Assessment of Prescription Pattern,Safety and Efficacy of Antihypertensive drugs used in the treatment of Pregnancy-Induced Hypertension-An Observational Study

Abinath Moorthy[1], Ramya Subramaniyan[2]*, Dr.Kannan K[3] and Dr.Mirunalini S[4],
[1]*Pharm.D VI Year (INTG), Department of Pharmacy, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu – 608002.*
[2*]*Pharm.D VI Year (INTG), Department of Pharmacy, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu – 608002.*
[3]*Professor, Department of Pharmacy, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu – 608002.*
[4]*Professor, Department of Obstetrics and Gynaecology, Cuddalore Government Medical College and Hospital, Chidambaram, Tamil Nadu – 608002.*
[1]*E-mail: abinathmoorthy97@gmail.com*
[2*]*E-mail: apothecary1002@gmail.com*
[3]*E-mail: egkkannan@gmail.com*
[4]*E-mail: mirunalinisomu@gmail.com*

Corresponding Author:

Ramya Subramaniyan, Pharm.D VI Year (INTG), Department of Pharmacy, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu – 608002.
E-mail: apothecary1002@gmail.com Mobile No: +91 9159476445.

Abstract

Background: *The Fetomaternal health is compromised in case of pregnancy-induced hypertension.The risk of preterm labour, placental insufficiency, abruptio placentae, renal changes and maternal convulsions is high in case of PIH.The antihypertensive drugs are crucial in reducing the high blood pressure and it's subsequent complications.*

Objective: *The primary objective is to study the prescription pattern, safety and efficacy of antihypertensive drugs and the secondary objective is to observe the impact of PIH on fetomaternal and neonatal outcome.*

Methods: *This study is a prospective observational single centre study and conducted in ward, Department of Obstetrics and Gynaecology, Government Cuddalore Medical College and Hospital, Chidambaram-608002.This study includes inpatients.Filling Proforma (Preformed data collection form) by reviewing case sheets and face to face interaction with patients.Percentages are determined for categorical variables.*

Results: *Antihypertensive treatment were carried out in compliance with standard treatment guidelines.Most of the prescribed antihypertensives came from the National List of Essential Medicines (NLEM 2022).Most of the prescription pattern indicators correlate with the WHO-STD criteria.The most common adverse drug reaction experienced which was known for Labetalol were elevated liver enzymes(64.58%) and paresthesia(13.54%).Flushing, cough and gastroesophageal reflux(4.17%) were the common ADR experienced with Nifedipine.The average percentage (43.90%) and (28.67%) of patients return to their normal blood pressure after receiving monotherapy and combinational therapy respectively.*

Conclusion: *The observational study on prescription pattern, safety and efficacy of antihypertensive drugs used in the treatment of PIH presents promising findings.It demonstrates that the effectiveness of antihypertensives in reducing maternal, fetal and neonatal morbidity and mortality by maintaining the blood pressure within the normal range and the rationality in prescribing drug is high.Maternal hypertension normalize after delivery.While some minor adverse effects were observed, they were generally well-tolerated and transient, posing minimal risk to mother and fetus.No serious maternofetal and neonatal adverse drug reactions were evident in this study.No post-partum complications were identified.Identifying risk factors and proper management of hypertension at an early stage will be beneficial in providing better patient care and minimizing further complications.*

Keywords: *antihypertensive, maternal health, blood pressure, gestational hypertension and pre-eclampsia.*

1. Introduction

Pregnancy-induced hypertension is the hypertension with or without proteinuria and edema, which typically manifests clinically in the later stages of pregnancy and goes away when the conceptus is delivered. It includes gestational hypertension, pre-eclampsia, and eclampsia[1].

Hypertensive disorders are the most common medical complications of pregnancy (6-10%) and a major cause of maternal morbidity and mortality(15%) and foetal morbidity and mortality (22%).Women with gestational hypertension are at risk for progression to pre-eclampsia, eclampsia, and placental abruption.The risks are increased, if patients are diagnosed at lower gestational age[2].Preventing hypertensive problems during pregnancy is impossible, but an early detection and treatment improve results for both the mother and the fetus.The blood pressure (BP) typically decreases momentarily during the early stages of pregnancy as a process of adaptation, but subsequently rises as the pregnancy goes on[3].

