

Effectiveness Of Aspirin On Prevention Of Preeclampsia And Neonatal Morbidity: A Retro Prospective Study In Tertiary Care Teaching Hospital.

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1. Abstract

Preeclampsia remains a major cause of maternal and perinatal morbidity and mortality globally. In an effort to determine aspirin's place in preventing it, this study examined the efficacy and safety of low dose aspirin, especially in high-risk pregnancies. Aspirin effectiveness and risks involved in its use must be assessed among various populations. This Retro-Prospective study was carried out for six months, involving pregnant women who had been exposed to aspirin and followed up for the onset of preeclampsia. Clinical information on 140 pregnant women was assessed, with participants divided into aspirin-exposed and unexposed groups. They included 51 patients who are treated with aspirin but didn't develop preeclampsia, 19 patients who are treated with aspirin and developed preeclampsia, 57 patients who weren't treated with aspirin and developed preeclampsia, and 13 patients who neither treated with aspirin nor developed preeclampsia. Maternal demographics, APGAR (Appearance, Pulse, Grimace, Activity, Respiration), aspirin use, blood pressure, and clinical outcomes data were gathered. Chi square test and Mann-Whitney U tests were used for the data analysis. Of the 70 aspirin users, 51(72.9%) remained free from preeclampsia, whereas only 13(18.5%) of 70 non-aspirin users were free from preeclampsia, indicating an appreciable decline in incidence. Statistical analysis ($p < 0.05$) validated significant intergroup differences in efficacy. There were no severe adverse events due to the use of aspirin, which further established its safety profile. The results prove aspirin to be both efficacious and safe for preeclampsia prophylaxis in high-risk pregnant women, providing worthwhile evidence for its routine clinical application.

Keywords: Preeclampsia, Aspirin, Safety, Effectiveness, APGAR.

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2. Introduction

Preeclampsia (PE) is a complex condition that affects multiple systems in the body during pregnancy, typically characterized by hypertension and proteinuria after the 20th week of gestation¹. Preeclampsia, which occurs in 2-8% of pregnancies, is a significant global cause of maternal and perinatal health complications and deaths. Preeclampsia is responsible for one-sixth of all preterm births and is often linked to fetal growth restriction, which can have long-term effects on the child's health².

Preeclampsia mainly occurring during pregnancy, can lead to severe maternal and fetal complications such as eclampsia, intrauterine growth restriction, placental abruption, preterm birth and long-term cardiovascular risks for both mother and child³. The signs of preeclampsia include reduced blood flow to the placenta, the mother's immune system becoming activated, increased resistance in the mother's blood vessels. This leads to reduced circulation to vital organs. These factors along with mother's high blood pressure, frequently

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leads to intrauterine fetal growth restriction (IUGR) and small-for-gestational-age infants⁴. Aspirin, recognized for its ability to reduce inflammation and prevent blood clotting, has become a commonly used medication in the field of Obstetrics and Gynecology. This study offers a summary of the diverse applications of aspirin in these medical domains, highlighting important factors and contemporary viewpoints. In the field of Obstetrics, low dose aspirin has become a preventive measure against preeclampsia, a hypertensive condition that can have severe and life-threatening effects on both the mother and the developing fetus⁵. Low dose aspirin commenced after the first trimester has been demonstrated to reduce the risk of preeclampsia by 24% and sequelae such as preterm birth and fetal growth restriction by 14% and 20% respectively when given to women at risk of developing preeclampsia⁶. Based upon such evidence, administration of aspirin is now recommended for women with one major risk factor or two moderate risk factors for preeclampsia⁷. Low dose aspirin at a dosage of 60 to 150 mg has been tried and tested in pregnancy for decades and has robust safety data to support its use beyond the first trimester. The CLASP study (collaborative low-dose aspirin study in pregnancy) was one of the original and largest randomized controlled trials to assess efficacy and safety of aspirin in the prevention of preeclampsia in at risk pregnant women and concluded, that aspirin was generally safe for the fetus and newborn infant, with no evidence of an increased likelihood of maternal or fetal bleeding⁸. Taking aspirin after the first trimester of pregnancy does not seem to increase the risk of congenital anomalies^{9,10}, nor it is linked to a higher risk of major post-partum bleeding or placental abruption¹¹. A number of robust studies have verified that aspirin is safe after the first trimester. The most recent of these is that conducted by the U.S Preventive Services Task Force in 2014, which failed to find any links between the use of aspirin and harm to mothers or newborns⁶. Prophylactic use of low dose aspirin (50-150mg/day) initiated at or before the 16th week of pregnancy is associated with significant reduction in the prevalence of severe preeclampsia, fetal growth restriction and preterm birth, all placenta-related complications of pregnancy¹². In recent years, numerous research studies have aimed to understand the underlying mechanisms of preeclampsia, identify individuals at risk, and assess preventive measures to reduce its occurrence. In this article, we review the use of low dose aspirin

