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Original Article

Pregnancy-induced hypertension: risk factors and current treatment strategies

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ABSTRACT

Hypertensive disorders during pregnancy are a major public health concern in both developed and developing countries. Early detection and treatment of maternal health issues reduce the severity of these issues. This study set out to identify possible risk factors of these conditions and evaluate current methods of treatment. Throughout the research (6 months), 80 PIH women who met the inclusion criteria were studied in an observational study. Women in their twenties and thirties are more likely to have pregnancy-induced hypertension. Preeclampsia and gestational hypertension in pregnancy are the most common types. Hypertension issues are more common among pregnant women who are more likely to be obese, have had previous pregnancies, and reside in rural areas. Medication for the treatment of pregnancy-induced hypertension is prescribed and administered regarding drugs used for primary hypertension. Methyldopa and labetalol are examples of first-line treatments. Patients with PIH who are about to give birth are given hydralazine intravenously (IV) or nifedipine orally (P.O.) as a second-line treatment. When providing antihypertensive medicines or any other medications, the well-being of both maternal and fetal is taken into consideration. The risks to both mother and child may be reduced with prompt treatment with additional, safe medications.

1. Introduction

The time during pregnancy is very important for both the mother and the developing baby. It is anticipated that 15% of women may have potentially fatal problems either during pregnancy, birth, or the postpartum period [1-3]. Around 5-8% of pregnant women, additionally, 5-22% of pregnancies primarily in developing countries, have pregnancy-induced hypertension (PIH), making it one of the most prevalent causes of maternal and newborn morbidity and mortality that develops throughout pregnancy and normally regresses after delivery [4]. Nearly 10% of pregnancies are thought to be complicated by hypertension globally [5]. Pregnancy-induced hypertension is defined as blood pressure (BP) readings that are 140/90 mmHg on two occasions or 160/110 mmHg on one occasion in a woman who was previously normotensive [6].

After the 20th week of pregnancy and throughout the puerperium, pregnancy-induced hypertension (PIH) complicates 6-8% of pregnancies and raises the risk of several serious obstetric problems [7]. Age over 40, obesity, and chronic maternal illnesses (diabetes, kidney diseases, autoimmune disorders), as well as the existence of PIH in prior pregnancies and any incidence in the

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family history, are risk factors for pregnancy-induced hypertension [8].

Pregnancy-induced hypertension (PIH) has been classified into four types of illnesses by the American College of Obstetricians and Gynaecologists - A woman is said to have gestational hypertension if her blood pressure at rest is at least 140/90 mm Hg after her 20th week of pregnancy, Hypertension that has been present for at least 20 weeks prior to pregnancy or that occurs during the first 20 weeks of gestation, Elevated blood pressure, swelling, and protein in the urine are all symptoms of pre-eclampsia or eclampsia (pre-eclampsia and seizures), Preeclampsia combined with persistent hypertension [9, 10].

Pregnancy-related hypertensive diseases are a major issue. It impacts 5%–8% of pregnant women worldwide [11] The leading causes of morbidity and mortality in mothers and newborns are preeclampsia and eclampsia. 5%–7% of pregnancies are affected by pre-eclampsia, which manifests as proteinuria and hypertension [4]. Pre-eclampsia and eclampsia are thought to be the cause of 14% of maternal fatalities globally and may result in renal and cardiovascular failure, hypertensive encephalopathy, hemorrhage into the brain, and disseminated intravascular coagulation (DIC) [12]. These illnesses are treated based on the advice of experts. The main goals of treating hypertension in pregnancy are to prevent maternal cerebrovascular and cardiovascular problems, protect uteroplacental and fetal circulation, and reduce pharmaceutical toxicity to the fetus [13].

