 pregnant women with PIH, 10(3.3 %) had the history of edema/pedal edema, while 19 did not have the history of this complication (Table 18).

**Table 18: Distribution of pregnant women with PIH according to their history of Edema/ Pedal edema**

History of E/PE	Pregnant women with PIH	Pregnant women without PIH	Total
Yes	10 (3.3%)	290 (96.7%)	300 (100%)
No	19 (10.5%)	161(89.5%)	180 (100%)
Total	29 (6%)	451(94%)	480 (100%)

**Table 19: Characteristics of pregnant women (with and without PIH) in relation to mean and standard deviation (n=480)**

Group		Numbers	Mean	Standard Deviation	p-value
Age	Pregnant women with PIH	29	34.48	4.020	0.8
	Pregnant women without PIH	451	34.56	3.078	
weeks	Pregnant women with PIH	29	31.41	5.004	0.7
	Pregnant women without PIH	451	31.12	4.993	
Height	Pregnant women with PIH	29	154.54	8.133	0.8
	Pregnant women without PIH	451	154.27	8.088	
Weight	Pregnant women with PIH	29	58.28	7.985	0.7
	Pregnant women without PIH	451	57.84	8.021	
BMI	Pregnant women with PIH	29	24.19	1.144	0.8
	Pregnant women without PIH	451	24.21	1.116	

## Discussion

### Proportion of pregnant women

An observational study done over a period of 2 years from January 2021 to December 2022, on the pregnant women attending the PHC, Bahadurpur, Darbhanga; out of 480 pregnant women who were screened for PIH, the proportion of PIH was found to be 29,(6%) (BP = 140 mm of Hg systolic and = 90 diastolic). Muhammad Obaid UUR Rehman studied 370 out of 1000 ladies and identified 37% to be the cases of PIH [19].

### Age

In the present study, 6.9% of the pregnant women with PIH were found among the age group of  $\leq 20$  years followed by 93.1% in between 31-35 years of age. In a similar manner, Duckitt et al. showed that the incidence of PIH and eclampsia was higher in the age range of 15-20 years, closely followed by the age group of 21-25 years [20]. They found teenage pregnancy to be one of the risk factors for PIH and eclampsia and found that women under the age of 40 had a risk of pre-eclampsia that was nearly twice as high whether they were primiparous or multiparous (relative risks of 1.68, 1.96, and 1.34 to 2.87, respectively). In the study by Prasanna Kumar et al., 2012, 67.85% of the patients were between the ages of 20 and 25 [21]. The maternal mean age was reported as 24.3 years by Sivakumar et al. [22]. In the study of Parmar et al., teenage pregnancies had a greater prevalence of PIH, and the majority of these cases were severe [23]. In the Anand S et al. study, 36.7% of the women were between the ages of 21 and 25 [24]. Lamminpaa et al. highlighted a higher incidence of preeclampsia in advanced maternal age, in contrast [25]. When Nadkarni et al. did an observational study in Indore, Madhya Pradesh, India, they found that the largest percentage of adolescent pregnancies, 55.8% was among those who were between the ages of 21 and 25 [26]. In the study by Owiredun et al., women between the ages of 24 and less did not have a significantly higher risk of developing PIH compared to women between the ages of 25 and 29 [27], but women between the ages of 35 and 39 did

have an approximately nine-fold higher risk of developing PIH compared to women between the ages of 25 and less. The mean age of hypertensive women who developed preeclampsia was  $26.01 \pm 7.13$  years, which was lower than the control group's average age of  $27.11 \pm 7.05$  years. This conclusion supports with earlier research showing preeclampsia affects people of a younger age group. Women aged 40 had twice the risk of developing pre-eclampsia, regardless of whether they were primiparous or multiparous, according to a study by Betsy Varughese, et al. [28]. According to Raddi Sudha A's study, the majority of the 65 women who had pregnancy-induced hypertension (69.23%) were between the ages of 19 and 24 [29].

### Socio-economic status

Indirectly reflecting the pregnant women's micro and macronutrient status, socioeconomic status is a significant risk factor. Based on three factors in urban communities—education, occupation, and income—the Kuppaswamy classification (Modified Kuppaswamy classification, 2012) classified people's socioeconomic level. Pregnant women in the unemployed group in the current study had a 69% PIH prevalence rate. Pregnant women with PIH were more frequently found in higher educational status groups, such as graduates (2%) and high school students (4.2%), whereas in terms of socioeconomic status (SES), they were more frequently found in lower class (72.4%) than the upper class (27.6%). Lower socioeconomic class (Kuppaswamy's classes III–V) was identified by P Nanjundan et al. as one of the risk factors that contributed to an elevated risk of PIH [30]. Study by Tebeu et al found that factors like illiteracy and a lack of employment were associated with hypertensive disorders in pregnancy using univariate analysis. On multivariate analysis, housewives and illiterate women had higher odds of developing hypertension during pregnancy and respectively [31]. Nevertheless, compared to healthy pregnant women, women with PIH experienced more home-related stress in the preceding year. According to a study by Borade et al in 2014, agricultural employees who must

perform farm work in addition to their regular home duties had a higher prevalence of hypertension during pregnancy than housewives [32]. According to recent research by Ali AA, education level and prenatal care are related, and education and antenatal care both have an impact on maternal mortality [33]. According to a study by shodhganga.inflibnet.ac.in, people of middle socioeconomic class (56 to 59%) and people of lower socioeconomic class (34 to 38%) were more likely to experience PIH. [34].