(LDA) in preventing preeclampsia, discussing the reasons behind its use, its effectiveness, and its safety.

3. Materials and Methods

A Retro-prospective observational study was conducted at Santhiram Medical College and General Hospital, Nandyal, Andhra Pradesh for six months of October 2024 to March 2025, after obtaining approval from the institution's Human Ethics Committee. The Participants were 140 pregnant women with complicating factors like previous abortion along with adverse obstetric history and previous preterm delivery and preeclampsia from inpatients and outpatient units of the Obstetrics department of SRMC&GH prescribed with and without aspirin, were collected. Researchers placed participants into two groups: those who took aspirin and those who did not in order to determine the effectiveness as well as risks of aspirin in preventing preeclampsia. The study involved pregnant women aged over 18 years and under high-risk factors in addition to aspirin prescriptions and agreeing to participate and with a previous aspirin intolerance or allergy or bleeding disorders or adverse drug reactions in previous treatments with an exclusion criterion of patients who were unwilling to participate in the study. A study gathered its data from prescription evaluations in addition to case sheet review and patient conversation that took place in the Obstetrics Department. The analysis was conducted using Chi-square test and Mann-Whitney test to assess the efficacy and safety of aspirin with statistical evaluation. The results were analysed and proportionally tabulated.

Ethical Statement

The study has been approved by the Institutional Ethics committee (IEC) of Santhiram Medical College and General Hospital, Andhra Pradesh, India with the certificate of Approval.

4. Results

Aspirin use during pregnancy prevents severe preeclampsia, intrauterine growth restriction, preterm birth, and placental disorder, particularly among women with a history of miscarriage, preeclampsia, and stillbirth. It improves uteroplacental blood flow and inflammation. In this retrospective-prospective observational study of 140 pregnant women, the participants were assigned to either 70 who got aspirin or 70 who did not. Of these, 51 in the aspirin and 13 in the non-aspirin groups qualified for assessment of the safety and efficacy of treatment. In-depth information was obtained, including patient history, clinical findings, aspirin dose and use, and complications. Delivery

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outcomes such as mode of delivery, weight and gender of baby, and APGAR scores were also recorded. The results indicate that aspirin when employed correctly in high-risk pregnancy, can improve maternal as well as fetal outcomes. Throughout the study period, we accrued information on 140 pregnant females exposed and not exposed to aspirin. Aged 23–24 years was the majority (56 cases, 40%), followed by 18–22 years (41 cases, 30%), 28–32 years (31 cases, 22%), 33–37 years (11 cases, 7%), and 38–42 years (1 case, 1%) (See Table A, Figure A).

