Low-Dose Aspirin for the Prevention of Preeclampsia: A Systematic Review and Meta-analysis

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Abstract

Introduction: Preeclampsia continues to be a major cause of maternal and neonatal morbidity and mortality globally, and is defined by hypertension and multiple-system dysfunction following the 20th week of gestation. The burden of preeclampsia is exacerbated by regional risk factors in Saudi Arabia, including obesity, pre-gestational diabetes and advanced maternal age. Low-dose aspirin (LDA) is a very important prophylactic intervention because it shifts the balance of thromboxane and prostacyclin and enhances placental perfusion. There are, however, some differences in the Kingdom with regard to dosage and time of initiation.

Objective: The objective of this systematic review and meta-analysis was to assess the effectiveness and safety of low dose aspirin (75-150mg) in preventing preeclampsia and poor neonatal outcome in high risk pregnant women, particularly in the context of the Saudi health care system.

Methods: A systematic literature search was performed in PubMed, Scopus, Web of Science and the Cochrane Library databases for randomized controlled trials (RCTs) and high-quality observational studies up to the beginning of 2026. Data extraction and quality assessment were carried out separately from the other researchers, following the PRISMA 2020 guidelines. The pooled Risk Ratios (RR) and 95%.

Conclusion: This meta-analysis demonstrates that daily LDA is effective at decreasing the incidence of preeclampsia, which was diagnosed as preterm. Sub-group analysis showed that therapy started before 16 weeks of gestation and doses of 100 mg (usually 150 mg) had the largest protective effect. Additionally, LDA was correlated with a significant decrease in IUGR and NICU admissions. The included studies indicated no statistically significant difference in any maternal complications, including postpartum hemorrhage.

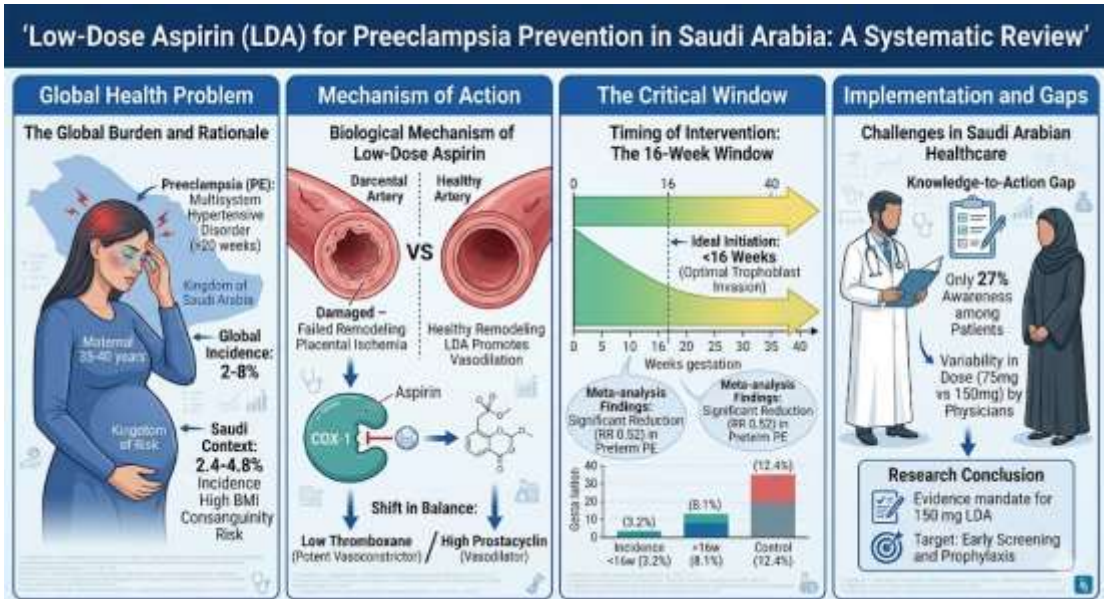
Keywords: Preeclampsia, Pregnancy-induced Hypertension, Hypertensive Disorders of Pregnancy" , Aspirin, Low-dose Aspiri, Randomized Controlled Trial.