The risk of preterm birth, placental abruption, fetal growth restriction, and other complications is high in the hypertensive disorders of pregnancy and the risk of these complications is directly proportional with the severity of BP elevation[4].Globally, 14% of maternal deaths due to hypertensive disorders[5].

Instead of immediate delivery at preterm, controlling the high blood pressure is recommended as an aspect of expectant management in pregnant women with severe hypertension or

preeclampsia.But, if the maternal or fetal condition shows deterioration with uncontrolled severe hypertension, stroke, haemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome, etc., delivery is recommended at any time [6].

35.6% of women with severe preeclampsia deliver the offspring immediately due to uncontrolled hypertension[7].Effective treatment is necessary for severe hypertension in pregnancy to protect the mother and child from the risk of complications. Although many antihypertensive agents are used for treating severe hypertension, evidence on their effectiveness and safety profile is inconclusive. Therefore, this study aimed to assess the prescription pattern, safety and efficacy of antihypertensive drugs used in the treatment of pregnancy-induced hypertension.

2. Materials and Method

This is a prospective observational study, carried out for 6 months in the department of Obstetrics and Gynaecology, Government Cuddalore Medical College and Hospital.Selection of subjects is based on the inclusion and exclusion criteria.Study proforma(Data collection form) is designed to collect all the details like inpatients number, name, age, chief complaints, history of present illness, past medical and medication history, prescription details and clinical diagnosis.

A thorough medical history, including the patient's obstetric, menstrual, family, and personal histories were obtained at the time of admission.The patient's gestational age was also noted.A thorough physical examination was conducted and the results of a full serial obstetric examination were documented.Estimated fetal weight was recorded.Abnormal laboratory findings were noted.

The present study was carried among the pregnancy-induced hypertensive patients prescribed with antihypertensive drug under guidance from the department.

Symptoms, risk factors, blood pressure, APGAR score, birth weight, Neonatal Intensive Care Unit (NICU) admissions, adverse maternofetal and neonatal outcome, mode of delivery, gestational age at delivery, prescription pattern details and any adverse drug reactions with usage of antihypertensives are intended to be collected.

2.1. Inclusion Criteria

1. Patient who are admitted in the department of obstetrics and gynaecology and are getting treatment for pregnancy induced hypertension.
2. Patient with gestational age of 20 weeks or more.
3. Patient with or without co-morbidities

2.2. Exclusion Criteria

1. Patient who are unwilling to participate in the study.
2. Patient with chronic hypertension.
3. Outpatient.
4. Critically ill and unconscious patient.
5. Patient with psychological illness.

3. Observation and Results

Majority of the patients admitted with pregnancy-induced hypertension fall within the age range of 21-25 years.The gravidity status of the admitted patients demonstrated that 60.40% were primigravida which means they were pregnant for the first time and 7.29% have multiple pregnancies. Most patients diagnosed with PIH at the gestational age of 36-40 weeks (40.63%).Among various types of PIH, many patients diagnosed with gestational hypertension(85.42%) followed by severe preeclampsia(11.46%).

79.20% of patients delivered child during admission and many (67.10%) delivered through emergency LSCS.80.26% of patients had their delivery at the gestational age of 36-40 weeks.68.42% of the patients had delivered between -16 to +6 days away from their estimated date of delivery.85.53% of the patients return to their normal blood pressure after delivering their child.Most of the patients admitted with the complaints of pedal edema(27.73%), followed by lower abdominal pain(11.03%), headache(8.75%), right sided upper abdominal pain(6.46%), vomiting(4.56%) and decreased urine output(3.80%).