A. Age wise distribution				
Age Range(years)	Prospective cases	Retrospective Cases	Total no. of cases	Total %
18-22	23	18	41	30%
23-27	30	26	56	40%

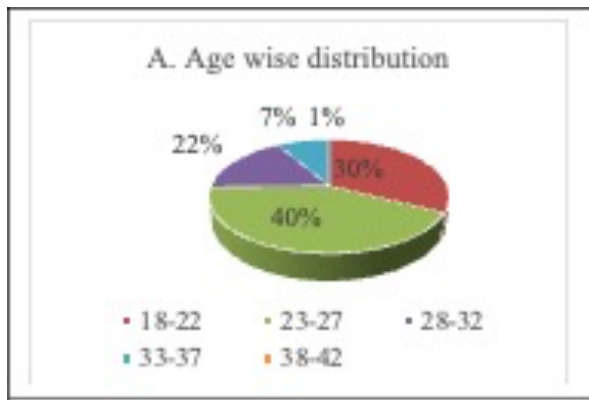


Table A & figure A: age wise distribution of cases

Age groups have been studied up to 42 years, whereas the reference is for up to 45 years of age. In contrast to the reference, where there is an increase in births to older mothers (30–40 and 39–45 years), our data cluster more strongly among younger mothers, particularly the 18–27 age group, indicating a departure from overall trends (Ananth CV, Keyes KM, et al., 2013). In 140 cases, the distribution of BMI was 40% healthy, 24% overweight, 24% obese and 9% underweight (See Table B, Figure B).

B. BMI Status		
BMI Category	Cases	Total %
Under weight	13	9%
Healthy weight	59	42%
Over weight	34	24%
Obese	34	24%

75 mg and 150 mg showed more variability in BMI. Both doses were used in all BMI groups with no dosing consistency. The higher rate of obesity shows BMI must guide aspirin prophylaxis (Chamani M, Shahrabi S, et al., 2022) We examined the menstrual history of 140 participants, finding that 42 (30%) were pregnant women with irregular cycles and 98 (70%) had regular cycles. This indicates that menstrual regularity may be a significant factor (See Table C, Figure C).

C. Menstrual History			
Menstrual cycle type	Cases	Total %	
Regular	98	70%	
Irregular	42	30%	

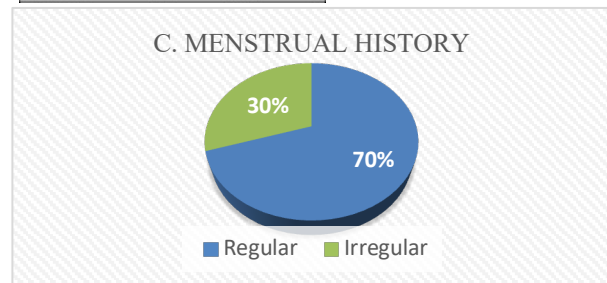


Table C & Figure C: Menstrual History of cases

The most common obstetric history included previous abortions (30%), first-time pregnancies (25%), and stillbirth or neonatal death (7%) (See Table D, Figure D).

D. Obstetrics History		
Obstetrics History	Cases	Total %
Primi	35	40%
Previous abortions	41	47%
Death/still birth	10	11%

Table D & Figure D: Obstetrics History

Medical histories were collected to identify preeclampsia risk factors, evaluate aspirin side effects, and compare aspirin users with non-users. Among the 74 cases reviewed, 52% had no significant medical history. Preeclampsia was reported in 18%, thyroid disorders in 11%, hypertension in 10%, and eclampsia in 4%. These findings align with the USPSTF and WHO guidelines, which recommend low-dose aspirin for high-risk women, as 48% of participants were identified at risk,

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and 11% had thyroid disease (Sibai BM, Mirro R, et al., 1989). We also noted that 104 patients had no previous medication use, while 14 reported taking medications, including Levothyroxine (14), Labetalol (10), and Nifedipine (5) for high blood pressure. Six patients were on Levetiracetam, and one was on aspirin (See Table E, Figure E).

