ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Vol 16, Issue 10, 2023

Online - 2455-3891
Print - 0974-2441

Research Article

EVALUATION AND MANAGEMENT OF POSTPARTUM HYPERTENSION IN A TERTIARY CARE HOSPITAL

SETUMA MISHRA, PARNEET KAUR, SATINDER PAL KAUR*

Department of Obstetrics and Gynaecology, Government Medical College and Rajindra Hospital, Patiala, Punjab, India.
***Corresponding author: Satinder Pal Kaur; Email: saka0275@gmail.com**

Received: 24 March 2023, Revised* and *Accepted: 22 May 2023

ABSTRACT

Objective: The objective is to study the causative factors of postpartum hypertension (PPHTN), time taken for control of blood pressure (BP) in postpartum period and to study the anti-hypertensive drugs used in control of PPHTN.

Methods: The study was conducted for 1½ years. During the study, 190 women in postpartum period with high BP were enrolled in the study. A detailed record of history and general physical examination and local examination was done as per pro forma after written informed consent.

Results: Out of 190 subjects, 168 had a history of hypertension (HTN) in the antenatal period, and the rest 22 went on to develop HTN in the postpartum period. Gestational HTN and preeclampsia were the most frequent types of hypertensive disorders seen among subjects. In 42.1% of patients, PPHTN developed after 48 h and in 23.7% of cases developed within 48 h. BP normalized post-delivery in 22.6% of subjects. The majority (74.1%) of subjects took tablet labetalol post-delivery. 62.1% of patients took anti-hypertensive for more than 7 days and were discharged on treatment with advice to follow-up. 15.3% took treatment for <7 days. No treatment was required by 22.6% of subjects.

Conclusion: Our data identified a high prevalence of PPHTN. We found a significant correlation between the levels of severity of antepartum BP with the level of severity of postpartum BP. Monitoring of HTN is important in the postpartum period for all patients as the majority develop hypertension after 48 h.

Keywords: Postpartum hypertension, Chronic hypertension, Preeclampsia.

 DOI: http://dx.doi.org/10.22159/ajpcr.2023v16i10.47925. Journal homepage: https://innovareacademics.in/journals/index.php/ajpcr

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) are one of the main causes responsible for significant maternal and perinatal morbidity and mortality; especially in developing countries like India [1]. Hypertension (HTN) in pregnancy including postpartum is defined as systolic blood pressure (BP) 140 mm Hg or more and/or diastolic BP 90 mmHg or greater on 2 or more occasions measured at least 4 h apart [3]. HTN can be present before (antepartum), during (intrapartum), or after pregnancy (postpartum) [2]. HDP persist following delivery, many a time [4] and sometimes arises as new-onset HTN postpartum [5]. Adverse events can occur in both scenarios.

The exact incidence of postpartum HTN (PPHTN) is difficult to ascertain but PPHTN can be due to exaggeration of previous existing hypertensive disorders such as persistence of gestational HTN (GH), preeclampsia, or pre-existing chronic HTN or may arise as *de novo* after delivery. The incidence of *de novo*/new-onset PPHTN is not known, best estimates indicate that PPHTN is seen to complicate around 2% of all pregnancies [3]. As per the evidence available, it is found that it is a result of increased resistance in the uteroplacental circulation thus resulting in impaired blood flow and subsequent poor placental perfusion [5]. BP is known to decrease after delivery but it tends to increase around the 3rd–6th day of postpartum. Mobilization of large volumes of sodium and free water to the intravascular compartment following parturition is responsible for this increase [6].

The National Institute for Health and Care Excellence (NICE) recommends frequent monitoring of blood pressure in postpartum period for women with both preeclampsia (every 1–2 days for 2 weeks) and gestational hypertension (at least once between days 3 and 5) [7] The guidelines specify thresholds for the increase or start (≥150/100 mm Hg) and the reduction or stoppage (consider <140/90 mm Hg and reduce <130/80 mm Hg) of antihypertensive medication after birth. As such no recommendations are given regarding frequency or proportion of dose reduction or how to manage when more than one antihypertensive drug is being used [8]. The American College of Obstetricians and Gynecologists recommends BP monitoring in hospitals for 72 h after birth. It is recommended to check blood pressure again 7–10 days postpartum (or earlier if the woman is symptomatic) [9].

There are various causes of PPHTN, GH/-preeclampsia (new-onset or pre-existing before delivery) being the most common cause of PPHTN. We need to evaluate life-threatening conditions such as pheochromocytoma and cerebrovascular accidents as well [2].