Methyldopa, labetalol, beta-blockers (other than atenolol), slow-release nifedipine, and a diuretic in pre-existing hypertension are considered appropriate treatments. If a woman's blood pressure is well controlled on an agent pre-pregnancy she may continue it during pregnancy, except for angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers. If restarting drug therapy in women with chronic hypertension, methyldopa is recommended as first-line therapy. For emergency treatment in preeclampsia, IV hydralazine, labetalol and oral nifedipine can be used [9].

Methyldopa acts as a 2-adrenergic receptor agonist in the brain. It prevents the release of catecholamines, which contributes to vasoconstriction, at the central nervous system level [14]. As a result, systemic vascular resistance is lowered without a corresponding drop in cardiac output [15]. Labetalol, a non-selective beta-blocking drug, is often used during pregnancy [16] due to its ability to inhibit vascular beta-1 receptors. Second-line treatments for hypertension during pregnancy may include oral nifedipine and verapamil. Arterial vasodilation is caused by calcium channel blockers (CCBs), with nifedipine acting mostly on the endothelium and verapamil primarily on the heart [15]. Nowadays, severe hypertension in pregnancy most often requires intravenous hydralazine. Arteriolar smooth muscle is selectively relaxed by hydralazine [17]. Sodium nitroprusside is only given to pregnant women in extreme cases of high blood pressure [18].

2. Methods and materials

2.1. Study sites, design, and period

The study is an Ambispective Observational study conducted in the Obstetrics and Gynaecology department of a 300-bedded multi-specialty tertiary care teaching hospital, for 6 months. A total of 80 prescriptions were included in the study. The study protocol and written informed consent were approved by the institutional ethical committee of the hospital. To consider both inpatients and outpatients of the obstetrics and gynaecology ward of SVS hospital.

2.2. Inclusion criteria

Patients with pregnancy-induced hypertension who are willing to consent and pregnant women with comorbidities.

2.4. Exclusion criteria

Patients who underwent major surgery, patients with immune-deficient diseases like HIV, and Patients with concomitant diseases like TB.

2.6. Method of data collection

- Case Report Forms.
- Patient Questionnaire/Interview.

2.7. Study procedure

This is an Ambispective observational study, where eligible patients are enrolled in the study after obtaining their consent. The case report forms are used to collect the data of patients. This form primarily includes demographic information, present and past medical history, physical examination details, biomedical reports, and medication charts of the women with pregnancy-induced hypertension. The SVS Medical College Hospital served as the site of this investigation. From the moment of admission to the date of release, all information related to the study has been gathered, and the data has been evaluated.

2.9.1. Duration of the study:

The study was conducted for a period of 6 months

2.9.2. Place of study

The study was conducted at SVS MEDICAL COLLEGE & HOSPITAL.

3. Results

3.1. Age-wise distribution of PIH patients:

In our study, a total of 80 pregnant women were examined. Pregnancy-induced hypertension was found in 22 i.e., 27.5% of the women aged 18–20 years, 39 i.e., 48.7% of the women aged 21–30 years, 17 i.e., 21.2% of the women aged 31–40 years, and 02 i.e., 2.5% of the women aged in 41 years. This was broken down into gestational hypertension, chronic hypertension, preeclampsia, and eclampsia. (Table 1).

Table 1. Age-wise distribution of PIH patients

Age	Total no of patients	Percentage
18-20	22	27.5%
21-30	39	48.7%
31-40	17	21.2%
41	02	2.5%

3.2. Distribution of patients based on types of PIH disorder

There were 80 women with PIH broken down into the following types, of whom 37 i.e., 46.2% had gestational hypertension, 24 i.e., 30.0% had pre-eclampsia, 14 i.e., 17.5% had eclampsia, and 05 i.e., 6.2% had chronic hypertension (Table 2 and Fig 2).