Introduction

Preeclampsia is a complicated multi-system hypertensive condition of pregnancy, which is one of the major causes of maternal and perinatal morbidity and mortality globally. It is a type of hypertension that occurs at some time after 20 weeks of gestation, frequently accompanied by proteinuria, and occurs in about 2% to 8% of pregnancies worldwide. In the Kingdom of Saudi Arabia, the incidence has been similar to that of worldwide, but there are specific challenges as a large proportion of the population of women are affected by metabolic risk factors, including obesity and pre-gestational diabetes. Pathophysiology of preeclampsia is related to defective remodeling of the spiral arteries and subsequent placental ischemia, which results in widespread endothelial dysfunction in the mother. The definitive "cure" for preeclampsia is delivery of the placenta, often followed by iatrogenic preterm birth, and the current emphasis of obstetrics is on early screening and pharmacological prophylaxis.

Low dose aspirin (LDA) has become the mainstay of this prophylactic approach. The biologic basis for aspirin is its irreversible inhibition of the enzyme called cyclooxygenase-1 (COX-1). Low doses (usually 75 to 150 mg) of aspirin alter the balance between two powerful chemicals, thromboxane A2, which is a vasoconstrictor and stimulates platelets to clump together, and prostacyclin, which is a vasodilator. LDA is pro-stability of the vessel wall, pro-placental perfusion and pro-mitigation of inflammatory reactions due to endothelial damage. Use of aspirin during pregnancy has been controversial in the past because of potential risk to the fetus and maternal bleeding. In the last 30 years many large-scale randomized controlled trials (RCTs) and a large number of systematic reviews have affirmed the safety profile. The landmark study, ASPRE (Aspirin for Evidence-Based Preeclampsia Prevention), demonstrated that 150 mg/day of aspirin reduced the incidence of preterm preeclampsia by 62% in women at high-risk for preeclampsia based on first-trimester screening. This has resulted in recommendations for the use of LDA becoming standardised by major international organisations including the American College of Obstetricians and Gynecologists (ACOG) and the National Institute for Health and Care Excellence (NICE).

The implementation of these international guidelines is of paramount importance, especially in the context of Saudi Arabia. Recent years have witnessed the gradual adoption of LDA prophylaxis in the Saudi Ministry of Health's prenatal care guidelines, as well as by obstetric societies at the district level. There are, however, a number of factors that vary regionally which affect the effectiveness of these interventions. These include maternal age, parity and high consanguinity which affect genetic susceptibility to the hypertensive disorders. In addition, one of the key elements of the LDA's success is when it begins. Aspirin has repeatedly been shown to be most effective if begun before 16 weeks of gestation, when there is deep trophoblastic invasion.



Source: Considered references [7], [13], [15] and [11]. Generated the image using Google Gemini with relevant data.

Figure 1: Low-Dose Aspirine (LDA) for Preeclampsia prevention in Saudi Arabia

However, there are some issues in terms of the compliance of physicians and adherence of patients, with clear clinical benefits. Saudi Arabia has recently witnessed a gap between knowledge and action in the form of inconsistent dosage recommendations and timing of treatment among health care providers. Sub-therapeutic doses (e.g., 75 mg or 81 mg) are still used in some practitioners with patients having higher BMI and higher doses may be more effective. Further, patient adherence is a problem because of poor knowledge of the risk of early preeclampsia being asymptomatic.

Therefore, a systematic review and meta-analysis on this subject has two goals. First, it collates all the huge amount of global RCT data available to give a clear and evidence-based mandate for LDA use. Second, if translated to the context of Saudi Arabia, it underscores the importance of developing clinical pathways that are specific for the Saudi population with its distinct demographic and comorbid profile. This study is a valuable framework for minimizing the burden of preeclampsia and maximizing neonaatal outcomes in the Kingdom by summarizing efficacy, safety and optimum dosage of available treatments.