Causes

1. Persistence of GH-preeclampsia (most common cause) – It is a pre-existing condition in the antepartum. It can be present as:
   a. Preeclampsia
   b. Eclampsia – It is diagnosed by the presence of headaches, visual changes, and seizures
   c. HELLP syndrome – It is diagnosed by the presence of hemolysis, low platelets, and increased liver enzymes (more than twice the normal value).
2. New-onset HTN – Its onset occurs 3–6 days in postpartum period. Its causes are as follows:
   d. Volume overload
   e. Medications/drugs – (non-steroidal analgesics and ergot derivatives)
   f. Ibuprofen and indomethacin.
3. Pre-existing/chronic HTN – HTN occurring before pregnancy or <20 week

METHODS

The study was conducted for 1½ years during the year 2021–2022.

It was a consecutive random sampling where women in the postpartum period whether delivered vaginally or by C-section with high blood pressure in the antenatal period and women who developed high BP in the immediate postpartum period were enrolled for the study. A detailed record of history general physical examination and local examination was done as per pro forma after written informed consent. Approval of the ethical committee was taken.

If normotensive during the antenatal period – BP was monitored twice on a daily basis till the day of discharge. If already hypertensive – BP was recorded every 6 h over 48 h and thereafter frequency was decreased according to the control of BP.

Inclusion criteria

1) Women in postpartum with newly developed HTN (HTN arising *de novo*)
2) Women in the postnatal period with a history of antenatal or intrapartum HTN (GH or preeclampsia).

Exclusion criteria

1) Women with chronic kidney or liver disease
2) Women with heart disease
3) Smokers
4) Any illicit drug use
5) Women who were not willing to participate in the study.
   - Initial treatment was continued with the same hypertensive that was taken during the antenatal period.
   - The dose of anti-hypertensive was titrated as per the given chart and regular blood pressure monitoring was done and participants were followed till the day of discharge.

RESULTS

A total of 190 subjects were enrolled during the study. The result of our study was as follows

The mean age in the study population came out to be 27±5.15 years (Table 1).

Of 190 subjects, 168 subjects (88.4%) had a history of HTN in the antenatal period and the rest 22 (11.6%) went on to develop HTN in the postpartum period. In these 168, GH and preeclampsia were the most frequent types of hypertensive disorders seen among subjects accounting for 30% and 51.6%, respectively (Fig. 1).

In our study, 31.5% of patients were overweight and 2.10% were obese making these groups at increased risk of HTN (Table 2).

In 42.1% of subjects, postpartum HTN developed after 48 h, and in 23.7% of cases developed within 48 h. Blood pressure was normalized post-delivery in 22.6% of subjects in the present study. About 11% of them developed *de novo* PPHTN (Fig. 2).

Fig. 3 shows anti-hypertensive treatment taken post-delivery. About 74.1% of patients took tablet labetalol, 24.5% of patients took both labetalol and amlodipine, and in the rest 1.5% apart from labetalol and amlodipine, the third drug enalapril had to be added for control of BP.

We observed in our study regarding the need for anti-hypertensive drugs (in days) post-delivery. About 62.1% of patients took anti-hypertensive for more than 7 days and were discharged on treatment with advice to follow-up. 15.3% took treatment for <7 days. No treatment was required by 23% of patients (Fig. 4).

We tried to find risk factors for the development of *de novo* PPHTN. Possible risk factors seen in the present study were maternal age, raised body mass index (BMI), family history of HTN, and history of a medical

Table 1: Age distribution in study population

Age	Number of subjects (%)
≤20	33 (17.4)
21–25	39 (20.5)
26–30	44 (23.2)
31–35	40 (21.1)
>35	34 (17.9)
Total	190 (100.0)
Mean age (years)	27±5.15

Table 2: BMI distribution among subjects as per international standards

BMI (kg/m^2)	Number of subjects (%)
Underweight (<18.5)	2 (1.05)
Normal (18.5–24.9)	124 (65.2)
Overweight (25)	60 (31.5)
Obese (>30)	4 (2.1)
Total	190 (100.0)
Mean BMI (kg/m^2)	24.22±2.51