Table 2. Distribution of patients based on types of PIH disorder

Type of PIH Disorders	No. of patients	Percentage
Pre-Eclampsia	24	30.0%
Eclampsia	14	17.5%
Gestational Hypertension	37	46.2%
Chronic Hypertension	05	6.2%

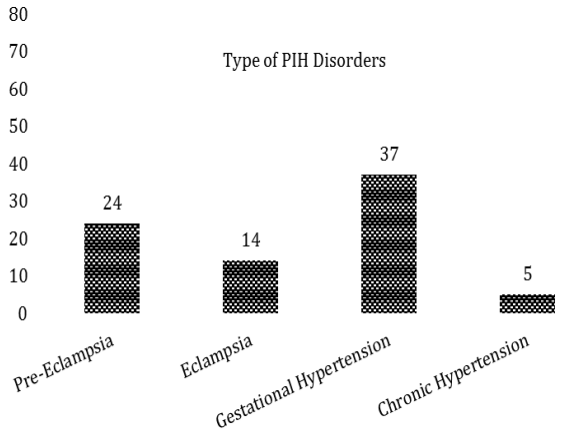

Fig. 1. Distribution of patients based on types of PIH disorder

3.3. Risk factors for hypertensive disorder in PIH disorder

Living in a rural region, being married at a young age, and not having a high school diploma were all shown to increase the likelihood of PIH, although they were found to be independent risk factors. Additional risk factors included having a history of abortion since oral contraceptives are associated with hypertension, being overweight (the leading cause of hypertension), and eating an unhealthy diet (a balanced diet is essential for maintaining healthy blood pressure in pregnancy). (Table 3).

Table3. Risk factors for hypertensive disorder in PIH disorder

Risk Factors	No. of patients	Percentage
Rural residents	30	37.5%
Overweight	09	11.2%
Less consumption of nutritional diet	08	10.2%
Comorbid disease	11	13.7%
History of multiple pregnancies	15	18.7%
History of abortion	07	8.7%

3.4 Antihypertensives used in the treatment of PIH disorders

In our study, we found that the first-line treatment for women with persistent hypertension is methyldopa, a centrally-acting 2-adrenergic receptor agonist. Preeclampsia, eclampsia, chronic hypertension, and gestational hypertension are treated with the medications Labetalol, which lowers blood pressure by inhibiting - and -adrenergic receptors, IV hydralazine, a direct vasodilator of arterioles, and/or oral Nifedipine, a calcium channel blocker. These drugs have a good safety record during pregnancy and are beneficial for lowering blood pressure.

Methyldopa is the medicine of choice for all forms of PIH, and the typical dosage ranges from 0.5 to 3 grams per day, split between morning and evening. Depression, hypotension, and sleep difficulties are typical adverse reactions, while haemolytic anaemia occurs rarely. There was no prevention of proteinuria with labetalol in women with pregnancy-induced hypertension. When used orally, a daily dose of 200 to 1200 mg is suggested, with dosages of 20 to 40 mg administered intravenously. Drowsiness, lethargy, sleep difficulties, inability to exercise, headaches, and cold fingers were often reported as adverse effects. Common adverse reactions to nifedipine, which is often administered as a second-line treatment in our study, include hypotension, oedema, facial flushing, and headaches when taken orally at doses of 10-30mg/day. Thrombocytopenia, polyneuropathy, and neonatal lupus are some of the adverse consequences of a daily dosage of 50–300 mg of IV hydralazine, which has rarely been suggested.

Antioxidants vitamin C 500 mg and vitamin E 400 IU are also used. The risk of preeclampsia may be lowered by taking a low dosage of aspirin, 75 mg a day. Women who are nutritionally deficient should take a calcium supplement. Magnesium sulphate has been shown to lessen the risk of maternal mortality and the risk of seizures in women who have a history of either condition. In addition to this medicine, we advised patients to follow non-pharmacological therapy approaches such as lifestyle changes, weight loss, and salt restriction, all of which help lower blood pressure.

4. Discussion

In our PIH research, it was shown that women between the ages of 21 and 30 had a higher frequency of pregnancy hypertension. A similar study conducted in India revealed that most of the women with PIH were within this age range [19]. The result was comparable to that of the cross-sectional prospective research completed in 2018 at Paropakar Maternity and Women's Hospital in Nepal, which revealed the greatest incidence (32.5%) in both the 20–24 and 25–29 years age groups [20]. Studies conducted in India by Aabidha et al. revealed similar results [21].