E. past medical & medication History				
Past medical history	Hypertension	Preeclampsia	Eclampsia	Thyroid diseases
cases	15	26	6	16

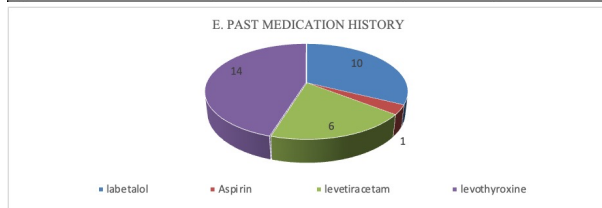


Table E & Figure E: Past medical and medication history

To assess aspirin's safety during pregnancy, we evaluated baseline RBC counts, platelet counts, and urine protein levels. Our findings showed that 83 patients had abnormal RBC counts, 47 had reduced platelet counts, and 89 exhibited proteinuria, indicating potential preeclampsia (see Table F). Unlike a cited study that found no significant difference between aspirin and a placebo, our results highlight a more severe condition, supporting the use of baseline tests to guide aspirin therapy (Viinikka L, Hartikainen-Sorri AL, et al., 1993) (See Table F, Figure F).

F. lab reports		
Parameters	Normal	Abnormal
RBC	57	83
WBC	108	33
Platelet count	94	47
Urine proteins	54	89

Table F & Figure F: Lab Reports

The research examined aspirin dosing patterns across various trimesters of pregnancy. Younger females (below the age of 30 years) were most probably to be administered the 150 mg dose, especially during the second trimester, whereas elderly females (age 30 and

above) tended to be administered the 75 mg dose, especially during the third trimester. This implies a more aggressive regimen for younger women at earlier gestational ages, with a conservative low-dose regimen for older women at later gestational ages. The variation in dosing and age-specific regimens is an expression of clinical judgement and regional practice. The study implies an individualized, age-dependent regimen, with younger women having higher doses at earlier gestation and older women having more conservative treatment at later gestation, an expression of clinical judgement and regional practice (Wang Y, Guo X, et.al, 2022) (See Table G, Figure G).

G. Dose of Aspirin According to Trimesters			
Trimesters	Month	Dose of Aspirin with trimesters	
		150 Mg	75Mg
1 st Trimester	1	0	0
	2	1	0
	3	2	0
2 nd Trimester	4	26	0

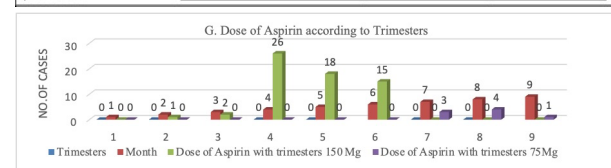


Table G & Figure G: Dose of Aspirin according to Trimesters

In our retro-prospective analysis of 140 pregnant women, aspirin exposure substantially lowered the incidence of preeclampsia. Out of 70 aspirin-treated patients, 27% had developed preeclampsia compared to 81% among non-exposed patients. This endorses aspirin's prophylactic role in high-risk individuals. The stark contrast emphasizes the significance of early detection and prophylactic exposure (See Table H, Figure H).

H. Incidence of preeclampsia exposure to aspirin or not		
Incidence	Preeclampsia	No preeclampsia
Exposure to aspirin	19	51

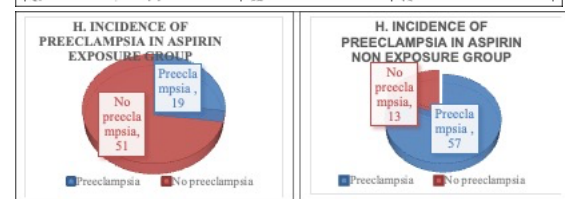


Table H & Figure H: Incidence of preeclampsia exposure to aspirin or not

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We assessed aspirin efficacy among pregnant women through a comparison between exposed and non-exposed populations. Parameters: IUGR, preeclampsia, preterm delivery, and APGAR score. IUGR was reduced slightly in the aspirin group (13 cases, 18.5%) compared to the non-exposed (23 cases, 16.4%), demonstrating a weak effect. Preeclampsia decreased among aspirin users (19 cases, 27.1%) compared to non-users (57 cases, 81.4%). Preterm delivery was lower in the aspirin group (8 cases, 11.4%) compared to non-exposed (35 cases, 50%). APGAR scores (8/10 or 9/10) were higher in the aspirin group (50 cases, 72%) compared to non-aspirin (46 cases, 65.7%). Our IUGR (18.5% vs. 16.4%) had a moderate effect compared to the study cited; their decrease (4% vs. 8%, $p < 0.001$) was most probably due to lower aspirin initiation (16 weeks); both studies had lower birth weights and preeclampsia (27.1% vs. 81.4%) (Ali PJ, Fattah CN, et al., 2018) (See Table I, Figure I).

