Section: Obstetrics and Gynaecology

Original Research Article

AN OBSERVATIONAL STUDY ON THE FETOMATERNAL OUTCOME IN ANTENATAL MOTHERS WITH RISK FACTORS FOR PREECLAMPSIA RECEIVING LOW-DOSE ASPIRIN

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Received : 18/06/2024
Received in revised form : 10/08/2024
Accepted : 27/08/2024

Keywords:
Preeclampsia, Low-dose aspirin, Hypertensive disorders, Maternal morbidity, Perinatal morbidity, Risk factor.

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DOI: 10.47009/jamp.2024.6.4.151

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (4); 763-768

Abstract

Background: Hypertensive disorders complicate approximately 8% of pregnancies and significantly affect maternal and perinatal morbidity and mortality rates. Low-dose aspirin, as recommended by national guidelines, effectively reduces the incidence of preeclampsia, a major cause of maternal and foetal complications. This study aimed to study obstetric outcomes in antenatal mothers receiving low doses of aspirin with risk factors for developing preeclampsia. **Materials and Methods:** A prospective observational study of 150 high-risk antenatal mothers was conducted between March 2021 and March 2022. The study included mothers between 12-16 weeks of gestation with factors such as previous hypertensive disease, chronic conditions, first pregnancy, age ≥ 35 years, BMI ≥ 35 years, long pregnancy intervals, and a family history of preeclampsia while excluding those with bleeding PV, antepartum haemorrhage, aspirin allergy, and other specified conditions. **Results:** Most subjects (73%) were female, with Systemic diseases, including Patients with preeclampsia had a higher rate of induced deliveries (72.3%) than those without preeclampsia (51%). Vaginal delivery was predominant in both groups. Maternal complications such as atonic PPH (28%) and placental abruption (22%) were more common in the preeclampsia group. NICU admissions (28%) and low birth weight/IUGR (22%) were also higher in preeclampsia cases than in non-preeclampsia cases. **Conclusion:** Hypertensive disorders in pregnancy are a major cause of maternal and perinatal morbidity and mortality in developing countries owing to inadequate antenatal care and low socioeconomic conditions. Low-dose aspirin administered between 12 and 20 weeks of gestation effectively reduces preeclampsia incidence, highlighting the importance of early identification and referral of high-risk mothers to specialist centres.

INTRODUCTION

Hypertensive disorders of pregnancy complicate approximately 8% of all pregnancies and are responsible for significant maternal and perinatal morbidity and mortality.[1] Preeclampsia is a common pregnancy-specific syndrome that originates in the placenta and accounts for a considerable proportion of maternal and perinatal deaths. It usually develops after 20 weeks of gestation and resolves after placental delivery. The Working Group of the National High Blood Pressure Education Program (NHBPEP) in 2000 is widely accepted the classification of hypertensive disorders during pregnancy. The NHBPEP and Task Force from the American College of Obstetricians and Gynaecologists (2013) provide evidence-based clinical practice guidelines for classifying pregnancy-induced hypertension.

Hypertension can be classified into four main types. Gestational hypertension is characterised by a blood pressure exceeding 140/90 mmHg for the first time during pregnancy, typically developing after 20 weeks of gestation, without evidence of preeclampsia syndrome, and resolving by 12 weeks postpartum. Preeclampsia is another type that often leads to eclampsia syndrome if untreated. Chronic hypertension of any aetiology is a long-standing

ISSN (O): 2687-5365; ISSN (P): 2753-6556

high blood pressure condition that predates pregnancy or is diagnosed before 20 weeks gestation. Additionally, preeclampsia can be superimposed on chronic hypertension, further complicating this condition. This classification differentiates preeclampsia from other hypertension disorders. Preeclampsia affects 3-5% of all pregnancies. In India, there is a 5-15% incidence of preeclampsia. It causes 10-15% of maternal deaths in developing countries.[2,3]

