

First Trimester Preeclampsia Screening & Effect of Low Dose Aspirin on Maternal Mean Arterial Pressure- An Observational Study**Banibrata Paul¹, Nagraja N.²**^{1,2}Department of Obstetrics & Gynaecology, Command Hospital Airforce, Bengalore, Karnataka, India

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Conflict of interest: Nil

Abstract

This prospective observational study aims to observe first trimester preeclampsia screening & effect of low dose aspirin on maternal mean arterial pressure. Total 500 women were categorized into two groups (250 each in high risk and low risk) based on the screening result during a period of 18 months in Command Hospital Airforce Bengalore. Women aged 18–35 years with singleton pregnancies between 11 weeks and 13+6 weeks period of gestation were included & pregnancies complicated by aneuploidy, chronic hypertension, prior hypertensive disorders, preexisting medical illnesses, or prior Aspirin use were excluded. Women identified as high risk for preeclampsia were initiated on Aspirin 150 while low-risk women were not started on any medication and both groups were monitored until delivery. Statistical significance threshold considered was $P \leq 0.05$. Findings revealed significant association between effect of aspirin and maternal MAP ($P < 0.001$).

Keywords: Preeclampsia; Aspirin; Hypertensive disorders of pregnancy.**DOI:** 10.25258/ijcpr.18.9.137

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Introduction

Hypertensive disorder during pregnancy impacts approximately 10 % of pregnancies and presents a significant risk to the health of both the mother and the foetus. Preeclampsia is a common complication during pregnancy, affecting around 3 - 5 % of pregnancies. [1] According to estimates from the World Health Organization (WHO), the occurrence of pre-eclampsia is seven times more prevalent in developing countries compared to developed countries. [2] Statistics suggest that there has been no decrease in the occurrence of eclampsia in India over the span of these decades. [3]

Preeclampsia ranks as the second highest cause of maternal mortality. It represents a significant portion of global maternal mortality, with India experiencing a particularly high percentage [4]. Preeclampsia is marked by the development of high blood pressure and the presence of protein in the urine after the 20th week of pregnancy. There are two types of preeclampsia: placental and maternal preeclampsia. [5]

Aspirin, a widely accessible, cost-effective, and generally safe medication, is commonly used in pregnancy for various prophylactic and therapeutic purposes. Despite the recognition of its benefits in reducing preeclampsia (PE) risk, especially in high-risk pregnant women, the optimal aspirin dosage remains uncertain. The American College of

Obstetricians and Gynecologists (ACOG) recently provided guidelines recommending low-dose aspirin (LDA) for women with a high risk of PE and those with multiple moderate-risk factors. [6] Evidence suggests that early initiation of LDA can reduce the risk of early-onset PE, potentially by improving uterine blood flow and promoting transformation of spiral arteries into low-resistance vessels [7]. This study aims to assess the efficacy of early screening for PE and evaluate the impact of LDA on mean arterial pressure in high-risk women.

Materials and Methods

The present study of first trimester preeclampsia screening & effect of low dose aspirin on maternal mean arterial pressure was conducted in the Department of Obstetrics & Gynaecology, after Institute Ethical Committee clearance. It was a hospital based observational study. Five Hundred patients' data were collected from Command Hospital Air Force Bangalore during the period of 18 months in 2023-'24 who were visiting the Department of Obstetrics & Gynaecology OPD for routine ANC visit. After obtaining written and informed consent, a detailed history was taken for each participant and documented. Routine antenatal investigations were conducted for all patients. Screening for preeclampsia was performed on all subjects according to the inclusion criteria. Each

participant underwent measurement of Mean Arterial Pressure (MAP), Uterine Artery Pulsatility Index (UtA-PI), and serum placental growth factor (PIGF). Women identified as having an increased risk of developing preeclampsia were started on tablet Aspirin 150 mg, administered at bedtime until 36 weeks period of gestation. On development of preeclampsia in the high risk group, aspirin was stopped. Those women identified as low risk for preeclampsia based on screening were monitored until delivery. UtA-PI values within the cut-off range of 0.95 to 1.50 MoM were used, and a PIGF ratio of less than 1:100 was considered normal. For MAP measurement, patients were positioned in a seated posture with feet flat on the floor after resting for five minutes.

Each patient's arms were bare and positioned at heart level. Blood pressure was taken from both arms simultaneously using validated automated blood pressure devices with appropriately sized cuffs. A total of two readings were recorded from each arm, with each reading taken one minute apart. The final MAP was calculated from the average of the four measurements. MAP values between 70-100 were considered normal. MAP was calculated using the formula: $\text{MAP} = \text{Diastolic Pressure} + \frac{1}{3}(\text{Systolic} - \text{Diastolic})$. Descriptive statistics for categorical data are expressed as numbers and percentages, while mean $\pm$ standard deviation was used to express continuous data based on normal distribution. After appropriate

data filtration, the data sheet was analyzed using Graph pad Prism (vs. 9.2.0). For comparing categorical data, Chi square (χ^2) test or fisher's exact test was performed. Comparison of quantitative variables between the study groups were done using Student t-test. Analysis of variance (ANOVA) was used to check if the means of two or more groups are significantly different from each other. P value of ≤ 0.05 was considered as statistically significant.