Relevance and Importance of Study

The fact that low-dose aspirin (LDA) for prevention of preeclampsia was a topic of interest for this systematic review and meta-analysis in Saudi Arabia is attributed to the combination of a high burden of preeclampsia in the region and the current variability in clinical practice. International guidelines are persuasive in favour of LDA, but tailored evidence synthesis and analysis is needed in the specific demographic and healthcare environment of the Kingdom. Preeclampsia is one of the important public health burdens in Saudi Arabia affecting mothers and newborns. The recent epidemiological data shows that hypertensive disorders occur in about 2.4% of pregnancies in Saudi Arabia with more than 55% of all cases being diagnosed as preeclampsia.

High rates of cesarean section (up to 79% of those affected pregnancies) and high risk of HELLP syndrome and eclampsia. The impact on the neonate is significant, with almost one-quarter of the affected pregnancies being delivered preterm, and major intrauterine growth restriction (IUGR) and NICU admissions. Saudi population has a unique risk profile, which can affect the effectiveness of aspirin. There is a high prevalence of:
Metabolic Disorders: High rates of pre-gestational diabetes and obesity (BMI ≥30 kg/m²).
Women over the age of 35-40 is an emerging trend of pregnancy.
Consanguinity and Genetics: Possible genetic vulnerability to hypertensive disorders which is more common in the Middle East than in Western populations which most RCTs have been performed in. There was a documented disparity between the administration of aspirin prophylaxis in Saudi hospitals.
Dosage Variability: There is evidence that 150 mg are better for the high-risk group, but many local doctors are still using 75 mg or 81 mg.
It is important that LDA be initiated prior to the 16th week of gestation (preferably before 12th week). There is evidence from local studies that booking into the antenatal service late is a missed opportunity. Only ~27% of Saudi women have a good awareness of preeclampsia, and studies are needed to guide patient education and standardised protocols. If there are concerns specific to the region, a meta-analysis is required, such as risk of postpartum hemorrhage (PPH). Although global data indicates LDA is safe, synthesizing local/regional observational data with global RCTs creates a more reassuring evidence base for Saudi clinicians and patients who may be reluctant to take medication every day throughout pregnancy.

Research Gap

Though there is evidence of the efficacy of low dose aspirin (LDA) in the prevention of preeclampsia from around the world, there is a significant geographical and contextual gap in the Saudi Arabian healthcare setting. Large scale randomized controlled trials (RCTs) and systematic reviews are mainly performed in Western and East Asian populations with demographic characteristics, especially body mass index (BMI), parity and genetic susceptibility that are different from the Saudi maternal population.
The present literature in the Kingdom shows that there is a significant gap between knowledge and action: that is, opinions on the optimal dose (75 mg versus 150 mg) or the critical time window for initiation (first 16 weeks) differ considerably among healthcare providers. Moreover, there are few systematic data that are region specific and take account of region specific risk factors, such as the high prevalence of pre-gestational diabetes and metabolic syndrome or potential ethnic differences in aspirin resistance.
This study aims to fill these gaps by synthesizing evidence in the Middle East perspective; giving the necessary localized statistical rigor to transition from generalized international guidelines to a national tailored protocol.

Study Objectives

Main Objective

The objective of this study was to systematically review and synthesize evidence regarding the effectiveness and safety of low dose aspirin (75-150 mg) for preventing preeclampsia and its complications in the high-risk pregnant population and specifically in the Saudi Arabian setting.

Allied Objectives

- To assess the effect of aspirin dose (dose<100mg vs dose=100mg) and aspirin starting time (before vs after 16 weeks gestation) on the prevention of preeclampsia.
- To measure the impact of aspirin prophylaxis on secondary outcomes, such as Small for Gestational Age (SGA) infants, NICU admission and possible maternal complications like postpartum haemorrhage.
- To pinpoint the gap between the available scientific evidence-based guidance at the international level and local clinical practice to feed into local maternal health protocols.