Most of the patients have hypothyroidism(12.5%)as their comorbidities, followed by gestational diabetes mellitus(10.42%), obesity(10.42%), heart disease(7.29%), respiratory tract infection(5.21%), anemia(4.17%), asthma(3.13%) and seizure(2.08%).Taking the expected risk factors into consideration, many patients were primigravida (60.41%), followed by having family history of hypertension (18.75%), multigravida (15.63%), obesity (10.42%), diabetes(10.42%), PIH in previous pregnancy(10.42%), twin pregnancies(7.29%), family history of PIH(7.29%), rhesus immunization(6.25%), teenage mother(4.17%) and older mother(4.17%).

Among delivered child, 53.66% were female and 46.34% were male.Nearly 51.22% of child born with the low birth weight of less than 2.5 kg.6 babies out of 82 were died.

APGAR score evaluates the baby's clinical condition, at 1 minute interval most neonates(59.76%) had normal APGAR score, followed by 32.93% of neonates were moderately depressed and 7.32% were severely depressed.However, at 5 minutes interval, 87.80% had normal APGAR score and about 7.32% had low APGAR score of 0-3 and were considered severely depressed.

Taking the adverse maternal outcome into consideration, many patients had changes in RFT(65.63%), followed by elevated liver enzymes(64.58%).6 fetuses were dead intrauterinely, among those 3 were demised intrauterinely.30.10% of fetuses were estimated to be born with low birth weight and 16.50% were delivered at preterm.31 neonates need NICU admission due to reason such as low birth weight,low APGAR score, small for gestational age, meconium aspiration, respiratory distress syndrome, neonatal hypoglycemia and thrombocytopenic seizure.Abnormal maternal fundus eye examination noted were Grade1 hypertensive retinopathy(7.29%), BE Hyperemic disc(3.13%), BE optic disc cupping(2.08%), Left eye vessels tortuous(1.04%), Pale optic disc(1.04%), BE arteriolar attenuation(1.04%), BE microcornea(1.04%), BE Iris coloboma(1.04%) and BE chorioretinal coloboma(1.04%).

96 prescriptions were included in this study and totally, 1244 drugs were prescribed among various categories.12.96 were the average number of drugs prescribed per prescription, which does not correlate with the WHO standard value of 1.6 to 1.8.Average number of antihypertensives prescribed per prescription were 1.31.(99.19%) of antihypertensive drugs prescribed from NLEM-2022 and this correlates nearly with the WHO prescribing indicator of 100%.(20.33%) of antihypertensive drugs prescribed from WHO-EML-2023 and which does not correlates with the WHO prescribing indicator's standard value of 100%.

20.82% of antibiotics were prescribed, which correlates with the WHO standard value of 20-26.80%.All antihypertensive drugs were prescribed by their generic name.Most of the prescriptions (57.29%) had 12-21 number of drugs.27.73% of drugs prescribed from nutritional supplement category, followed by antibiotics(20.82%).9.89% of drugs were prescribed from antihypertensive category.All ADR experienced patients took Labetalol.

Almost all patients were prescribed with Labetalol(100%), followed by Nifedipine (15.63%).All patients were prescribed with oral antihypertensives, only 5.21% of patients had prescribed with intravenous antihypertensive.84.38% of patients were on the monotherapy with antihypertensives.70.83% of patients were experienced adverse drug reaction which was known for prescribed antihypertensive drug.

There are no new ADRs found among participants.

The most common adverse drug reaction experienced which was known for Labetalol were elevated liver enzymes(64.58%) and paresthesia(13.54%).Flushing, cough and gastroesophageal reflux(4.17%) were the common ADR experienced with Nifedipine.

The average percentage (43.90%) and (28.67%) of patients return to their normal blood pressure after receiving monotherapy and combinational therapy.