Result

In the present study, among the 250 patients of high-risk for pre-eclampsia, 52.8% (n = 132) were aged 30–35 years, while 47.2% (n = 118) were aged 18–29 years. In the low-risk pre-eclampsia group (n = 250), 51.6% (n = 129) were aged 18–29 years, and 48.4% (n = 121) were aged 30–35 years (Table: 1; Figure 1). Statistical analysis demonstrated no significant association between age group and pre-eclampsia risk (P = 0.326).

The mean SBP in the high-risk group was 125.7 ± 10.4 mmHg, which was significantly greater than that in the low-risk group (119.6 ± 9.9 mmHg; P < 0.001). Similarly, the mean DBP was elevated in the high-risk group (84.5 ± 8.2 mmHg) compared to the low-risk group (78.4 ± 8.3 mmHg; P < 0.001). Additionally, the MAP was significantly higher in the high-risk group (98.3 ± 9.0 mmHg) than in the low-risk group (92.5 ± 8.6 mmHg; P < 0.001) (Table: 2; Figure 2).

Table 1: Distribution of patient's age group in high risk vs low risk PE.

Age Group	High risk group (N=250)		Low risk group (N=250)		P-value
	N	%	N	%	
18-29 years	118	47.2%	129	51.6%	0.326
30-35 years	132	52.8%	121	48.4%	

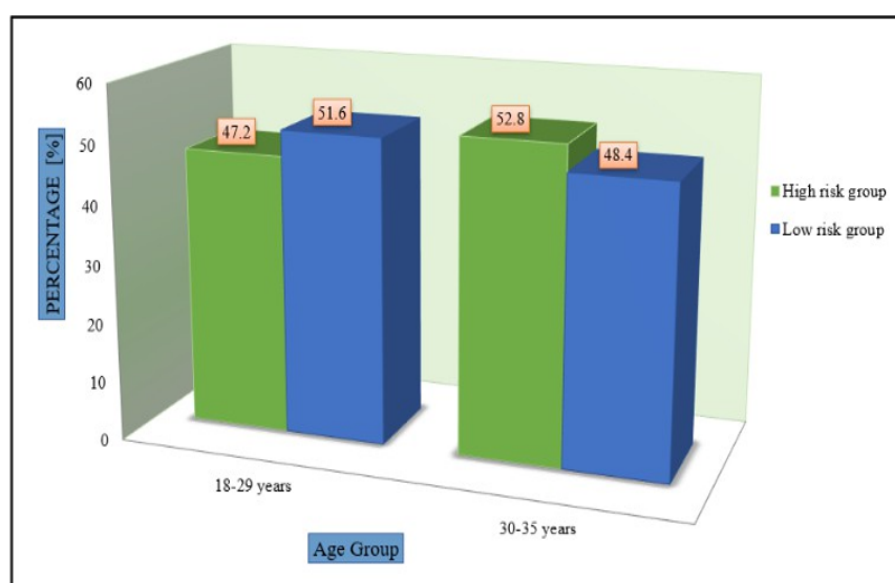


Figure 1: Graphical distribution of patient's age group in high risk vs low risk PE

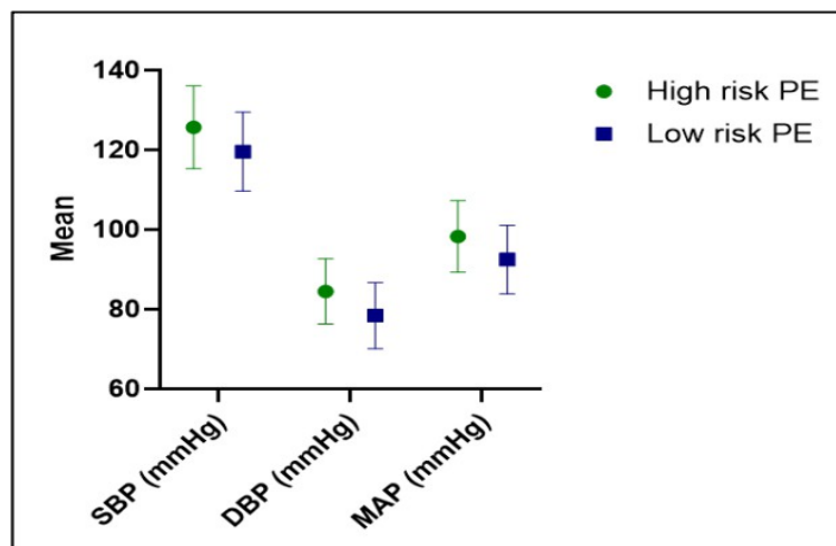


Figure 2: Mean blood pressure in high risk vs low risk PE group

Table 2: Comparison of mean blood pressure in high risk and Low risk PE

Blood pressure (mmHg)	High risk group (N=250)	Low risk group (N=250)	P-value
SBP (mmHg)	125.7 ± 10.4	119.6 ± 9.9	<0.001
DBP (mmHg)	84.5 ± 8.2	78.4 ± 8.3	<0.001
MAP (mmHg)	98.3 ± 9.0	92.5 ± 8.6	<0.001

