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Overview and current status of hypertensive disorder of pregnancy

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Abstract

Hypertensive disorders in pregnancy (HDP) have become enormous problem faced by public health because HDP is a mainreason of prenatal and antenatal mortality and morbidity. It includesgestational hypertension, chronic hypertension, preeclampsia-eclampsia, and chronic hypertension with superimposed preeclampsia.Although researches have been done to bring effective treatments in use, but many advances have yet to detect predictive test like imaging marker foridentification of preeclampsia. In spite of the available information which is putting some light on the treatment and diagnosis of HDP but still many researchers are unaware about immediate assessment and management. This article reviews HDPs' definition, its risk factor, diagnosis and indications for treatment of HDP for subsequent health [36].

Keywords: *HDP; diagnosis; prenatal; mortality; pathophysiology; treatment and hypertension*

Introduction

Hypertension in pregnancy is defined as: Systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg in two occasions at least 6 hours apart after fifth month of gestation for pregnancy induced hypertension or before pregnancy/before 20 weeks of gestation for chronic hypertension. Hypertensive disorders of pregnancy (HDP) comes under category which is characterized by increase in blood pressure. It is further classified into 4 categories such as gestational hypertension, preeclampsia-eclampsia, chronic hypertension (of any cause analysed before 5 months of pregnancy) and chronic hypertension with superimposed preeclampsia. Almost 6%-11% of all pregnancies considered as complicated ones due to hypertension disorders and this makes it a leading cause of perinatal as well as maternal mortality and morbidity [1].

Classification of hypertensive disorders during pregnancy (HDP) as per current guidelines:

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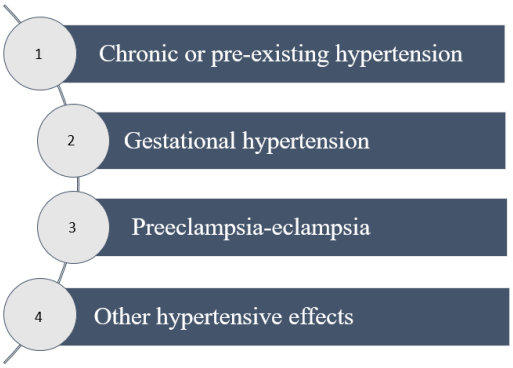


Fig.1 Types of hypertension [1]

HDP influence the morphology and function of the kidney. The reported studies have shown that a moderate increase in the level of urine albumin after gestation is more common in women who had HDP [2]. In cases when women having two consecutive deliveries the effect of first delivery adds upon to the second subsequent pregnancy such as higher BP condition in first pregnancy have higher risks of emerging as a hypertension in second pregnancy as per data from the National Institute of Child Health and Human Development (NICHD) Consecutive Pregnancy Study [3].

HDP long-term impact on cognitive function as well as structure of brain remain unidentified [4]. The relationship between stillbirth and various types of HDP has been explored by few large-scale studies. In addition, recent findings have shown that women with HDP are more prone to stillbirth cases and have lesser chances of singleton pregnancies [5].

The clinical effects like cerebrovascular and cardiovascular dysfunction as well as pathophysiological of HDP were seems to be reversible. But the observations are indicating that HDP causes long term effects on the health of women [6]. Approximately 10% of gestations have become complicated due to HDP. In developing nations, eclampsia or preeclampsia are the reason of death of about 40,000 women. It is estimated that preeclampsia is the only reason for approximately 40 to 60% of antenatal mortality in economical growing nations [7]. The International Society for the Study of Hypertension in Pregnancy (ISSHP) has published tips on prognosis to bring international team spirit of that means refer to the diverse hypertensive disorders of being pregnant, with the maximum current guidelines being released in 2014. They encompass a further class of white coat high blood pressure [8].

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Hypertensive pregnancy problems represent the maximum good-sized headaches of pregnancy and make a contribution substantially to perinatal and maternal mortality and morbidity. Most of the remedies of those problems are relied on suggestions of experts and their findings. Antenatal cardiac as well as cerebrovascular complications are prevented by the regulation of high blood pressure [9]. As per previous studies, if a woman has hypertension and give a birth to man then it seems more complex as compare to man born after normal blood pressure pregnancies, rating decrease on cognitive potential on the common age of twenty years. Here we take a look at whether the outcomes of hypertensive issues in pregnancy on cognitive capability persist into antique age among those men retested on the age of 65 to 76 years and predict age related change in cognitive capacity after age 20 years [10].

