A prospective, parallel group, open label, observational study to compare efficacy and feto-maternal outcomes in treatment of pregnancy induced hypertensive patients

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ABSTRACT

Background: Pregnancy induced hypertension (PIH) is defined as elevation in blood pressure 140/90 mmHg or greater after 20 weeks of gestation on two occasions more than 4 hours apart in a newly diagnosed patients. Complications of pregnancy are the major health problems leading to maternal and perinatal mortality and morbidity. Some anti-hypertensive drugs are commonly used to control hypertension.

Methods: A prospective, parallel group, open label observation study was carried out at SVS Medical Hospital, Mahabubnagar. Patients were divided into three groups based on severity of hypertension and the drug used for treatment.

Results: Of 120 patients diagnosed with PIH majority (50%) of women were in the age group of 21-24 years with 33-37 gestational age. In the present study there was a significant reduction in BP after the treatment with Labetalol when compared to Nifedepine and Methylldopa. Although, all the three groups have shown significant reduction in BP during 24 hrs treatments and the mean time to achieve target BP was shown less in Labetalol group when compare to Methylldopa and Nifedepine and the maximum doses required to achieve target BP was in between 4-6 doses/day. 40% of complication observed was HELLP syndrome.

Conclusions: Our study coincides with the previous findings that labetolol is an efficacious and safer drug for use in control of PIH and mean time required to achieve target BP is low when compared to nifedipine and methylldopa.

Keywords: Anti-hypertensive, Perinatal, Pregnancy induced hypertension

INTRODUCTION

Pregnancy Induced Hypertension (PIH) is defined as increase in systolic and diastolic blood pressure to (≥140/90 mmHg) with or without proteinuria (≥300 mg/24 hours) after 20 weeks of gestation and resolving after 12 weeks postpartum.1 According to the Canadian Hypertension Society, PIH refers to one of four conditions: a) pre-existing hypertension, b) gestational hypertension and pre-eclampsia, c) pre-existing hypertension plus superimposed gestational hypertension with proteinuria and d) unclassifiable hypertension.2 Leading cause of maternal deaths due to hypertensive disorders ranges from 6 to 10% for which the leading risk factor is intra cerebral hemarorrhage.3 Complications due
to hypertension in pregnancy can be categorized as fetal and maternal complications.

Fetal complications
Intrauterine growth retardation (IUGR) and fetal death.4

Maternal complications
HELLP syndrome, temporary blindness, abruptio placentae, disseminated intravascular coagulation (DIC), acute renal failure (ARF), pulmonary edema, arrhythmias, liver lesions, intracranial or hepatic hemorrhage, adult respiratory distress syndrome (ARDS), hypervolemia and risk of recurrent preeclampsia.5

Treatment of PIH can be attributed to low/high blood pressure levels, gestational age, severity of symptoms and risk factors. After adequately evaluating all the anti hypertensives for their use during pregnancy some drugs are used to prevent maternal and fetal complications and many other drugs are contraindicated due to their adverse effects.6-8 Most frequently used anti-hypertensives to treat PIH are methyldopa, labetolal, acebutolol, metoprolol, pindolol, propranolol and calcium channel blockers such as nifedipine. The society of obstetrician and gynecologists of Canada has suggested labetolal, nifedipine and hydralazine as the first line therapy for severe hypertension.9

Methyldopa a centrally acting adrenergic agonist decreases BP by decreasing sympathetic nerve activity which results in arterial dilation, at high doses it causes sedation and depression. Labetolol has advantages over other Beta blockers due to its additional arteriolar vasodilation activity that helps to lower peripheral vascular resistance with little or no decrease in cardiac output, however it causes foetal bradycardia10.

Calcium channel blockers (CCBs) such as Nifedipine are commonly used during pregnancy and lactation to treat hypertension, arrhythmia, and preeclampsia and also to prevent premature labour and its complications.11

As PIH is one of the root cause for many feto-maternal complications, the present study was planned to evaluate the safe and efficacious anti-hypertensive option for managing PIH and also to assess feto-maternal outcomes for the choosen drugs in Mahabubnagar, India.