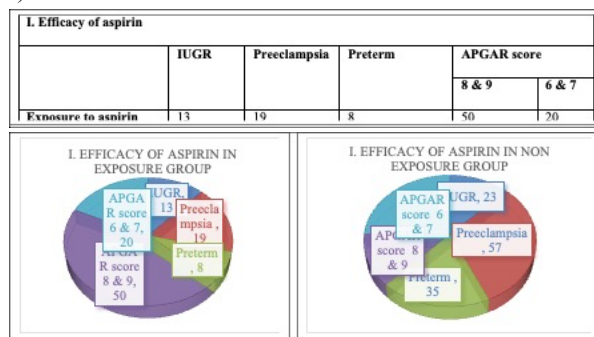


Table I & Figure I: Efficacy of Aspirin

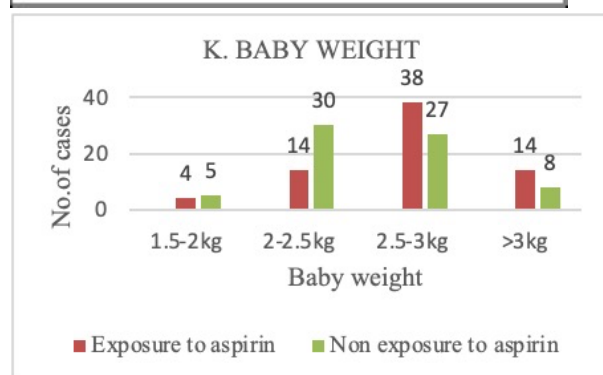
The mode of delivery varied significantly between groups, reflecting aspirin's effect. In the aspirin group, 57.1% (40/70) delivered normally, as opposed to 30% (21/70) in the non-exposed group. Cesarean sections were more common in the non-exposed group (70%, 49 cases) than in the aspirin group (42.9%, 30 cases), reflecting aspirin reduces cesarean rates by enhancing pregnancy outcomes and decreasing preeclampsia-related complications. Both our study and the reference data reveal the positive influence of aspirin on delivery types with increased normal deliveries and reduced caesareans in the aspirin group. (Ali PJ, Fattah CN, et al., 2018) (See Table J, Figure J).

J. Delivery details		
	Normal	c. section
Exposure to aspirin	40	30
Non exposure to aspirin	21	49

Table J & Figure J: Delivery Details

The prioritization of neonatal birth weights in our study depicted a positive trend among aspirin-treated women. Normal birth weight (>2.5 kg) was observed in 74.3% (52/70) of the aspirin group compared to 50% (35/70) in the non-exposed group. Low birth weight (<2.5 kg) was more in the non-aspirin group (50%) compared to the aspirin group (25.7%). For the aspirin group, 54.3% (38) had a weight of 2.5–3 kg and 20% (14) >3 kg, whereas the non-aspirin group comprised 38.6% (27) and 11.4% (8) respectively. Further, 42.9% (30) in the non-aspirin group weighed 2–2.5 kg compared to 20% (14) in the aspirin group. Our research confirms the effectiveness of aspirin in increasing birth weight. In contrast to the quoted study, our findings indicate a higher advantage, supporting aspirin's use in preventing IUGR (Ali PJ, Fattah CN, et.al, 2018) (See Table K, Figure K).