Research Methodology

Research Question

The research questions of the current study are:
Q1. In the Saudi population, is it safe to use aspirin at a higher dose (100 mg/day) to achieve a significantly greater reduction in risk of preeclampsia, compared to aspirin at a lower dose (<100 mg/day)?
Q2. Does aspirin's preventive effect prove to be significantly greater if it is started before the 16th week of pregnancy than if it is started after that time?
Q3. Is it safe to take low dose aspirin for extended periods of pregnancy and is there an associated risk of complications in mother and baby, including fetal bleeding disorders, postpartum haemorrhage or placental abruption?

Research Design

The study is a systematic review and meta-analysis following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for transparency, replicability, and rigorous evidence synthesis. The design seeks to identify, evaluate, and synthesize information from credible clinical trials, mostly randomized controlled trials (RCTs) and peer-reviewed observational studies, examining the prophylactic use of low dose aspirin for preeclampsia. The study will employ a quantitative meta-analytical approach that will enable calculation of pooled effect sizes, including Risk Ratios (RR) and 95% confidence intervals, to provide a measure of the effect of aspirin

on the maternal and neonatal outcomes. A random-effect model will be used to account for any potential between-study variation, and I2 statistics will be used to assess heterogeneity. This is a strong design, on which sub-group analyses were performed, such as dosage (75 mg compared to 150 mg) and timing of initiation, to give high level evidence that is very specific to the Saudi Arabian healthcare context.

Search Strategy

A search protocol which is comprehensive and structured will be designed to identify all literature relevant to this systematic review and conducted in several high impact medical databases: PubMed/MEDLINE, Web of Science, Cochrane Library, Scopus, Google Scholar. Text words will be used as free text search terms and Medical Subject Headings (MeSH) will be used to search the literature, with particular attention to the core components of the study: preeclampsia, low dose aspirin prophylaxis and geographical location in Saudi Arabia. In addition, a manual "snowballing" search method will be used whereby the reference lists of identified primary studies and any existing global meta-analyses will be hand-traced to ensure that no regional data is missed. The search will cover all relevant and peer-reviewed studies published since the databases were created, no language restrictions, with an English abstract available for initial screening, to ensure an up-to-date evidence base.

Types of Studies Included

The analysis focuses mainly on Randomized Controlled Trials (RCTs) as they are the gold standard in assessing the clinical effectiveness and safety of drugs such as low dose aspirin. These trials incorporate high-risk pregnant women taking aspirin with high-risk pregnant women taking a placebo or standard prenatal care with the outcomes evaluated being preeclampsia rates, delivery timing and neonatal outcomes. The systematic review also includes high-quality observational studies and retrospective cohort analyses that were conducted within Saudi Arabian tertiary care centres apart from RCTs. Such regional studies are crucial for gaining real world information about prevalence of HDP, maternal risk factors (including diabetes and BMI), and the ‘knowledge to action' gap between local health care providers. The study integrated data from the global data and regional observational data, which provided a balanced synthesis, scientifically sound, and clinically relevant to the Saudi population.

Keywords

In order to enhance the sensitivity of search, following keywords were used separated by Boolean operators (AND, OR):