BMI: Body mass index

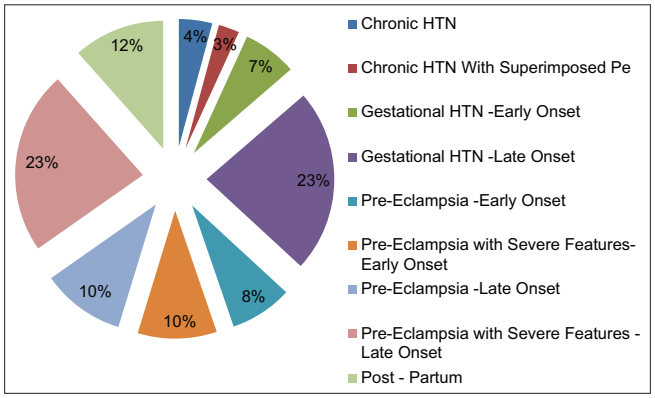

Fig. 1: Distribution of hypertensive disorders among subjects

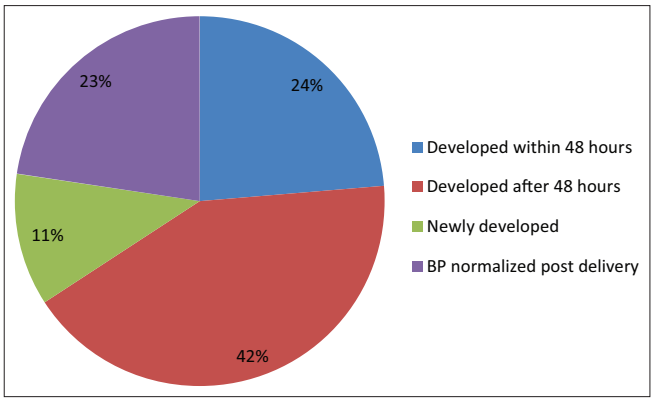

Fig. 2: Onset of postpartum hypertension in study subjects

disorder in the form of diabetes mellitus (DM). In 45.5% of patients, no risk factor could be identified (Table 3).

DISCUSSION

Our study included cases, both with persistent HTN following a pregnancy complicated by antenatal HDP and *de novo* HTN following a normotensive pregnancy and delivery. GH and preeclampsia accounted for the majority of these cases, whereas chronic HTN and superimposed preeclampsia accounted for the remainder.

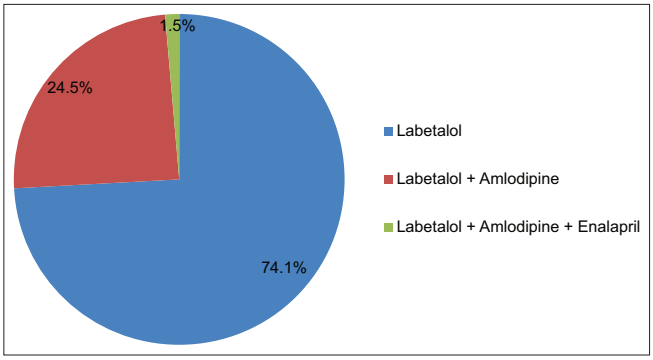

Fig. 3: Anti-hypertensive drug taken post-delivery

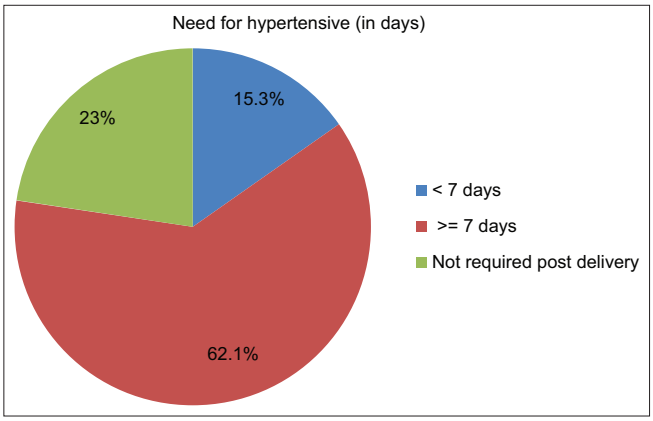

Fig. 4: Need for hypertensive in postpartum period

The mean age in our study was 27.65±5.15 years which was comparable to other studies [10-13]. The mean age was 30.8±5.1 years in the study conducted by Reddy *et al.* [14].

Maximum percentage of subjects presented in our hospital with preeclampsia (including both early and late-onset type, with/without severe features) followed by GH and then chronic HTN, which is comparable to other studies [15,16] (Table 4).

The mean BMI in the present study was 24.22±2.51 kg/m^2 which is comparable to other studies [12,14].

In a study conducted by Ishaku *et al.* [16], the mean BMI in those who received antenatal care was 28±7.7 kg/m^2.