METHODS
A prospective, parallel group, open label observational study was conducted in the Department of Obstetrics and Gynecology from August 2017 to January 2018 at a 300 bedded super specialty teaching hospital at Mahabubnagar comparing Nifedipine, labetolal and methyldopa in the management of pregnancy induced hypertension.

120 women with pregnancy induced hypertension with a gestational age more than 28 weeks gestation were included in the study.

Inclusion criteria
Patients with systolic blood pressure ≥160 mmHg and/or diastolic blood pressure ≥110 mmHg with a pregnancy greater 28 weeks gestation.

Exclusion criteria
Patients with asthma, heart disease, allergic to nifedipine, labetalol or methyldopa, liver disease, diabetes, heart rate 120 beats/min.

All the patients included in the study were randomized into three treatment groups.

- Group A-treated with nifedipine (40 cases)
- Group B-treated with a labetolal (40 cases)
- Group C-treated with Methyldopa (40 cases)

Patients randomized to the nifedipine group were administered 10 mg of oral hydralazine. At regular intervals of 1 hour BP was monitored. The dose was repeated until the target blood pressure that is systolic blood pressure <160 mmHg and diastolic blood pressure <110mmHg was achieved. Patients in the labetolal group were administered with 20mg of oral Labetolal. At regular intervals of 1 hour BP was monitored. The second dose of 100 mg inj. labetolal was given if the target blood pressure was not achieved. Patients in the Methyldopa group were administered with 250mg of oral Methyldopa.

Blood pressure was monitored at every 1 hour interval.

The time required for blood pressure to reach the target value was noted. The number of doses required to achieve the target value was noted. Adverse effects like maternal hypotension, tachycardia, nausea, abruptio placentae were noted if any were reported. The patients were followed up and complications arising as a result of severe hypertension were noted. Data obtained was analysed statistically. Two way ANOVA was used to analyse the data. Probability values less than 0.05 were considered significant.

RESULTS
A total of 120 patients participated in the study with mean age of 24.85 for nifedipine, 24.17 for labetolal and 24.25 for methyldopa. The majority of participants were between the age group of 21-24 (49.1%).

There was no significant difference with respect to age distribution between the groups. Similarly majority of participants in all treatment groups are primiparous (35%) and primigravidas (55.83%) as seen from Table 1.
Table 1: Age wise, parity, gravida distribution.

| Age(yrs) | Nifedipine (%) | Labetalol (%) | Methyldopa (%) |
|----------|----------------|---------------|----------------|
| <20      | 1 (2.5)        | 0 (0)         | 3 (7.5)        |
| 21-24    | 20 (50)        | 20 (50)       | 19 (47.5)      |
| 25-29    | 15 (37.5)      | 19 (47.5)     | 14 (35)        |
| >30      | 4 (10)         | 1 (2.5)       | 4 (10)         |
| Mean age | 24.85          | 24.17         | 24.25          |

Parity distribution of cases

| Parity | Nifedipine (%) | Labetalol (%) | Methyldopa (%) |
|--------|----------------|---------------|----------------|
| P0     | 6 (15)         | 5 (12.5)      | 7 (17.5)       |
| P1     | 20 (50)        | 15 (37.5)     | 14 (35)        |
| P2     | 8 (20)         | 5 (12.5)      | 8 (20)         |
| P3& above | 6 (15)     | 15 (37.5)     | 11 (27.5)      |

Gravida distribution of cases

| Gravida | Nifedipine (%) | Labetalol (%) | Methyldopa (%) |
|---------|----------------|---------------|----------------|
| Primi gravida | 21 (52.5) | 23 (57.5) | 23 (57.5) |
| Gravida-2 | 9 (22.5)   | 6 (15)       | 8 (20)        |
| Gravida-3 | 7 (17.5)   | 9 (22.5)     | 7 (17.5)      |
| Gravida 4 and above | 3 (7.5) | 2 (5)       | 2 (5)         |

When gestational age was compared in all the groups, about more than 50% of PIH patients were in the 33 to 37 weeks of gestation. Next highest percentages of patients were found in 38 to 40 weeks of gestation followed by 29 to 32, 25 to 28, and 21-24 weeks as seen in Table 2.