The reasons for increased maternal mortality and morbidity in developing countries include social deprivation, lack of access to trained birth attendants, lack of education, and late referral to tertiary centres. The disease is responsible for one-sixth of all premature births, which is a notable burden on healthcare systems.[4] One-third of all preeclampsia cases require preterm delivery, and its association with foetal growth restriction and prematurity often leads to lifelong consequences for the child. There is a high risk of cerebral palsy, neurodevelopmental delay, respiratory disorders, hypertension, and renal dysfunction. There is also an increased incidence of insulin resistance, obesity, cardiovascular disease, and impaired work capacity.[5] Mothers who are affected by preeclampsia are 2-5 times more at risk of developing hypertension and cardiovascular and cerebrovascular disease shortly as compared to mothers who do not have preeclampsia during pregnancy.[6]

Low-dose aspirin reduces mortality and morbidity in pregnant women at high risk for preeclampsia.[7] National guidelines have suggested that women at high risk for preeclampsia should be treated with prophylactic low-dose aspirin (75 mg). This reduces the prevalence of this disease. Differences in low-to high-risk were defined (NICE guidelines and ACOG recommendations (2017). Acetylsalicylic Acid (ASA) or aspirin is considered an attractive pharmacological agent for use in pregnancy and prevention of maternal and perinatal mortality and morbidity. It is popular because it is of low cost, has widespread availability, easy to administer and has a good safety profile.[8]

According to the US Food and Drug Administration (FDA), aspirin is a category C drug during the first and second trimesters of pregnancy and a category D drug in the third trimester. There is some evidence suggesting that aspirin can adversely affect the foetus and cause congenital anomalies. So, the FDA has assigned Aspirin in pregnancy as category C, and treatment is comparatively safe.[9] Aspirin is safe in low doses even though it can cross the placenta.[10] Aspirin may prevent preeclampsia, though the exact mechanism is unclear. Theories include improved placentation, inhibition of platelet aggregation, reduction of placental infarction, and anti-inflammatory effects that stabilise the endothelium. Early treatment appears to reduce preeclampsia incidence, suggesting a benefit from these mechanisms.[11]

Aim: This study aimed to study obstetric outcomes in antenatal mothers receiving low doses of aspirin with risk factors for developing preeclampsia.

MATERIALS AND METHODS

This prospective observational study was conducted on 150 pregnant women at the Department of Obstetrics and Gynaecology, K.A.P.V Government Medical College and M.G.M.G.H OPD, Trichy, from March 2021 to March 2022. This study was approved by the Institutional Ethics Committee before initiation, and informed consent was obtained from all patients.

Inclusion Criteria

Antenatal mothers aged 12 -16 weeks, at high risk**,** hypertensive disease during previous pregnancy, chronic kidney disease, autoimmune diseases such as systemic lupus erythematosus or antiphospholipid syndrome, type 1 or type 2 diabetes, and chronic hypertension, pregnant women with more than one moderate risk factor for preeclampsia, first pregnancy, age 35 years or older, pregnancy interval of more than 10 years, body mass index (BMI) of 35 kg/m2 or more at the first visit, and family history of preeclampsia were included in this study.

Exclusion Criteria

Refusal of participation**,** Bleeding PV and antepartum haemorrhage**,** allergy to aspirin and ye syndrome**,** acid peptic diseases**,** Asthma**,** Bleeding and coagulation disorders**,** and gestational age < 12 weeks > 20 weeks were excluded from this study.

Methods

Statistical Analysis

All data were analysed using the Statistical Package for Social Sciences (SSPS). The chi-square test was used to compare categorical variables, and the student's t-test was used to compare continuous variables. Statistical significance was set at $P < 0.05$. All data were analysed in terms of rates, percentages, and averages.