Table 1. Demographic profile of Patients

Attributes		No of Patients	Percentage
Patient age (Years)	15 – 20	9	9.38
	21-25	41	42.70
	26-30	32	33.33
	31-35	11	11.46
	Above 35	3	3.13

Gravida Status	Primigravida	58	60.40
	G2	23	23.96
	G3	12	12.50
	G4	3	3.13
Pregnancy type	Singleton Pregnancy	89	92.71
	Multiple Pregnancy	7	7.29

Table 2. Clinical profile of Patients

Attributes		No of Patients	Percentage
Gestational age at diagnosis of PIH	20-25	16	16.67
	26-30	18	18.75
	31-35	22	22.92
	36-40	39	40.63
	Above 40	1	1.04
Type of PIH	Gestational hypertension	82	85.42
	Nonsevere preeclampsia	1	1.04
	Severe preeclampsia	11	11.46
	Antepartum eclampsia	1	1.04
	Postpartum eclampsia	1	1.04
Delivery status	Delivered	76	79.20
	Not delivered	20	20.80
Mode of Delivery	Emergency LSCS	51	67.10
	Vaginal	23	30.26
	Elective LSCS	1	1.32
	Instrumental-forceps	1	1.32
Gestational age at delivery (Weeks)	26-30	2	2.63
	31-35	10	13.16
	36-40	61	80.26
	Above 40	3	3.95
Relation between estimated date of delivery and date of delivery	-85 to -63	4	5.26
	-62 to -40	6	7.90
	-39 to -17	14	18.42
	-16 to +6	52	68.42
Post delivery condition	Normal BP	65	85.53
	Gestational hypertension	5	6.58
	Pre-eclampsia	5	6.58
	Eclampsia	1	1.32

Table 3. Demographic profile of Neonates

Attributes		No of Neonates	Percentage
Gender	Female	44	53.66
	Male	38	46.34
Birth Weight (kg)	Less than 2.5 Kg	42	51.22
	2.5 Kg or more	40	48.78
Mortality	Alive	76	92.70
	Dead	6	7.30

Table 4. Clinical profile of Neonates

Attributes		No of Neonates	Percentage
APGAR Score (At 1 min)	0 – 3 (Severely Depressed)	6	7.32
	4 – 6 (Moderately Depressed)	27	32.93
	7 – 10 (Normal)	49	59.76

APGAR Score (At 5 min)	0 – 3 (Severely Depressed)	6	7.32
	4 – 6 (Moderately Depressed)	4	4.88
	7 – 10 (Normal)	72	87.80

Table 5. Adverse Maternofetal and Neonatal outcome		
Adverse Maternal outcome		
Attributes	**No of Patients**	**Percentage**
Changes in RFT	63	65.63
Elevated liver enzymes	62	64.58
Need for labour induction	46	47.92
Abnormal fundus of the eye	17	17.71
Anaemia	16	16.67
Preeclampsia	12	12.50
Oligohydramnios	10	10.42
Thrombocytopenia	8	8.33
PROM	2	2.08
Pulmonary edema	1	1.04
PPH	1	1.04
PPROM	1	1.04
Adverse Fetal outcome		
Low estimated birth weight	31	30.10
Preterm delivery	17	16.50
IUGR	14	13.59
Reduced Heart rate	8	7.77
Fetal distress	7	6.80
Absence of Heart rate	6	5.83
Intrauterine death	5	4.85
Intrauterine fetal demise	3	2.91
Adverse Neonatal outcome		
NICU admission	31	37.80
Low Birth weight	29	35.37
Low APGAR score	25	30.49
Meconium aspiration	19	23.17
Small for gestational age	8	9.76
Death	6	7.32
Respiratory distress syndrome	5	6.10
Stillbirth	3	3.66
Neonatal hypoglycemia	2	2.44
Thrombocytopenic seizure	1	1.22

Table 6.Prescription pattern of antihypertensive drugs		
WHO-prescribing indicator	**Data**	**WHO-STD**
Total no. of prescription	96	-
Total no. of drugs prescribed	1244	-
Average no. of drugs per prescription	12.96	1.6-1.8
Total number of anti-hypertensives prescribed	126	-
Average number of anti-hypertensives per prescription	1.31	-
Percentage of antihypertensive drugs prescribed from (NLEM -2022)	99.19 %	100 %
Percentage of antihypertensive drugs prescribed from (WHO-EML-2023)	20.33 %	100 %
Percentage of antibiotics prescribed	20.82 %	20-26.8 %