BMI is a modifiable risk factor and women can be counseled to maintain healthy BMIs to reduce the risk of complications. BMI is an important risk factor for HDP in the antenatal as well as postnatal period.

About 88.7% of patients who presented with preeclampsia in the antenatal period went on to develop PPHTN in the present study whereas 47.3% of cases with GH developed PPHTN which is comparable to studies of other authors [16,17] (Table 5).

In the present study, 147 subjects developed PPHTN, out of which 22 of them developed *de novo* PPHTN. Of these, 86.4% of patients had developed HTN after 48 h and the rest (13.6%) developed within 48 h. When we tried to look at risk factors for *de novo* PPHTNin the present study, we observed raised BMI in 22.7% of patients, family history of HTN in 9.1% presence of associated medical condition (gestational diabetes mellitus) in 9.1% of patients and 13.6% of cases were of age ≥35 years.

In a study conducted by Goel *et al.* [17], 9.9% of women went on to develop *de novo* PPHTN. Women with a higher BMI at delivery

Table 3: Risk factors for *de novo* PPHTN

Risk factors	Number of subjects (%)
Age ≥35 years	3 (13.6)
Raised BMI	5 (22.7)
Family history of HTN	2 (9.1)
Associated medical condition (GDM)	2 (9.1)
No risk factors	10 (45.5)
Total	22 (100)

BMI: Body mass index, GDM: Gestational diabetes mellitus, HTN: Hypertension, PPHTN: Postpartum hypertension

Table 4: Comparison of distribution of hypertensive disorders of pregnancy among subjects in various studies

Author	Preeclampsia (%)	Gestational HTN (%)	Chronic HTN (%)
Hauspurg *et al.* (2019) [15]	44	41	12
Ishaku *et al.* (2021) [16]	50	18.5	11.5
Present study (2023)	51.6	30	6.8

HTN: Hypertension

Table 5: Comparison of development of PPHTN

Author	Incidence of development of PPHTN	
	Pre-eclampsia cases (%)	Gestational hypertension cases (%)
Goel *et al.* 2015 [17]	85.7	75
Ishaku *et al.* 2021 [16]	62	23
Present study	88.7	47.3

PPHTN: Postpartum hypertension

(mean±standard deviation: 34.1±7.3 vs. 30.0±5.2 kg/m^2), and women with a history of DM (13.0% vs. 3.9%) demonstrated an increased risk of developing *de novo* PPHTN as compared to normotensive women who remained normotensive (all p<0.001).

In our study, labetalol was given as the first line for the treatment of PPHTN followed by amlodipine and enalapril. Since the majority of patients in our study were already on tablet labetalol in their antenatal period so were put on the same treatment post-delivery for control of HTN. In 24.5% combination of amlodipine and labetalol was given, whereas enalapril was added to control PPHTN in just 1.4% of cases.

About 62.1% of patients took anti-hypertensive for more than 7 days and were discharged on the same with advice to follow-up in the medicine outpatient department after 1 week with a regular BP record. In 15.3% of cases, HTN was settled and was normotensive at the time of discharge. In a study conducted by Ishaku *et al.* [16], only 33% of patients with high blood pressure were on anti-hypertensive therapy within the first 5 postpartum days. In a study conducted by Ngene and Moodley [18], a total of 49/50 (98%) and 48/50 (96%) of the patients were on anti-hypertensive therapy in pre-delivery and postpartum (days 0–3) periods, respectively.

CONCLUSION

Our data identified a high prevalence of PPHTN. We found a significant correlation between the level of severity of antepartum BP with the level of severity of postpartum BP. In the present study, we could correlate the risk factors that could have led to the development of *de novo* PPHTN.

Monitoring of HTN is important in the postpartum period for all patients as majority develop HTN after 48 h. Further studies need to explore these factors and implement measures to reduce the prevalence of

PPHTN and long-term outcomes associated with uncontrolled BP after delivery.

CONFLICT OF INTEREST

None.

AUTHORS' FUNDING

None.