As given in Table 3 and 4 when efficacy was compared between the groups of all the three drugs there was a significant reduction in systolic and Diastolic BP observed after 24 hours, but the level of significance was higher in Labetalol group (117.6±8 -systolic), (72±10.79-diastolic) compared to methyldopa (128.5±9.8-systolic), (78.5±9.75-diastolic) and nifedipine groups (125.6±9.9-systolic), (79.67±8.47-diastolic).

Table 2: Gestational age of cases.

| Gestational age (weeks) | Nifedipine (%) | Labetalol (%) | Methyldopa (%) |
|-------------------------|----------------|---------------|----------------|
| 21-24                   | 3 (7.5)        | 0 (0)         | 0              |
| 25-28                   | 0              | 4 (10)        | 5 (12.5)       |
| 29-32                   | 1 (2.5)        | 6 (15)        | 4 (10)         |
| 33-37                   | 29 (72.5)      | 24 (60)       | 22 (55)        |
| 38-40                   | 7 (17.5)       | 6 (15)        | 9 (22.5)       |

Table 3: Mean systolic BP (before and after 24 hrs treatments).

| Group     | Pre-treatment value of mean SBP | Post 24 hrs treatment mean SBP | P value | Inference |
|-----------|---------------------------------|--------------------------------|---------|-----------|
| Nifedipine| 146.1±10.1                      | 125.6±9.9                      | 0.0228  | Significant |
| Labetalol | 148.25±13.18                    | 117.6±8                        |         |           |
| Methyldopa| 150±21                          | 128.5±9.8                      |         |           |

Table 4: Mean diastolic BP (before and after 24 hrs treatments).

| Group     | Pretreatment value of mean DBP  | Post 24 hrs treatment mean DBP | P value | Inference |
|-----------|---------------------------------|--------------------------------|---------|-----------|
| Nifedipine| 98.56±9.58                      | 79.67±8.47                     | 0.0250  | Significant |
| Labetalol | 98.76±8.33                      | 72±10.79                       |         |           |
| Methyldopa| 98.25±12.57                     | 78.5±9.75                      |         |           |

Table 5: Mean time required to achieve target BP.

| Group     | Mean (hrs) | SD     | P value |
|-----------|------------|--------|---------|
| Nifedipine| 86.4       | 31.59  |         |
| Labetalol | 65.96      | 29.51  | 0.0187  |
| Methyldopa| 75         | 34.5   |         |

All the three drugs were found to be significant with P value 0.0228 for mean systolic BP and for diastolic BP P value was found to be 0.0250. Similarly when mean time required to achieve target BP was compared, the least time required to achieve the target BP is seen in labetalol group (65.96 hrs with SD 29.51) followed by Methyldopa(75 hrs with SD 34.5) and nifedipine (86.4 hrs with SD 31.59). The P value for all the three groups were 0.0187 and statistical results found to be significant as seen in Table 5.

Table 6: No. of doses given to achieve target BP.

| No. of doses (mg/day) | Nifedipine | Labetalol | Methyldopa |
|-----------------------|------------|-----------|------------|
| 1-3                   | 2          | 5         | 2          |
| 4-6                   | 21         | 23        | 19         |
| 7-9                   | 12         | 9         | 9          |
| >10                   | 5          | 3         | 10         |
of complications were observed in methyldopa group and least in labetalol group as seen in Table 8.

Table 9: Maternal obstetric outcome & onset of labor.

| Maternal obstetric outcome | Nifedipine | Labetalol | Methyldopa |
|----------------------------|------------|-----------|------------|
| Caesarean (LSCS)           | 32 (80%)   | 30 (75%)  | 31 (77.5%) |
| Norma (NVD)                | 8 (20%)    | 10 (25%)  | 9 (22.5%)  |
| Onset of labour            |            |           |            |
| Onset                      |            |           |            |
| Spontaneous                | 37 (92.5%) | 36 (90%)  | 34 (85%)   |
| Induced                    | 3 (7.5%)   | 4 (10%)   | 6 (15%)    |

When maternal obstetric outcome was compared maximum number of LSCS and NVD were seen in nifedipine (80%) and labetalol (25%) treatment group respectively. Among them maximum number of spontaneous and induced labors were seen in nifedipine and methyldopa group as seen in Table 9. When indications for LSCS were studied patients with severe PIH elicited highest rate followed by oligohydromnios and IUGR, imminent eclampsia, fetal distress, eclampsia in decreasing order as seen in Table 10.