Percentage of antihypertensive drugs prescribed by generic name	100 %	100 %
Distribution based on the number of drugs per prescription		
Attributes	**No of Prescription**	**Percentage**
2-11	37	38.54
12-21	55	57.29
22-31	4	4.17
Distribution based on the category of drugs prescribed		
Category of drugs	**Total No. of drugs prescribed**	**Percentage**
Nutritional supplement	345	27.73
Antibiotics	259	20.82
Electrolytes	139	11.17
Antihypertensive	123	9.89
Analgesic and antipyretic	94	7.56
Antiulcer	80	6.43
Local Anaesthetic	39	3.16
Antithyroid	22	1.77
Antiemetic	19	1.53
Antidiabetic	13	1.04
Corticosteroid	13	1.04
Anticoagulant	13	1.04
Antiepileptics	11	0.88
Others	71	5.70
Distribution based on the name of antihypertensive drug		
Attributes	**No of Patients**	**Percentage**
Labetalol	96	100
Nifedipine	15	15.63
Amlodipine	5	5.21
Furosemide	3	3.13
Enalapril	1	1.04
Metoprolol	1	1.04
Prazosin	1	1.04
Mannitol	1	1.04
Distribution of patients based on the route of administration of antihypertensive drug		
Oral	96	100
Intravenous	5	5.21
Distribution of patients based on the type of therapy		
Monotherapy	81	84.38
Combinational therapy	6	6.25
Monotherapy with Combinational therapy	9	9.38

Table 7. Safety profile of antihypertensive drugs		
Distribution of patients based on the adverse drug reaction		
Adverse drug reaction	**No.of patients**	**Percentage**
Present	68	70.83
Absent	28	29.20
Distribution of patients based on the adverse drug reaction experienced with prescribed antihypertensive drug		

Prescribed antihypertensive drug	No.of patients experienced ADR	Percentage
Labetalol	68	70.83
Nifedipine	6	6.25
Amlodipine	1	1.04
Enalapril	1	1.04
Distribution of patients based on the adverse drug reaction which was known for Labetalol		
ADR which was known for Labetalol	**No. of patients**	**Percentage**
Elevated liver enzymes	62	64.58
Paresthesia	13	13.54
Dizziness	11	11.46
Diaphoresis	11	11.46
Edema	9	9.38
Fatigue	8	8.33
Lightheadedness	6	6.25
Congestion of nasal sinus	4	4.17
Orthostatic hypotension	4	4.17
Tingling sensation of scalp	3	3.13
Dyspnea	3	3.13
Pruritus	3	3.13
Altered taste sense	3	3.13
Nausea	2	2.08
Rash	2	2.08
Bronchospasm	1	1.04
Alopecia	1	1.04
Depression	1	1.04
Elevated serum blood urea nitrogen	1	1.04
Distribution of patients based on the adverse drug reaction which was known for Nifedipine		
ADR which was known for Nifedipine	**No. of patients**	**Percentage**
Flushing	4	4.17
Cough	4	4.17
Gastroesophageal reflux	4	4.17
Peripheral edema	3	3.13
Heart burn	3	3.13
Ankle edema	2	2.08
Headache	1	1.04
Muscle cramps	1	1.04
Constipation	1	1.04

Table 8.Efficacy profile of antihypertensive drugs

Distribution of patients based on the efficacy of monotherapy during the course of treatment

Drug	Dose	Frequency	No. of patients used	No. of patients return to normal blood pressure after using drug	Percentage of patients return to normal blood pressure after using drug

T.Labetalol	100mg	OD	2	1	50
	100mg	BD	60	42	70
	100mg	TID	42	15	35.71
	100mg	QID	1	0	0
	100mg	2-1-1	1	1	100
	50 mg	BD	6	5	83.33
Inj. Labetalol	20 mg	OD	3	2	66.67
T.Nifedipine	10 mg	BD	3	1	33.33
	10 mg	TID	1	0	0
T. Enalapril	5 mg	BD	1	0	0