REFERENCES

1. Goldenberg RL, McClure EM, Macguire ER, Kamath BD, Jobe AH. Lessons for low-income regions following the reduction in hypertension-related maternal mortality in high-income countries. Int J Gynaecol Obstet 2011;113:91-5. doi: 10.1016/j.ijgo.2011.01.002, PMID: 21349517
2. Sibai BM. Etiology and management of postpartum hypertension-preeclampsia. Am J Obstet Gynecol 2012;206:470-5. doi: 10.1016/j.ajog.2011.09.002, PMID: 21963308
3. Sharma KJ, Kilpatrick SJ. Postpartum hypertension: Etiology, diagnosis, and management. Obstet Gynecol Surv 2017;72:248-52. doi: 10.1097/OGX.0000000000000424, PMID: 28426127
4. Podymow T, August P. Postpartum course of gestational hypertension and preeclampsia. Hypertens Pregnancy 2010;29:294-300. doi: 10.3109/10641950902777747, PMID: 20670153
5. Hu X, Zhang L. Uteroplacental circulation in normal pregnancy and preeclampsia: Functional Adaptation and maladaptation. Int J Mol Sci 2021; 22:8622. https://doi.org/10.3390/ijms22168622, PMID: 34445328, PMCID: PMC8395300
6. Chandiramani MA, Shennan AH, Waugh JJ. Modern management of postpartum hypertension. Trends Urol Gynaecol Sex Health 2007;12:37-42.
7. National Collaborating Centre for Women's and Children's Health (UK). Hypertension in Pregnancy: The Management of Hypertensive Disorders during Pregnancy. London: RCOG Press; 2010. PMID: 22220321
8. Magee L, von Dadelszen P. Prevention and treatment of postpartum hypertension. Cochrane Database Syst Rev 2013;4:CD004351. doi: 10.1002/14651858.CD004351.pub3, PMID: 23633317
9. Hypertension in pregnancy. Report of the American college of obstetricians and gynecologists' task force on hypertension in pregnancy. Obstet Gynecol 2013;122:1122-31. doi: 10.1097/01.AOG.0000437382.03963.88, PMID: 24150027
10. Viteri OA, Alrais MA, Pedroza C, Hutchinson M, Chauhan SP, Blackwell SC, *et al*. Torsemide for prevention of persistent postpartum hypertension in women with preeclampsia: A randomized controlled trial. Obstet Gynecol 2018;132:1185-91. doi: 10.1097/AOG.0000000000002941, PMID: 30303905
11. Mogos MF, Salemi JL, Spooner KK, McFarlin BL, Salihu HH. Hypertensive disorders of pregnancy and postpartum readmission in the United States: National surveillance of the revolving door. J Hypertens 2018;36:608-8. doi: 10.1097/HJH.0000000000001594, PMID: 29045342
12. Ainuddin J, Javed F, Kazi S. Oral labetalol versus oral nifedipine for the management of postpartum hypertension a randomized control trial. Pak J Med Sci 2019;35:1428-33. doi: 10.12669/pjms.35.5.812, PMID: 31489020; PMCID: PMC6717493
13. Vigil-De Gracia P, Ruiz E, López JC, de Jaramillo IA, Vega-Maleck JC, Pinzón J. Management of severe hypertension in the postpartum period with intravenous hydralazine or labetalol: A randomized clinical trial. Hypertens Pregnancy 2007;26:163-71. doi: 10.1080/10641950701204430, PMID: 17469006
14. Reddy M, Rolnik DL, Harris K, Li W, Mol BW, Da Silva Costa F, *et al*. Challenging the definition of hypertension in pregnancy: a retrospective cohort study. Am J Obstet Gynecol 2020;222:606.e1-21. doi: 10.1016/j.ajog.2019.12.272, PMID: 31954700
15. Hauspurg A, Lemon LS, Quinn BA, Binstock A, Larkin J, Beigi RH, *et al*. A postpartum remote hypertension monitoring protocol implemented at the hospital level. Obstet Gynecol 2019;134:685-91. doi: 10.1097/AOG.0000000000003479, PMID: 31503166; PMCID: PMC7289450
16. Ishaku SM, Jamilu T, Innocent AP, Gbenga KA, Lamaran D, Lawal O, *et al*. Persistent hypertension up to one year postpartum among women with hypertensive disorders in pregnancy in a low-resource setting: A prospective cohort study. Glob Heart 2021;16:62. doi: 10.5334/gh.854. PMID: 34692386; PMCID: PMC8428291
17. Goel A, Maski MR, Bajracharya S, Wenger JB, Zhang D, Salahuddin S, *et al*. Epidemiology and mechanisms of *de novo* and persistent hypertension in the postpartum period. Circulation 2015;132:1726-33. doi: 10.1161/CIRCULATIONAHA.115.015721, PMID: 26416810; PMCID: PMC4816491
18. Ngene NC, Moodley J. Pre-eclampsia with severe features: Management of antihypertensive therapy in the postpartum period. Pan Afr Med J 2020;36:216. doi: 10.11604/pamj.2020.36.216.19895, PMID: 32963682; PMCID: PMC7490136