E. Baby weight				
Baby weight	1.5-2kg	2-2.5kg	2.5-3kg	>3 kg
Exposure to aspirin	4	14	38	14
Non exposure	5	30	27	8



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Table K & Figure K: Baby Weight

Among 140 live births, 77 (55%) were females and 63 (45%) were males. Gender, although not an outcome of interest, gives meaning to the population under study. The female preponderance is expected and non-intervention-influenced. Although fetal sex may impact outcomes in some pregnancies, the even distribution eliminates gender bias to a large extent. Therefore, gender information makes the sample representative and enhances the reliability of the results.

A Chi-square test compared the relationship between aspirin exposure and preeclampsia in 140 pregnant women (70 exposed, 70 not exposed). Within the aspirin group, 27% had preeclampsia compared with 81% in the non-exposed group. The finding was significant ($X^2(1) = 41.56$, $p < 0.001$, Cramer's $V = 0.54$), suggesting a moderately strong protective effect of aspirin. Among non-aspirin users, 81.4% had preeclampsia ($X^2(1) = 70$, $p < 0.001$, Cramer's $V = 1$), indicating an extremely strong correlation between aspirin non-use with heightened risk. Such results indicate that aspirin does work in terms of lowering the incidence of preeclampsia. The cited study (Talari H, Mesdaghinia E, et al., 2014) reported an incidence of 2.5% with aspirin and 22.5% with the placebo, as in our finding. Although they mentioned other predictors, our study is centered on aspirin's preventive function to enhance maternal and neonatal outcomes (See Table M).

M. Chi-square tests	
Parameters	P-value
Incidence of preeclampsia exposure to aspirin or not	<.001

Table M: Chi square test

A Mann-Whitney U test compared aspirin's influence on fetal development in the IUGR condition. There was increased birth weight in the aspirin-exposed group (2.75 ± 0.43 kg) compared with the non-exposed group (2.57 ± 0.40 kg), with significance ($U = 1790$, $n1 = 70$, $n2 = 70$, $p = 0.006$). That the exposed group had a larger mean rank (79.93 vs. 61.07) reaffirms this. Hence, the null hypothesis was rejected, showing aspirin enhances fetal growth and decreases the severity of IUGR. A Mann-Whitney U test demonstrated aspirin lowered systolic blood pressure, with the exposed group recording 120.79 ± 7.05 mmHg compared to the unexposed group of 137.57 ± 9.55 mmHg ($U = 39.5$, $Z = -8.86$, $p < 0.001$, R

$= 0.75$). The null hypothesis was rejected, confirming aspirin's effect in reducing systolic blood pressure and helping against hypertensive pregnancy disorders such as preeclampsia. Both our study and the reference study demonstrate significant blood pressure lowering with aspirin, with our study showing a bigger difference (16.78 mmHg) (Ali PJ, Fattah CN, et al., 2018). A Mann-Whitney U test revealed lower diastolic blood pressure in the aspirin group (Mean = 81.86, Median = 80) than in the unexposed group (Mean = 90.57, Median = 90) with a lower mean rank (52.54 vs. 88.46). Results were significant ($U = 1193$, $Z = -5.55$, $p < 0.001$, $R = 0.47$). Both studies affirm aspirin's effect on lowering diastolic blood pressure, with a variance of 8.71 mmHg in our study and 10 mmHg in the reference study, possibly owing to sample factors or dosages. Both attest to aspirin's advantage in high-risk pregnancy (Ali PJ, Fattah CN, et al., 2018).

The Mann-Whitney U test revealed a significant difference in gestational age between aspirin-exposed (37.46 ± 1.49 weeks) and non-exposed groups (36.13 ± 1.74 weeks) ($U = 1334$, $Z = -4.77$, $p < 0.001$, $r = 0.4$). Aspirin exposure prevents preterm labor by increasing gestational age and improving neonatal outcome. Statistical analysis revealed a large difference in APGAR scores between aspirin-exposed and non-exposed groups ($U = 1292$, $Z = -5.01$, $p < 0.001$, $r = 0.42$). The aspirin group scored more (Mean = 7.91, SD = 0.91, Median = 8) than the non-exposed group (Mean = 7.06, SD = 0.95, Median = 7), with non-overlapping 95% confidence intervals (7.7–8.13 vs. 6.83–7.28). These findings verify aspirin's beneficial impact on neonatal outcomes, attesting to its function in decreasing the risk of preeclampsia and enhancing placental function (See Table N).