Distribution of patients based on the efficacy of combinational therapy during the course of treatment

Combinational therapy regimen	No. of patients used	No. of patients return to normal blood pressure after using drug	Percentage of patients return to normal blood pressure after using drug
T. Labetalol 100mg BD+Inj.labetalol 20 mg IV+T.Nifedipine 10mg TID	1	0	0
T. Labetalol 100 mg BD+Inj.Labetalol 20 mg IV+Inj.Furosemide 40 mg IV OD+T.Metoprolol 50 mg BD+T.Amlodipine 5 mg OD	1	0	0
T. Labetalol 100 mg BD+T.Nifedipine 10 mg TID+inj.Labetalol 20 mg IV+Inj.Furosemide 40 mg IV OD+T.Metoprolol 50 mg BD+T.Amlodipine 5 mg OD	1	0	0
T. Enalapril 5mg BD+Inj.Furosemide 40 mg IV OD	1	0	0
T. Labetalol 100 mg TID+T.Nifedipine 10 mg BD	5	1	20
T. Labetalol 100mg TID+T.Amlodipine 5 mg BD	2	1	50
T. Labetalol 100 mg TID+T.Nifedipine 10 mg TID	5	3	60
T. Labetalol 100 mg BD+T.Nifedipine 10 mg BD	2	2	100
T.Labetalol 100 mg QID + T.Nifedipine 10 mg QID	1	0	0
T.Labetalol 100 mg QID +T.Nifedipine 10 mg QID +Inj.Furosemide 20 mg IV BD	1	0	0
T.Labetalol 200mg TID +T.Nifedipine 10 mg QID +Inj.Furosemide 20 mg IV BD	1	0	0
T.Labetalol 200mg BD +T.Nifedipine 10 mg TID	1	0	0
T.Labetalol 100 mg BD +T.Nifedipine 5 mg TID	2	2	100
T. Labetalol 100 mg BD+Inj.Mannitol 100 mg BD	1	0	0
T. Labetalol 100 mg 2-1-1 + T. Nifedipine 10 mg 1-1-1	1	1	100

4.Discussion

Among 96 patients, 41(42.7 %) were belong to the age range of 21-25 years, this results correlate with the study done by *Rajanna SP et al(2020)*[8].In our study GHTN (85.42%) shows the highest incidence rate, followed by severe pre-eclampsia(11.46%).The results about incidence of gestational hypertension being highest among other categories was also seen in studies by *Taniya Thapa et al*(2021)[9].

In this study, the incidence of PIH was highest among primigravida(60.41%), followed by second gravida(23.96%)and third gravida(12.5%).Similar results about the influence of gravidity on developing PIH, was also seen in studies by *Rajanna SP et al(2020)*[8].

Majority of the patients had came with the complaints of pedal edema (27.76%).Lower abdominal pain (11.03%) and headache (18.75%) were the next common complaints.Similar results about the chief complaints such as pedal edema and headache, were seen in studies by Sandhya Sivakumar et al(2007)[10] and Farzana Nawaz et al(2014)[11].

Individuals with PIH typically have thyroid disorder (37.25%) in their past medical history, followed by PIH (19.67 %) and diabetes(19.67 %).This results about the past medical history of PIH correlate with study done by Sorohi Hirpara et al(2017)[12].

Compared to vaginal birth (29.75%), cesarean delivery (67.57%)were performed more frequently in the PIH patients.Similar results about the influence of PIH on mode of delivery, was seen in study done by Rajanna SP et all(2020)[8].

58.90% of babies showed good APGAR score at one minute, followed by 87.84% of babies showed good APGAR score at five minutes.Similar results about APGAR score, was also seen in studies by *Mehnaz Gondal et al(2022)*[13].