RESULTS

The age distribution showed the highest frequency in the 26-30 years age group (34%) and the lowest in the 36-40 years group (7%). Most participants were booked (71%) rather than unbooked (29%). Regarding socioeconomic status, the largest group was the lower middle class (37%) and the smallest was the upper class (7%). In terms of gravidity, multi-gravida women constituted 55.3% of the sample, whereas 44.7% were primigravida women. BMI results indicated the highest frequency in the 25-29.9 range (52 participants) and the lowest in the < 18 range (10 participants). A family history of preeclampsia was present in 33.3% of the cases, while 66.7% had no such history. 86% of patients had no previous gestational hypertension. [Table 1]

The most prevalent demographic and clinical characteristics included a high rate of compliance

ISSN (O): 2687-5365; ISSN (P): 2753-6556

with antenatal visits (77.3%) and more than eight antenatal visits (70%). Most participants were free of chronic kidney disease (98.7%), systemic lupus erythematosus/antiphospholipid antibody syndrome (97.3%), overt diabetes (97.3%), cardiovascular disease (93.4%), and multi-foetal pregnancies (93.3%). Most participants did not require assisted reproductive techniques (95.3%) or have polycystic ovary syndrome (90.7%). A significant proportion of the patients did not have gestational diabetes mellitus (80.7%) or chronic hypertension (80%). The least common characteristic was chronic kidney disease (1.3%), followed by SLE/ALPA, and overt diabetes, each affecting 2.7% of the population. [Table 2]

The induction of delivery was more common in preeclampsia patients (72.3%) than in non-preeclampsia patients (51%). The mode of delivery was predominantly vaginal in both groups (78% non-preeclampsia and 83% preeclampsia). Maternal complications were higher in the preeclampsia group, notably atonic PPH (28%) and placental abruption (22%), whereas these were much lower in the non-preeclampsia group (5.5% and 0.01%, respectively). Regarding neonatal outcomes, most babies had normal birth weight (2.5-3 kg) in both groups (58% non-preeclampsia, 55% preeclampsia). NICU admissions were more frequent among preeclampsia cases (28% vs. 20%), and perinatal complications such as low birth weight and IUGR were significantly higher in the preeclampsia group (22% vs. 2%). [Table 3]

Table 1: Demographic and clinical characteristics of the study population

		Frequency (%)
Age in years	< 20	16 (11%)
	20-25	50 (33%)
	26-30	51 (34%)
	31-35	22 (15%)
	36-40	11 (7%)
Status	Booked	107 (71%)
	Uncooked	43 (29%)
Socio- economic status	Upper class	10 (7%)
	Upper middle	32 (21%)
	Lower middle	55 (37%)
	Upper lower	15 (10%)
	Lower	38 (25%)
Gravity	Multi	83 (55.3%)
	Primi	67 (44.7%)
BMI	< 18	10
	18-24.9	38
	25-29.9	52
	30-34.5	38
	> 35	12
Family history of pre-eclampsia	No	100 (66.7%)
	Yes	50 (33.3%)
Previous GHTN	No	129 (86%)
	Yes	21 (14%)

Table 2: Clinical characteristics of study participants

		Frequency (%)
CVD	No	140 (93.4%)
	Yes	10 (6.6%)
Interpregnancy interval > 10 years	No	43 (51.8%)
	Yes	40 (48.2%)
Multi-foetal pregnancy	No	140 (93.3%)
	Yes	10 (6.7%)
GDM	No	121 (80.7%)
	Yes	29 (19.3%)
Assisted reproductive techniques	No	143 (95.3%)
	Yes	7 (4.7%)
Chronic HTN	No	120 (80%)
	Yes	30 (20%)
CKD	No	148 (98.7%)
	Yes	2 (1.3%)
SLE/ALPA	No	146 (97.3%)
	Yes	4 (2.7%)
Overt diabetes (pregestational)	No	146 (97.3%)
	Yes	4 (2.7%)
PCOS	No	136 (90.7%)
	Yes	14 (9.3%)
Compliance	Good	116 (77.3%)
	Poor	28 (18.7%)
	Lost to follow up	6 (4%)

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AN visit	2 - 4	16 (10%)
	5 - 8	30 (20%)
	> 8	104 (70%)
Pre-eclampsia	No	126 (83%)
	Yes	18 (12%)
	Lost to follow up	6 (8%)