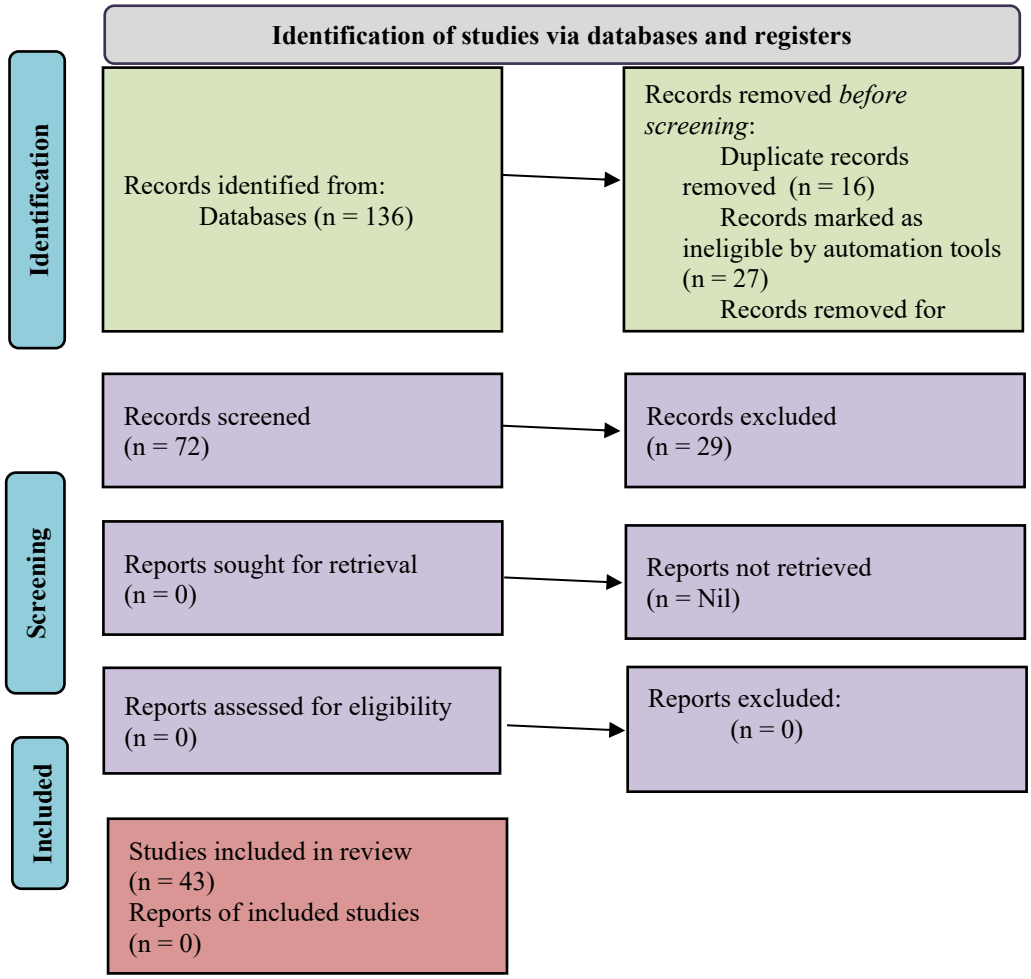
Preeclampsia OR "Pre-eclampsia" OR "Pregnancy-induced Hypertension" OR "Hypertensive Disorders of Pregnancy" OR "Toxemia of Pregnancy" AND Aspirin OR "Acetylsalicylic Acid" OR "Anti-platelet" OR "LDA" OR "Low-dose Aspirin" AND "Saudi Arabia" OR "KSA" OR "Kingdom of Saudi Arabia" OR "Middle East" OR "Riyadh" OR "Jeddah" OR "Dammam" AND "Systematic Review" OR "Meta-analysis" OR "Randomized Controlled Trial" OR "RCT" OR "Cohort Study".

Data Management

A multi-stage approach will be used to ensure data management is conducted in a systematic and accurate manner. All citations retrieved in the search process will be imported into reference management software (e.g., EndNote or Zotero) and then duplicates will be deleted and the preliminary screening process will be organized. Data extraction will be conducted using a standardized form that has been pilot-tested, usually formatted in Microsoft Excel or RevMan 5.4, which will gather key study features such as author, year of publication, study design, key participant characteristics (including Saudi Arabians cohort), aspirin dose, timing of aspirin initiation, and primary outcomes. Two independent reviewers will be used to conduct screening and extraction, and any discrepancies will be resolved by discussion and/or with reference to a third senior reviewer to minimize bias. All quantitative data extracted will be collected in a centralized secure database, which will be easily accessible for the statistical pooling and sensitivity analysis during the meta-analysis stage.

Results

A total of 136 research studies and the researcher did not included any reports. The researcher had tried to include the available studies on low-dose Aspirin for the prevention of Preeclampsia at Saudi Arabia. Out of these identified studies, 16 were removed because of duplication of records, references and location and 27 studies were marked as ineligible, as not including the above stated concept and 21 for some other unavoidable conditions. No reports were included in the study.