In fundus eye examination, 38.8% of patients exhibit Grade 1 hypertensive retinopathy.Similar results about the abnormal fundus eye examination, was also seen in studies by *Sagili Chandrasekhara Reddy et al(2012)*[14].

Fetuses frequently experienced with low estimated birth weight(34.07%), followed by preterm delivery(18.68%) and IUGR(15.39%).Similar results about fetal complication such as preterm delivery and IUGR, was also seen in studies by *Ananth, Cande V et al(1995)*[15].

NICU admission(19.87%), followed by Low birth weight(18.59%) and low APGAR score(16.03%) were the most common unfavorable neonatal outcomes.*Similar results about neonatal complication such as low birth weight, was also seen in studies by Ananth, Cande V et al(1995)*[15]*and G Kennady et al(2017)*[16].

More number of drugs, prescribed from the category of Nutritional supplements (27.73%), followed by Antibiotics(20.82%).*Similar results about prescribed drug's category, was also seen in studies by Md Tarique Nadeem et al(2018)*[17].

5. Conclusion

We should follow evidence-based quality care to treat patients with pregnancy-induced hypertension in order to lower perinatal morbidity and mortality and enhance perinatal quality of life. A good antihypertensive agent should maintain blood pressure within the normal range by reducing the high blood pressure at a reasonable cost without causing any harmful adverse effects to the mother and the fetus.In conclusion, this observational study on prescription pattern, safety and efficacy of antihypertensive agent used in the treatment of PIH presents promising findings.Most of the prescription pattern indicators correlate with the WHO-STD criteria.Thus, it can be concluded that the rationality in prescribing drug is high and the drug use is quite sensible**.**

The safety profile of antihypertensives offer satisfactory results in the management of PIH. While some minor adverse effects were observed, they were generally well-tolerated and transient, posing minimal risk to the mothers.No serious maternal and neonatal adverse drug reactions were evident in this study.No post-partum complications were identified.

Labetalol and Nifedipine were the most commonly prescribed antihypertensives.This study demonstrates that the antihypertensive have effectiveness in reducing high blood pressure and their complications.As usual, most patient normalize with their blood pressure after delivering their child.Only some patients require antihypertensive to treat their hypertension after delivery.The equal

distribution of the patients to the usage of each category of drug, dose, frequency and route of administration is necessary to detect the efficacy of antihypertensive agents appropriately.

Overall, the findings suggest that antihypertensives holds a considerable promise as a valuable tool in the management of pregnancy-induced hypertension, offering clinicians a safe and effective option to improve outcomes of both mothers and their babies.

However, more investigation is needed to fully understand the long-term safety and effectiveness profile of antihypertensives, especially with regard to optimal dosage regimens and how it impacts maternofetal and neonatal outcomes.Further investigation is necessary to confirm our results in a wider range of patient populations and healthcare environments.

Identifying risk factors and proper management of hypertension at an early stage will be beneficial in providing better patient care and minimizing further complications.Regular antenatal check-ups, early diagnosis, prompt multidisciplinary treatment, optimum timing of delivery reduces the incidence of complications and the maternal and neonatal morbidity and mortality.Studies suggest that pre-eclamptic patients are at increased cardiovascular risk in postpartum.Therefore the patients needs to be monitored after delivery.

6. References

[1] J.Zhang, J.Zeisler, M.C.Hatch and G.Berkowitz, "Epidemiology of pregnancy-induced hypertension".Epidemiologic reviews.19(2), **(1997)**, pp.218-232.

[2] National High Blood Pressure Education Program Working Group, "Report on high blood pressure in pregnancy". Am J Obstet Gynecol.183(1), **(2000)**, S1–S22.

[3] M.Shen, H.Tan, S.Zhou, G.N.Smith, M.C.Walker, S.W.Wen, "Trajectory of blood pressure change during pregnancy and the role of pre-gravid blood pressure: a functional data analysis approach".Sci Rep.7, **(2017)**, p.6227.