Table 3: Comparative analysis of delivery outcomes and complications in non-pre-eclampsia and preeclampsia patients

		Frequency (%)		P value
		Non-pre-eclampsia	Pre-eclampsia	
Induction of delivery	Induced	65 (51%)	13 (72.3%)	0.088
	Not induced	61 (49%)	5 (27.7%)	
Mode of delivery	Vaginal	98 (78%)	15 (83%)	0.927
	Instrumental	11 (9%)	1(6%)	
	LSCS	17 (13%)	2 (11%)	
Indication of LSCS	Abruption	3	1	-
	Failed induction	3	0	
	Precious pregnancy	3	1	
	Non-reassuring CTG	5	0	
	Failure to progress	3	0	
Maternal complications	Acute renal failure	0	0	0.153
	Abruptio placenta	1 (0.01%)	4 (22%)	
	Atonic PPH	7 (5.5%)	5 (28%)	
	HELLP syndrome	0	2 (11%)	
	Acute pulmonary oedema	0	0	
	Traumatic PPH	0	0	
Gender of the baby	Female	69 (55%)	11 (61%)	-
	Male	57 (45%)	7 (39%)	
Birth weight (kg)	1-1.5	3 (2.5%)	1 (6%)	0.904
	1.5-2.5	28 (22.5%)	4 (22%)	
	2.5-3	73 (58%)	10 (55%)	
	> 3	22 (17%)	3 (17%)	
Preterm (weeks)	< 37	25 (20%)	5 (28%)	0.04
	> 37	101 (80%)	13 (72%)	
NICU admission	No	100	8	0.175
	Yes	26	10	
APGAR score	< 7	6 (5%)	2 (11%)	0.281
	> 7	120 (95%)	16 (89%)	
Perinatal complications	Prematurity	2	5	0.241
	Meconium aspiration syndrome	12	0	
	Respiratory distress syndrome	2	2	
	Low birth weight & IUGR	2	8	
	Birth Asphyxia	6	2	

DISCUSSION

In our study, most antenatal mothers belonged to the age group 20-25 (33%) and 26-30 (34%) age groups, respectively. The mean age was 26.3 and this is similar to the findings of Bilano et al. and Atallah et al,[12,13] Multiparous mothers (55.3%) were more common in our study; however, nulliparous mothers were more common in studies by Bilano et al. and Atallah et al,[12,13] Most Mothers were booked (71%) and belonged to the lower middle class (45%) of the Modified Kuppusamy classification which is like the findings of Mahji et al.[14]

The distribution of the risk factors for preeclampsia in antenatal mothers was like that reported in other studies.

In our study, 150 mothers were administered low-dose aspirin between 12-20 weeks of gestation. Of these, 116 exhibited good compliance, 28 had poor compliance, and six were lost to follow-up. Among the mothers, 126 (84%) did not develop preeclampsia, while 18 (12%) did. This outcome is supported by multiple RCTs, including a Cochrane review by Duley et al. which reported a 17% relative reduction in preeclampsia with low-dose aspirin, and a study by Henderson et al. which demonstrated a 24% reduction in preeclampsia with low-dose aspirin prophylaxis (60-150 mg/day).[16,17]

Maternal morbidity and obstetrics outcomes

In our study on high-risk antenatal mothers for preeclampsia, vaginal delivery was more common, consistent with the findings of Majella et al,[18] Ndaboine et al. study reported that LSCS was the most common mode of delivery in their study, highlighting a difference in delivery methods between the studies.[19]

In our study, abruption and PPH were more common in antenatal mothers with preeclampsia, similar to the findings of Ndaboine et al. and Sunita et al.[19,20]

Foetal outcomes

In our study, male babies were more prevalent, with 75% having a birth weight > 2.5 kg. Preeclamptic mothers had a higher incidence of low birth weight (28%) than non-preeclamptic mothers (25%), with