A research study by Sreeprathi N. and Subha Sivagami Sengodam observed that the prevalence of hypertensive disorders during pregnancy was 10.4% overall: gestational hypertension was diagnosed in 962 cases (47.4%); preeclampsia was diagnosed in 661 cases (32.6%); chronic hypertension was detected in 166 cases (8.2%); and severe pre-eclampsia superimposed on chronic hypertension was detected in 239 cases (11.8%) [22] are fairly like our study.

According to the results of the present research, living in a rural area increased the risk of developing a pregnancy-related hypertension disease. This result supports a prior finding from an epidemiological study of expectant women in Cairo, Egypt [23]. When comparing mothers with high and low body mass index, hypertensive disorders of pregnancy were more likely to occur in overweight and obese women. The latest result concurs with those earlier studies [24].

In this study, fruit intake was also revealed to be a significant predictor; women who consumed fewer fruits in their diets were more likely to have hypertensive disorders during pregnancy. This was further supported by a comprehensive review and meta-analysis of research, in which it was shown that a multivariable analysis of calcium consumption revealed a protective effect against hypertensive disorders of pregnancy [25, 26]. It has been shown in prior research that the most frequent predictor is diabetes mellitus, which increases a pregnant woman's propensity to develop hypertensive disorders during pregnancy [27].

In the current study, women who have had at least two prior pregnancies or abortions are more likely than non-hypertensive women to have PIH problems. Multiparity has been linked in the past to an increased risk of pregnancy-related hypertension [28, 29]. We found that the preferred therapy for PIH problems included nifedipine, hydralazine, labetalol, and methyldopa. Despite a review, provide nifedipine, labetalol, or methyldopa as first-line oral medications if your blood pressure is below 150/90 mmHg. Before combining two medications for persistent hypertension, the highest dosage of one medication should be used. Emergency hypertension caused by BP > 160/110 mmHg may cause eclampsia or a stroke in the mother. Parenteral treatment with labetalol (IV), hydralazine (IV), or nifedipine (PO) may be necessary if delivery is imminent [30].

Our study took place at one of the referral hospitals and was completed in a short time frame with a small sample size, which led to an overestimation of the pregnancy outcome in PIH. Without control groups, only PIH patients were examined, making it difficult to compare the various kinds of PIH. For greater comparisons within and between groups, more case-control studies may be performed.

5. Conclusions

Our study shows that pregnancy-related hypertension is more common in women between the ages of 21 and 30, followed by those between 18 and 20. The two most common hypertensive conditions among pregnant women were identified as gestational hypertension and pre-eclampsia. Pregnancy-related hypertension disorders were shown to occur more often in rural areas. Women who have had several pregnancies in the past had abortions, are overweight, have comorbid conditions, or consume a diet low in nutrients are at significant risk of having PIH. For PIH problems, the preferred therapies are nifedipine, hydralazine, labetalol, and methyldopa.

Abbreviation

BP: Blood Pressure
HDOP: Hypertensive Disorders of Pregnancy
IV: Intravenous
PIH: Pregnancy-induced hypertension
PO: Peroral

Conflict of Interest

The authors hereby declare that they have no conflict of interest.

Author's contributions

All authors equally participated in designing experiment analysis and interpretation of data. All authors read and approved the final manuscript.

Consent for publications

All authors have read and approved the final manuscript for publication.

Availability of data and material

The authors have embedded all data in the manuscript.

Informed Consent

The authors declare not used any patients in this research.

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Ethics approval and consent to participate

The ethical committee clearance was obtained from the Institutional Ethical Committee of SVS MEDICAL COLLEGE

HOSPITAL before initiating the study. Reference number: IEC/DHR-011/2022/155(1)

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