Discussion

Pre-eclampsia is a multifactorial hypertensive disorder of pregnancy characterized by new-onset hypertension and proteinuria after 20 weeks of gestation. It remains a leading cause of maternal and perinatal morbidity and mortality worldwide, contributing to complications such as eclampsia, multi-organ dysfunction, fetal growth restriction, and preterm birth. Early identification of individuals at high risk is crucial for implementing timely interventions to mitigate adverse outcomes. Various screening modalities have been proposed for the early detection of pre-eclampsia, including maternal risk factor assessment, biophysical measurements (e.g., blood pressure and uterine artery Doppler), and biochemical markers (e.g., placental growth factor and pregnancy-associated plasma protein-A).

The effectiveness of these screening methods in predicting pre-eclampsia and guiding clinical decision-making requires further evaluation to optimize their clinical utility. Low-dose aspirin (LDA) has been widely recommended as a prophylactic intervention for pregnant individuals identified as high risk for pre-eclampsia. Evidence suggests that LDA exerts protective effects through mechanisms such as inhibition of platelet aggregation, improvement of placental perfusion, and modulation of inflammatory pathways. This was a prospective cohort study in which 500 subjects were included. 250 patients with high risk of preeclampsia were advised aspirin (150mg) after screening. The remaining 250 were defined as

being at low risk for preeclampsia at the time of assessment and did not receive any intervention. There was no significant difference in age ($P=0.326$), Parity ($P=0.283$) and BMI ($P=0.092$) between the two groups. Hypertension in pregnancy is a well-established risk factor for adverse maternal and fetal outcomes. Elevated SBP and DBP contribute to endothelial dysfunction, reduced placental perfusion, and increased systemic vascular resistance, all of which are central to the pathophysiology of pre-eclampsia. We observed a statistically significant difference in systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) between the high-risk and low-risk groups, emphasizing the role of elevated blood pressure in pre-eclampsia risk stratification. Lan PG et al. [8] reported that aspirin use did not significantly impact the initial blood pressure levels at the time of presentation in high-risk pregnancies. Ebrashy et al. [9] reported a significantly lower pre-eclampsia rate in women receiving aspirin (35%) compared to a control group (62%) ($p = 0.003$). Similarly, Xiao Y et al. [10] also found that early aspirin initiation (before 16 weeks) reduced pre-eclampsia risk (10.43%) compared to a control group (22.52%) (Odds ratio = 0.40, $p = 0.0098$).

Conclusion

Pre-eclampsia is a multifactorial hypertensive disorder of pregnancy characterized by new-onset hypertension and proteinuria after 20 weeks of gestation. It remains a leading cause of maternal and perinatal morbidity and mortality worldwide,

contributing to complications such as eclampsia, multi-organ dysfunction, fetal growth restriction, and preterm birth. Early identification of individuals at high risk is crucial for implementing timely interventions to mitigate adverse outcomes. Various screening modalities have been proposed for the early detection of pre-eclampsia, including maternal risk factor assessment, biophysical measurements (e.g., blood pressure and uterine artery Doppler), and biochemical markers (e.g., placental growth factor and pregnancy-associated plasma protein-A).

The effectiveness of these screening methods in predicting pre-eclampsia and guiding clinical decision-making requires further evaluation to optimize their clinical utility. Low-dose aspirin (LDA) has been widely recommended as a prophylactic intervention for pregnant individuals identified as high risk for pre-eclampsia. Evidence suggests that LDA exerts protective effects through mechanisms such as inhibition of platelet aggregation, improvement of placental perfusion, and modulation of inflammatory pathways. However, the efficacy of LDA in different high-risk populations and the optimal timing of administration necessitate further investigation. This study aims to evaluate first trimester preeclampsia screening & effect of low dose aspirin on maternal mean arterial pressure.

This was a prospective cohort study in which 500 subjects were included. 250 patients with high risk of preeclampsia were advised aspirin (150mg) after screening. The remaining 250 were defined as being at low risk for preeclampsia at the time of assessment and did not receive any intervention. There was no significant difference in age ($P=0.326$) and Parity ($P=0.283$) between the two groups. We observed a statistically significant difference in systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) between the high-risk and low-risk groups, emphasizing the role of elevated blood pressure in pre-eclampsia risk stratification. Overall, these findings reinforce the role of aspirin in pre-eclampsia prevention among high-risk individuals while underscoring the necessity for enhanced risk stratification and tailored management approaches.

Limitations of the study: Small sample size, multiple comparisons, observational design, risk of

confounding were some of the limitations.

Ethical Clearance: The present study was approved by Institutional Ethics Board.

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