ISSN (O): 2687-5365; ISSN (P): 2753-6556

an average birth weight of 2.6 kg. A study by Majella et al. showed a higher incidence of low birth weight (LBW), while 10% of infants had a birth weight below 2.5 kg, 89% had a birth weight above 2.5 kg. Preeclamptic mothers had a 28% chance of delivering preterm, compared to 11% for non-pre-eclamptic mothers.[18] In contrast, 72% of high-risk mothers carried to term, and in a multicentric study by Magee et al., 34.3% of mothers had preterm deliveries, which is comparable to the findings of our research. Most babies had an APGAR score > 7, with 11% preeclamptic and 5% non-preeclamptic babies scoring < 7. NICU admission was higher in preeclamptic babies (55%) than in non-preeclamptic babies (21%).[21] Ayaz et al. reported a 26% NICU admission rate. The primary due for NICU stays were prematurity, LBW, and respiratory distress in preeclamptic cases, while meconium aspiration and birth asphyxia were common in non-pre-eclamptic cases.[22]

Table 4: Comparison of risk factors for preeclampsia with other studies

Risk factors		Our study (%)	Bilano et al. (%)[12]	Atallah et al. (%)[13]	KF Tessema et al. (%)[15]
Age > 35	No	93	92	91	88
	Yes	7	8	9	12
Body mass index	< 18	6.5	3.3	90	8.5
	18-24.9	25	47.7		62.5
	25-29.9	34.5	35		26
	30-34.5	25			3
	> 35	8	3.5	10	
Inter pregnancy interval	No	51.8	52	53	53.5
	Yes	48.2	48	41	46.5
Family history of pre-eclampsia	No	77	88	90	85.5
	Yes	22.6	12	10	14.5
Multifetal Pregnancy	No	93.3	95	97	94
	Yes	6.7	5	3	6
Gestational diabetes	No	80.7	99.3	92	86
	Yes	19.3	0.7	8	14
CVD	No	93.4	99.6	93	96
	Yes	6.6	0.4	8	4
Previous GHTN	No	86	85	86	89
	Yes	14	15	14	11
Assisted reproductive techniques	No	95.3	93	95	97
	Yes	4.7	7	5	3
Chronic HTN	No	80	99.2	89	85
	Yes	20	0.8	22	5
CKD	No	98.7	99.6	94	98
	Yes	1.3	0.4	6	2
SLE/APLA	No	97.3	97	99	98
	Yes	2.7	3	1	2
Diabetes	No	97.3	99.3	92	95
	Yes	2.7	0.7	8	5
PCOS	No	90.7	99	97	99
	Yes	9.3	1	3	1

Table 5: Comparison of the mode of delivery with other studies

Mode of delivery	No pre-eclampsia (%)	Pre-eclampsia (%)	Majella et al. (%)[18]	Ndaboine et al. (%)[19]
Vaginal	78	83	74	33.5
Instrumental	9	6	1	0.5
LSCS	13	11	25	66

Table 6: Comparison of maternal complications with other studies

Maternal Complications	No-pre-eclampsia (%)	Preeclampsia (%)	Ndaboine et al. (%)[19]	Sunita et al. (%)[20]
Acute renal failure	0	0	7.8	2
Abruptio placenta	0.01	22	11.8	2
Atonic PPH	5.5	28	0	6
HELLP syndrome	0	11	38	7
Acute pulmonary oedema	0	0	0	1
Traumatic PPH	0	0	0	0

CONCLUSION

Hypertensive disorders complicating pregnancy are among the most important causes of maternal and perinatal morbidity and mortality in developing countries. This is due to a lack of proper antenatal care, low socioeconomic status, and lack of education. Low-dose aspirin is highly effective in preventing preeclampsia when administered between 12 and 20 weeks gestation, thereby reducing its incidence. The early identification of high-risk mothers and early transfer to specialist centres are important.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

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ISSN (O): 2687-5365; ISSN (P): 2753-6556