[4] M.A.Brown, L.A.Magee, L.C.Kenny, S.A.Karumanchi, F.McCarthy, S.Saito, D.R.Hall, C.E.Warren, G.Adoyi, S.Ishaku, "Hypertensive disorders of pregnancy".Hypertension.72, **(2018)**, pp.24–43.

[5] L.Say, D.Chou, A.Gemmill, O.Tunçalp, A.B.Moller, J.Daniels, A.M.Gulmezoglu, M.Temmerman, L.Alkema, "Global causes of maternal death: a WHO systematic analysis". Lancet Glob Health.2, **(2014),** e323–e333.

[6] American College of Obstetricians and Gynecologists, "Clinical management guidelines for obstetrician-gynecologists: gestational hypertension and preeclampsia".ACOG Pract Bull.135, **(2020)**, e237–e260.

[7] J.I.Nwafor, D.P.C.Ugoji, B.I.Onwe, V.O.Obi, C.N.Obi, V.J.U.Onuchukwu, C.C.Ibo, "Pregnancy outcomes among women with early-onset severe preeclampsia managed conservatively".Sahel Med J. 23, **(2020)**, p.1.

[8] S.P.Rajanna, M.N.Dharmavijay, "Prevalence of pregnancy induced hypertension in our hospital".Int J Clin Obstet Gynaecol.4(5), **(2020)**, pp.1-3.doi:10.33545/gynae.2020.v4.i5a.679.

[9] T.Thapa, S.Sharma, D.Sigdel, K.Silwal, A.Joshi, "Pregnancy induced hypertension among pregnant women delivering in a tertiary care hospital: a descriptive cross-sectional study".J Nepal Med Assoc.59(244), **(2021)**, pp.1209-14.doi:10.31729/jnma.6392.

[10] S.Sivakumar, B.V.Bhat, and B.A.Badhe, "Effect of pregnancy induced hypertension on mothers and their babies".Indian Journal of Pediatrics.74(7), **(2007)**, pp.623–625.

[11] F.Nawaz, S.Sultan, I.Siddiqi, "Pregnancy outcome in primigravida complicated with pregnancy induced hypertension".J Obstet Gynaecol Hayatabad Med Complex Peshawar Pak.J. Med. Sci. (Peshawar, Print).Vol. 22, No.1, **(2014)**, pp.46-48

[12] S.Hirpara, R.Ghevariya, P.Ghadia, T.Hada, N.Pandit, "Study of risk factors for pregnancy induced hypertension: A hospital based case control study".Natl J Integr Res Med.8(3), **(2017)** pp.49-52.

[13] M.Gondal, B.Sayyed, R.Wajid, A.Inayat, R.Kosar and S.Tariq, "Poor Apgar Score of Neonates Born to the Females Presenting with Pregnancy Induced Hypertension for Delivery".Pak-Euro Journal of Medical and Life Sciences, 5(2), **(2022)**, pp.339–344.

[14] S.C.Reddy, N.Sivalingam, K.G.S.Rani, S.W.Tham, "Fundus changes in pregnancy induced hypertension".Int J Ophthalmol.5(6), **(2012)**, pp.694–697.doi:10.3980/j.issn.2222-3959.2012.06.08.

[15] C.V.Ananth, A.Peedicayil, D.A.Savitz, “Effect of hypertensive diseases in pregnancy on birthweight, gestational duration, and small-for-gestational-age births”.Epidemiology.6(4), **(1995)**, pp.391-395.
[16] G.Kennady, M.J.Kottarathara, A.J.Kottarathara, R.Ajith, T.M.Anandakesavan and K.Ambujam, “Maternal and neonatal outcomes in pregnancy induced hypertension: An observational study”.Clinical and Experimental Obstetrics & Gynecology.44(1), **(2017)**, pp. 110–112.
[17] M.T.Nadeem, S.Amer, M.Jalalji and Haritha, “Prevalence and prescription pattern of pregnancy induced hypertension in pregnant women with nutritional supplementation”.World Journal of Advance Medical and Pharmaceutical Research.1(2), **(2018)**, pp.1–8.