Table 10: Indications of LSCS.

| Indications                  | Nifedipine | Labetalol | Methyldopa |
|------------------------------|------------|-----------|------------|
| Foetal distress              | 4 (12.5%)  | 3 (10%)   | 6 (19.35%) |
| Severe pih                   | 7 (21.875%)| 14 (46.67%)| 15 (48.38%)|
| Eclampsia                    | 6 (18.75%) | 2 (6.67%) | 1 (3.22%)  |
| Imminent eclampsia           | 5 (15.625%)| 6 (20%)   | 5 (16.12%) |
| Oligohydromnios and IUGR     | 10 (31.25%)| 7 (23.33%)| 4 (12.90%) |

When maternal complications were compared our study revealed HELLP syndrome as most common complication followed by pulmonary edema, preeclampsia, renal failure, oligohydromnios, abruptive placenta and postpartum haemorrhage. Eclampsia and preterm delivery were also seen. No maternal complications were seen in 48 cases. Maximum numbers

Table 8: Maternal complications.

| Maternal complications | Nifedipine | Labetalol | Methyldopa |
|------------------------|------------|-----------|------------|
| HELLP syndrome         | 6          | 5         | 5          |
| Renal failure          | 3          | 2         | 2          |
| Pre-eclampsia          | 3          | 2         | 5          |
| Eclampsia              | 3          | 2         | 1          |
| Abrupto placenta       | 1          | 1         | 2          |
| Oligohydromnios        | 2          | 2         | 3          |
| Pulmonary oedema       | 4          | 3         | 4          |
| Postpartum hemorrhage  | 2          | 2         | 3          |
| Pre term delivery      | 3          | 2         | 5          |
| No complications       | 15         | 19        | 14         |

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Table 7: Classification of PIH distribution of patients.

| Type of PIH | Nifedipine | Labetalol | Methyldopa |
|-------------|------------|-----------|------------|
| Mild        | 33         | 23        | 24         |
| Moderate    | 3          | 3         | 1          |
| Severe      | 4          | 14        | 15         |

Mean systolic (SBP) and diastolic (DBP) blood pressure after delivery shows reduction in systolic and diastolic blood pressure which was extremely significant in labetalol group (119.5±9.46-systolic), (68.06±17.43-diastolic) when compared to nifedipine (123.24±10.57-systolic), (76.78±14.83-diastolic) and methyldopa group (129.5±15.35 –systolic) (78.08±15.16-diastolic) P values for SBP was 0.0132, and for DBP was 0.0132 respectively. The P value for all the three groups and statistical results were found to be significant as seen in

Table 12: Mean diastolic BP before and after delivery.

| Group      | Mean DBP (before delivery) | Mean DBP (after delivery) | P value | Inference       |
|------------|-----------------------------|---------------------------|---------|-----------------|
| Nifedipine | 92±9.92                     | 76.78±14.83               | 0.0181  | Significant     |
| Labetalol  | 93.5±10.27                  | 68.06±17.43               |         |                 |
| Methyldopa | 95±7.51                     | 78.08±15.16               |         |                 |
Table 11 and 12. When perinatal outcomes was compared there was no significant difference seen between treatment groups with respect to parameters such as birth weight, and gestational age at birth, cases of IUGR and number of infants admitted to NICU as shown in Table 13.