N. Mann whitney tests	
Parameters	P-value
Efficacy of aspirin on iugr	0.006
Efficacy of aspirin on systolic blood pressure	<.001
Efficacy of aspirin on diastolic blood pressure	<.001
Efficacy of aspirin on gestational age (weeks)	<.001

Table N: Mann whitney test

Safety of Aspirin: A retrospective analysis of the effectiveness of low-dose aspirin in preventing preeclampsia discovered that all 70 participants were well-tolerated to aspirin with no side effects reported. The group given aspirin had a significantly lower rate of

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preeclampsia, which suggested enhanced maternal vascular function and improved placental perfusion. No neonatal complications or congenital malformations were seen in the neonates, which indicated aspirin plays a role in fetal health by improving placental function.

5. Discussion

In a 2024 retrospective cohort study, assessed the safety and efficacy of a regimen of 162 mg aspirin for the prevention of preeclampsia in high-risk pregnancy. Fewer cases of preeclampsia were seen in patients on 162 mg than in those on 81 mg, with no higher risk of postpartum hemorrhage or neonatal complications, showing the safety and possible efficacy of higher-dose aspirin. (Ayyash et al.) In the same year, conducted a systematic review and meta-analysis to evaluate the impact of 75 to 81 mg aspirin initiated before 16 weeks of gestation. Although the dose did not significantly influence preterm preeclampsia, it had a moderate effect in total prevention of PE and increased birth weight. However, significant study heterogeneity and differential risk of bias led the authors to conclude that higher doses, particularly 100 to 150 mg, are more effective, and aspirin resistance in some patients warrants individualized dosing. (Demuth et al.) A 2025 meta-analysis found that low-dose aspirin (75–150 mg), particularly when started between 12–16 weeks, reduced preeclampsia risk in high-risk pregnancies significantly. Higher doses (particularly 150 mg) were more effective. Despite heterogeneity of studies, evidence supports early, individualized aspirin treatment as a preventive intervention (Saxena et al.). A 2025 population-based cohort trial of about 14,000 women reported no significant difference in preeclampsia or preterm preeclampsia incidence between 150–160 mg and 75 mg aspirin doses, or any difference in risk for postpartum hemorrhage, suggesting that both doses may be acceptable alternatives. (Kupka et al.) Contrarily (Komoróczy et al.) (2025) reported aspirin begun prior to 20 weeks of pregnancy lowered preeclampsia and perinatal death regardless of maternal risk or aspirin dose. In order to consolidate these findings, We performed a retrospective-prospective study in 140 pregnant women and identified aspirin to significantly reduce the incidence of severe preeclampsia, intrauterine growth restriction, prematurity, and placental pathology—particularly among patients with a history of previous abortion, stillbirth, or previous preeclampsia. For the purpose of the study, only 27% of the women

treated with aspirin developed preeclampsia, compared to 81% of the control group. Most of the respondents were aged between 23–24 years and 40% had a normal BMI, though menstrual irregularity was identified to be a robust risk factor. Aspirin also reduced neonatal outcomes as well as blood pressure, augmenting its role in prevention of pregnancy at risk

6. Conclusion

The Study highlights the importance of low-dose aspirin as a well-tolerated, safe, and effective prophylactic therapy in the treatment of high-risk pregnancies. Its use, when started at the correct gestational age and customized to each patient's profile, is in line with standard clinical guidelines and exhibits definite benefits in preventing the risk of hypertensive complications, especially preeclampsia. The research highlights the significance of early detection of at-risk women and careful use of aspirin to ensure maximal maternal and fetal benefits. Safe with no known adverse effects, aspirin is a useful addition to prophylactic obstetric care, ensuring better vascular and placental function.

7. Acknowledgement

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8. Conflict of interest

The authors declare that there is no conflict of interest.

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