### Body mass index

In the current investigation, pregnant mothers who were in the moderately obese-2 group (5%) with a BMI of between 25 and 30 were shown to have a lower proportion of PIH. Although the studies that examined body mass index before pregnancy all utilised different ranges, they all revealed effects in the same direction, demonstrating that a higher body mass index is associated with a twofold increased risk of pre-eclampsia. According to one study by Milne et al, women with a pregnancy body mass index of 19–27 had a higher risk of developing PIH [35]. Pre-eclampsia risk was reported to be elevated by 50% in numerous pooled studies that examined higher versus normal body mass index at booking. A study by Lee CJ found that women with a pre-pregnancy BMI more than 24.2 kg/m<sup>2</sup> had a higher chance of having PIH [36]. Notably, Dr. Olumide Ojudun's study demonstrated the risk of developing PIH with a BMI >25 and that a body mass index > 35 at booking doubles the pre-eclampsia risk [37]. In the study by P. Nanjundan et al., overweight (>120% to 150% of pregnancy optimum body weight), was one of the risk factors that was linked to an elevated risk of PIH [30]. In the study of Parmar et al., 61% of the participants had obesity, and the majority had severe PIH, in order to assess the relationship between pregnancy BMI and unfavourable mother and newborn outcomes [23]. Owiredo et al.'s study showed that maternal obesity, as determined by the mother's Body Mass Index, was positively connected with the likelihood of having PIH and that obese women were five times more likely to do so [27]. This supports research that found a significant link between higher maternal body mass and the risk of preeclampsia (Aksornphusitaphong A et al., [38].

### Edema

In the current study, edema was found in 6% of pregnant women with PIH. According to a study by Prakash et al. [39], edema is the most common symptom that occurs in up to 80% of pregnant women in a healthy state as well as always in PIH patients.

### Stages of Hypertension

The majority of the pregnant women in the current study (27.6%) experienced stage-2 hypertension, which is followed by stage -1 hypertension (55.2%) and pre-hypertensive stage in 17.2% of pregnant women. Similar to this, a research by Bangal et al., found that out of 100 cases of PIH, 80% of cases were unbooked, and of these, 74.35% of cases had mild PIH, 80.95% had severe PIH, and 89.47% had eclampsia. These cases also had not received any antenatal care for the entirety of the pregnancy [40]. Women who ultimately developed preeclampsia had considerably higher systolic and diastolic blood pressure during the first trimester. Cut off values weren't specified in the study. Sibai et al. [41] discovered that greater systolic and diastolic blood pressures at the initial visit were linked to a higher incidence of pre-eclampsia (3.8% in women with diastolic blood pressure of less than 55 mm Hg and 7.4% in those with diastolic blood pressure of 70-84 mm Hg). According to a study on gestational hypertension and diet in the city of Udaipur by Mogra and Surana, 2012 [42], the majority of subjects' systolic blood pressure (88%) was in the Stage 1 range of 140-159 mm Hg, and 86 percent of them had Stage 1 diastolic blood pressure (90-99 mm Hg). The majority (50%) of subjects in Mehul T. Parmar's study had severe PIH, 29% had mild PIH, and 21% had moderate PIH [23].

### Gestational week in pregnancy

In the current study, the prevalence of PIH among pregnant women was shown to be highest between weeks 31 and 35, when it accounted for 44% of cases, and the mean gestational week was 34.45±5.0 weeks. Similarly, 71.4% of PIH cases in the study of Prasanna Kumar et al. [21], involved women who were more than 36 weeks pregnant. The mean gestational age was reported by Sandhya Sivakumar et al. [22] to be 37 weeks.

Other studies show mean gestational age to be 37.3 weeks, with a range of 34-39 weeks.

### Family history of Hypertension

In the current study, 10.8% of expectant mothers who had PIH belonged to families with a positive family history of hypertension. According to a study by Kirsten Duckitt, having a mother who had pre-eclampsia increases the probability of developing the condition by almost thrice, meaning that women who have severe pre-eclamptic toxemia (PET) are more likely to have a mother than a mother-in-law who also had the condition [20]. Family history of hypertension in one or more first-degree relatives was one of the risk factors that was linked to an elevated risk of PIH, according to P. Nanjundan et al. [30]. According to Pierre Marie Tebeu, using univariate analysis, it was discovered that family history of hypertension was one of many factors linked to hypertensive disorder in pregnancy. On multivariate analysis, it was

confirmed that women with family histories of hypertension still had a higher risk of developing hypertension during pregnancy [31]. According to Parmar et al's study, 60% of the participants had PIH in their families, and the majority of them had severe PIH [23]. Women with a family history of hypertension were almost 7 times more likely to develop PIH than women without a family history of hypertension, according to a research by Owiredu et al. [27].

### Conclusion

The study shows that PIH prevalence was high among the pregnant women came for the treatment. Proportion of PIH among antenatal mother was 6%.

Women with PIH were at higher risk of adverse pregnancy outcomes than those which does not have PIH. Young pregnant women, families with a history of hypertension, BMI, high cholesterol levels, previous incidents of hypertension, low socioeconomic status, anaemia, etc. were risk factors for PIH.

Therefore, in future, to lessen the negative effects of pregnancy-induced hypertension on the foetus, healthcare professionals should prioritise prevention, early detection, and timely therapy of the condition.

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