Types of hypertension during pregnancy (HDP):

1. Pre-existing or chronic hypertension
2. Gestational hypertension
3. Preeclampsia-eclampsia
4. Other hypertensive effects (including white-coat hypertensive effect, transient hypertensive effect, and masked hypertensive effect)

1. **Pre-existing hypertension:** Itis alsoknown as chronic hypertension. It shows it's impact on around 5% of girls throughout being pregnant. If hypertension persists for more than 12 weeks after delivery is likewise taken into consideration persistent high blood pressure. In the closing 20 years, the prevalence of chronic high blood pressure has enhanced in all racial and ethnic corporations inside the United States (US), with the finest growth among non-Hispanic black ladies. Additionally, persistent hypertension is of two types- 1º hypertension as well as 2º hypertension [14].
2. **Gestational hypertension:** Transient gestational high blood pressure is high blood pressure that arises within the second or 1/3 trimester. The high blood pressure is typically measured in the hospitalwhich includes the assessment of BP at regular time interval.This type of hypertension is related to approximately 40% hazard of growing authentic gestational high blood pressure or preeclampsia in the rest of the being pregnant[12].

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Vol-22-Issue-37-December -2019

3. **Preeclampsia-eclampsia:** Preeclampsia is characterized by way of the new onset of high blood pressure (BP ≥one hundred forty mm Hg systolic or ≥ninety mm Hg diastolic) at or after 20 weeks' pregnancy. Moreover, it is crucial to have ordinary BP documented both in early pregnancy or pre-pregnancy. However, a BP first detected after 12 weeks' pregnancy this is regular might also show the standard decrease in BP from baseline that happens via the end of the first trimester[32]. Eclampsia is found only in 0.5% of women with mild preeclampsia and in about 2–3% with severe preeclampsia[15].
4. **Other hypertensive effects:** Masked high blood pressure is another form of high blood pressure, characterized via BP this is every day at a health center or workplace visit however increased at different times, most generally identified through 24-hour ABPM or automated domestic BP tracking. Although that is a form of continual high blood pressure, the superiority of masked high blood pressure and its significance in gestation are less as per observations [12].

Risk factors for hypertensive disorders in pregnancy

S. no.	Types of HDP	Risk Factors
1	Chronic hypertension	Age above 30 years associated with the risk for preeclampsia superimposed Intrauterine growth restriction Abruptio placentae Premature birth C- section Personal history
		Advanced maternal age (above 40 years) Systemic lupus erythematosus Obesity Preeclampsia background Previous preeclampsia pregnancy

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2	Preeclampsia	Artificial insemination Chronic kidney disease Type I or type II diabetes mellitus Multifetal gestation
3	Gestational hypertension	Smoking Gestational diabetes mellitus Pre-existing disease
4	Other hypertensive disorder	Genetic variants Body mass index Family history Primipara Alcohol intake

Table 1 depicts risk factors of hypertensive disorders in pregnancy [14]

Diagnosis criteria for hypertensive disorder in pregnancy

S.no.	**Condition**	**Blood pressure**		**2 Readings at regular time interval (minutes)**	**Diagnostic hypertension**
		Systolic BP (mm Hg)	**Diastolic BP (mm Hg)**		
1	Preeclampsia with severe features	160	110	15	(i) Impaired liver function (ii) Renal insufficiency (iii) Thrombocytopenia (iv) Pulmonary edema (v) CNS signs
2	Preeclampsia without	140	90	240	(i) CNS signs (ii) Wet lung

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Vol-22-Issue-37-December -2019

	severe features				(iii) Thrombocytopenia (iv) Impaired liver function (v) Renal insufficiency
3	Gestational hypertension	140	90	240	(i) Lack of protein in urine (ii) Lab analysis (iii) Wet lung (iv) Central nervous system signs
4	Chronic hypertension	140	90	240	
4 (a)	Chronic hypertension with superimposed preeclampsia				New onset proteinuria or abrupt increase in proteinuria in a woman with known proteinuria prior to or in early pregnancy
4 (b)	Chronic hypertension with superimposed preeclampsia with severe features				(i) Thrombocytopenia (ii) Impaired liver function (iii) Renal insufficiency (iv) Pulmonary edema (v) CNS signs

Table 2 depicts diagnosis criteria for HDP [14]

The evaluation of an affected person with high blood pressure calls for greater than the diagnosis of increased BP. It has to also include evaluation of the goal organ harm, cardiovascular risk and other associated conditions that exerts its impact on the BP or

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associated target organ harm. This type of some studies is habitual assessments necessary in all patients. However, other patients' groups are easily observed by various other ways like medical examination, way of record and routine assessments. The pathogenesis of high blood pressure is well explained by a single gene mutation in rare inherited type of hypertension.

The scientific records have to deal with the time of the first diagnosis of high blood pressure, present day and previous BP measurements and medicines to treat hypertension. The previous record of patient with HDP is necessary in the evaluation of women with high blood pressure. Hypertension increases the risk of continual kidney disorder (CKD) and cardiovascular complications. Therefore, the medical record of all sufferers needs to be maintained for evaluation of world cardiovascular danger [13].