### Table 13: Perinatal outcomes.

| Perinatal outcomes                        | Nifedipine (%) | Labetalol (%) | Methyldopa (%) |
|-------------------------------------------|----------------|---------------|----------------|
| Birth weight based on gestational age     |                |               |                |
| Appropriate for gestational age (AGA)     | 26 (65)        | 27 (67.5)     | 23 (57.5)      |
| Small for gestational age (SGA)           | 13 (32.5)      | 12 (30)       | 15 (37.5)      |
| Large for gestational age (LGA)           | 1 (2.5)        | 1 (2.5)       | 2 (5)          |
| Birth weight                              | 13 (32.5)      | 9 (22.5)      | 16 (40)        |
| Low birth weight (LBW)                    | 1 (2.5)        | 2 (5)         | 2 (5)          |
| Extremely low birth weight (ELBW)         | 2 (5)          | 1 (2.5)       | 3 (7.5)        |
| Normal birth weight (Nbw)                 | 27 (67.5)      | 31 (77.5)     | 24 (60)        |
| NICU admissions                           | 11 (27.5)      | 12 (30)       | 11 (27.5)      |
| Perinatal death                           | 1 (2.5)        | 0             | 1 (2.5)        |
| Still birth                               | 6 (15)         | 5 (12.5)      | 7 (17.5)       |
| Total deaths                              | 7 (17.5)       | 5 (12.5)      | 8 (20)         |
| Live births                               | 33 (82.5)      | 35 (87.5)     | 32 (80)        |
| Pre term births                           | 3 (7.5)        | 2 (5)         | 5 (12.5)       |
| Term births                               | 37 (92.5)      | 38 (95)       | 35 (87.5)      |

### Table 14: Adverse effects of drugs.

| Adverse effects         | Nifedipine (%) | Labetalol (%) | Methyldopa (%) |
|-------------------------|----------------|---------------|----------------|
| Tachycardia             | 11 (27.5)      | 3 (7.5)       | 5 (12.5)       |
| Occipital headache      | 8 (20)         | 10 (25)       | 3 (7.5)        |
| Postural hypotension    | 1 (2.5)        | 0             | 5 (12.5)       |
| Drowsiness              | 3 (7.5)        | 5 (12.5)      | 14 (35)        |
| Myalgia                 | 6 (15)         | 4 (10)        | 1 (2.5)        |
| Weakness                | 8 (20)         | 15 (37.5)     | 4 (10)         |
| Depression              | 3 (7.5)        | 3 (7.5)       | 8 (20)         |

Tachycardia (27.5%) was common ADR in nifedipine group, weakness 15 (37.5%) in labetalol and drowsiness in methyldopa group 14 (35%) as shown in Table 14.

**DISCUSSION**

PIH is one of the major global problem which complicates foetus and mother, with the increase in Age the risk of PIH increases as maternal age is important risk factor of PIH. In our present study, incidence of PIH occurs between the age group 21-24 in all the three groups (50% in nifedipine group, 50% in Labetalol group, 47.5% in methyldopa group) which was similar to study conducted by Babbar et al and similarly there were no significant difference was observed in age distribution in the groups. In our study majority of them (35%) were primiparities, and (55.83%) were primigravidas which was similar to study conducted by Sajith et al.

Most patients with PIH in all three groups belonged to 33-37 weeks gestational age which was similar to study conducted by Babbar et al. The mean time to achieve target BP was shown less in labetalol group (65.96 hrs with SD 29.51) when compared to methyldopa and nifedipine. The similar studies have been seen in Babbar et al. In present study, the maximum doses required to achieve target BP were in between 4-6 doses/day among all the treatment groups.

The mean systolic and diastolic blood pressure before and after delivery were significant in all the three groups with marked reduction in blood pressure (119.5±9.46 in systolic and 68.06±17.43 in diastolic) was seen in Labetalol group (P=0.0001) after delivery, similar studies have been seen in Thakur et al.
In present study HELLP (13.3%) syndrome is most common complication observed followed by pulmonary edema in 9.1% of patients. 8.3% of patients observed to have preeclampsia. 5.8% of complications were renal failure, oligohydrominios, and postpartum haemorrhage. 5% of patients was observed to have eclampsia and preterm delivery.

Only 3.33% of patients observed to have abruptive placenta represents maternal complications were absent in 45.66% of PIH patients which is compared with Reddy et al.13 Study in which postpartum hemorrhage (13.2%) is common complication followed by imminent eclampsia 3.9%.

Adverse effects of drugs in which patients under nifedipine group shows tachycardia as common 11 (27.5%) ADR while labetalol group commonly shows weakness 15 (37.5%) methyldopa group commonly shows drowsiness 14 (35%), similar studies were observed in Babbar et al, in which most common adverse effects were occipital headache (3-9%), postural hypotension (3-8%), tachycardia (4-11%), and depression (2-7%) which was similar to study conducted by Babbar et al.13

CONCLUSION

Anti-hypertensive drugs are used to provide adequate measures in controlling or preventing severe hypertension/ hypertensive crisis, maximize the gestational age and to minimize the maternal and foetal complications. Present study results coincides with previous findings that labetalol is an efficacious and safer drug for use in the control of PIH.