Treatment of hypertensive disorder in pregnancy

Treatment of severe hypertension

Drugs including hydralazine, methyldopa, isosorbide, magnesium sulfate, prazosin, calcium channel blockers, prostacyclin, ketanserin, urapidil, or diazoxide are using to reduce blood strain. Intravenous hydralazine, calcium channel blocker as well as intravenous labetalol are commonly used in the recent years to treat hypertension. Severe high blood pressure in being pregnant without quit-organ complications is taken into consideration. An extra forceful discount may also vicinity the fetus at danger for under perfusion, thinking about that the autoregulation of blood drift is not possible by fetoplacental unit. Blood stress and medical situations are strictly tracked in post-delivery care of ladies with preeclampsia. Moreover, magnesium sulfate has been accepted to treat seizure prophylaxis in ladies with preeclampsia with excessive characterization like proteinuria, neurological headaches, etc. [11].

Treatment of non-severe hypertension

The first choice of drugs like labetalol, nifedipine, methyldopa and hydralazine are generally encouraged to treat non-severe hypertension.

1. Oral labetalol: - Itconsiders as a first-line agent for non-severehigh blood pressure in gestation and according to the British pointers, it is acceptedas the best first line agent.Approximately 75% ladies have shown good response to oral drug delivery of labetalol as monotherapy as per prospective observations. The comparison of oral labetalol has been

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done with methyldopa in randomized trials and it is found out that it shows similar results in efficacy and protection. Recently, it is utilised to treat extreme hypertension, proteinuria as well as antenatal hospitalizations. However, some current findings indicate that it is not a good choice as methyldopa to prevent perinatal and maternal detrimental effects.

2. Calcium channel blockers: - Out of all, especially nifedipine is long-performing drug andfavoured as first line in maximum tips. When studies are performed on women treated with calcium channel blockers in first 12 weeks of gestation then it exhibits minimum teratogenicity. Moreover, methyldopa is safer and imparts better blood pressure control as compared to labetalol. Clinical comparative studies of oral dosage form of nifedipine and labetalol was done over pregnant women suffering from chronic hypertension.

3. Angiotensin converting enzyme inhibitors (ACE inhibitors) and angiotensin receptor blockers (ARBs): - ACE inhibitors continue to be first-line marketers in high blood pressure outdoor of being pregnant. These are also utilized for treatment of microvascular headaches of diabetes along with ARBs.As such, it's very important to recognize protection profile of first trimester, as it will aid the management of preconception care.

4.Nonsteroidal anti-inflammatory drugs (NSAIDs): - HDP can occur after childbirth. There are several factors affecting postpartum hypertension as the frame makes attempt to regain prepregnant physiology and extracellular fluid moves into the intracellular space. As a result, elevated blood pressure occurs and NSAIDs acts as supportive treatment [11].

5. **Device based treatments**: - These types of remedies have been developed for ladies suffering with high blood pressure problem that cannot be treated by using antihypertensive medicine.These therapies are in diverse ranges of medical improvement, with the maximum full-size facts available on electrical carotid sinus stimulation andrenal nerve ablation. None has been revealed efficacious in dropping BP in randomized sham-managed clinical trials, due to the fact both the number one endpoint became no longer completed or no trials were conducted. Finally, trials with hard clinical endpoints do not exist [12].

Medication	Dosage range	Dose frequency	Action
Labetalol	100-400 mg orally;	2-3 times a day	Act as Vasodilators to

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Vol-22-Issue-37-December -2019

	usual maintenance dosage 200-600 mg Mean daily dose 2400 mg/day		reduce BP by blocking β-1 and 2 receptors as well as α-1 vascular receptors
Nifedipine	Immediate release: initially 10 mg Ordinary preservative dose: 10-20 mg Mean daily dose:120 mg/day Extended release: 30-60 mg	Immediate release: tid Extended release: oid	Block entry of calciumions in peripheral arteries which leads to vasodilation
Hydralazine	Initially 10 mg (for 2-4 days) Mean daily dose: 300 mg/day	qid	Act as vasodilator to decrease BP
Methyldopa	25-500 mg oral Mean daily dose: 3000 mg/day	2-4 times daily	Reducesystemic vascular resistance and drop BP by acting as centrally performing α-2 adrenergic agonist

Table 3 depicts the medications for the treatment of HDP [14]

Antihypertensive medications contraindicated in pregnancy

Angiotensin-receptor blockers (ARBs) and angiotensin-changing enzyme (ACE) inhibitors both are contraindicated in pregnancy. If pregnant women have exposed to these drugs

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during second trimester of gestation then it can cause renal failure, fetal hypotension as well as fetal demise [14].

Conclusion

HDP is not considered as an uncommon complication in pregnancy. HDP impact can extended even after pregnancy also. It is cleared that if patient is having any HDP background then it can lead to various chronic diseases like cardiovascular ones as per epidemiological information.HDP can become a leading cause of antenatal mortality as well as morbidity. Current research helps to get better understanding of preeclampsia but still it has indefinable predictive analysis for the disease. There is no existence of any imaging test or biomarker to diagnose preeclampsia at present time. Immediate release nifedipine, i.v hydralazine as well as i.v labetalol still be the choice of drug to treat severe hypertension. However, non-severe hypertension can be treated by using first line drugs like methyldopa, oral labetalol and oral extended release nifedipine. In addition, diuretics and β-blockers are acceptable but RAAS inhibitors still comes under the category of contraindicated medicines.

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