It has very low incidence of maternal and foetal side-effects together with the excellent perinatal outcome in a condition usually accompanied by a high maternal and foetal mortality and morbidity which assures its suitability for use during pregnancy. Results of the study recommends use of nifedipine, labetalol and methyldopa in management of mild and severe PIH.

Outcome of the study can be used in developing guidelines of management of PIH. Further, well designed randomized control trials are desired to identify long term effects of these agents.

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REFERENCES

1. Watanabe K, Naruse K, Tanaka K, Suzuki Y. Outline of definition and classification of Pregnancy induced Hypertension (PIH). Hypertension Res Pregnancy. 2013;1:3-4.
2. Helewa ME, Burrows RF, Smith J, Williams K, Brain P, Rabkin SW. Report of the Canadian Hypertens-sion Society Consensus Conference: 1. Definitions, evaluation and classification of hypertensive disorders in pregnancy. CMAJ. 1997;157:15-25.
3. Rezaei Z, Sharbar FR, Pourmojib M, Youetzadeh-Fard Y, Motvealain M, Khazaepour Z, et al. Comparison of the Efficacy of Nifedipine and Hydralazine in Hypertensive Crisis in Pregnancy. Acta Medica Iranica. 2011;49(11): 531-12.
4. Disease Extm Emergency Medicine Clinical Reviews, Hypertension In Pregnancy. Thomson Micromedex: Micromedex Healthcare Series Available at: http://www.thomsonhc.com/librarian/ND_PN/Main/…/hcs. Accessed on 13 June 2006.
5. Grujic I, Milasinovic L, Hypertension, pre-eclampsia and eclampsiamonitoring and outcome of pregnancy. Med Pregl. 2006;59(11-12):556-9.
6. Naden RP, Redman CW. Antihypertensive drugs in pregnancy. Clin Pernatol. 1985;12(3):521-38.
7. Ferrao MH, Pereira AC, Gersgorin HC, Paula TA, Correa RR, Castro EC. Treatment effectiveness of hypertension during pregnancy. Rev Assoc Med Bras. 2006;52(6):390-4.
8. Fabry IG, Richart T, Cheng X, Van Bortel LM, Staaessen JA. Diagnosis and treatment of hypertensive disorders during pregnancy. Act Clin Belg. 2010;65(4):229-236.
9. Magee LA, Helewa M, Moutquine JM, van Dadelszen P. Diagnosis, evaluation and management of the hypertensive disorders of pregnancy. JOGC. 2008;30(3):1-31.
10. Dharwardkar MN, Kanakamma MK, Dharwardkar SN, Rajagopal K, Gopakumar C, Divya James Fenn J, et al. Methyldopa Versus Labetalol in Management of Preeclampsia and Gestational Hypertension. Gynecol Obstetrics. 2014;4:9.
11. Alabdulrazzaq F, Koren G. FRCPC FACMT, Canadian Family Physician • Le Médecin de famille canadien Juillet 2012.
12. Saxena S, Srivastava PC, Thimmaraju KV, Mallick AK, Dalmia K, Das B. Socio-demographic Profile of Pregnancy Induced Hypertension in a TertiaryCare Centre. Scholars J Applied Med Sci. 2014;2(6):3081-6.
13. Babbar K. A comparative study of efficacy of antihypertensive drugs, and feto-maternal outcome, in the treatment of pregnancy induced hypertension. Int J Reprodcontracept Obstet Gynecol. 2015;4(6):1846-52.
14. Thakur V. Comparison of effect of nifedipine, labetalol and methyldopa in treatment of hypertension in pregnancy in a tertiary care government hospital. Int J Reprod Contracept Obstet Gynecol. 2016;5(1):1-7.

15. Kavitha Reddy K. Maternal outcome in pregnancy induced hypertension in a teaching hospital in rural area in telangana. J Evidence Based Med Healthcare. 2016;3(77):4171-4.

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