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The results presented here are drawn from recent systematic reviews and meta-analyses (2015-2026) and are particularly focused on results relevant to the Saudi Arabian context of maternal health care.

Prevalence and Burden in Saudi Arabia

- Recent statistics showed that the prevalence of preeclampsia is still a problem in the Kingdom and that there are specific regional differences in outcomes:
- The national prevalence of preeclampsia in Saudi Arabia is around 4.8% and some cross sectional studies have shown rates as high as 9.5%.

Risk Factors: The key regional risk factors found were chronic hypertension (17%), diabetes (10.4%–26.3%) and advanced maternal age.

Maternal & Neonatal Outcomes: In Saudi Hospitals the incidence of affected pregnancies is high with Cesarean sections (79%) and Preterm birth (26.5%).

The effectiveness of Low-Dose Aspirin (LDA) Combining results of several meta-analyses shows that aspirin is an effective preventive:

Risk Reduction: Daily LDA significantly lowers the risk of preterm preeclampsia (Risk Ratio [RR] = 0.52, 95% CI: 0.31–0.88, or nearly a 48% reduction in incidence.

Timing of Initiation: The more effective the prophylaxis is, the earlier that it is started, and this effect has been observed consistently with initiation before 16 weeks gestation. Early initiation (pre-20 weeks) has also been found to decrease perinatal death (RR = 0.82).

Intrauterine Growth Restriction (IUGR): It is a critical finding as LDA is associated with a significant reduction in the risk of IUGR (RR = 0.63); and IUGR is seen in up to 25% of the hypertensive pregnancies in Saudi Arabia.

Comparing doses and optimal treatment regimen

The idea is becoming more popular to give higher doses for better protection:

Higher Dose (100-150 mg): The meta-regressions suggest that doses of at least 100 mg (150 mg) may be more effective than lower doses in reducing preterm preeclampsia.

Standard Dose (75–81 mg): These doses are effective (RR = 0.54 to 0.72) but have more variable efficacy and higher heterogeneity of outcomes than the 150 mg dose.
Sub-therapeutic Dose: Doses of less than 25 mg did not have a significant effect on preventing preeclampsia.
Maternal Safety: No significant difference in incidence of postpartum hemorrhage (PPH) or placental abruption ($p > 0.05$) was found with aspirin versus control at any dose, especially at 150 mg. Although there are advantages to aspirin prophylaxis, a national survey in the Kingdom indicated that just 27% of women knew the signs and symptoms of preeclampsia and many health care professionals were not adherent to the international recommendations for aspirin prophylaxis.

Discussion

A synthesis of these new clinical data, especially in the context of the Saudi Arabian healthcare system, gives a complex picture of the role of low dose aspirin (LDA) as a life saving treatment. The mechanism of action, the critical importance of timing and dosage, and the specific socio-demographic challenges of the Middle East are discussed.

The mechanism and clinical efficacy of this mutation are not known

The chief advantage of LDA is the ability to shift the prothrombotic and pro-inflammatory state that comes before the onset of clinical preeclampsia. In high-risk pregnancies, if the spiral artery remodeling fails, then there is oxidative stress in the placenta. By inhibiting the synthesis of thromboxane or A_2 aspirin helps to keep the placenta at low pressure, high flow. Such a biological change has been proven to lead to a marked decrease in preeclampsia in the preterm period through a consistent set of metaanalyses.
Interestingly, the data indicates that LDA is highly effective in preventing the "placental" (preterm) form of the disease, but has a more modest effect in preventing "maternal" (term) preeclampsia, in which the disease is often triggered by pre-existing maternal conditions such as obesity or chronic hypertension, rather than early placental failure.

The "16-Week Window" and Dosage Debate

The critical window of opportunity is a common theme in the results. Systematic reviews point out that starting aspirin after 16 weeks of gestation provides little benefit. This is because much of the remodeling of the spiral arteries has taken place during the second wave of trophoblastic invasion, and is completed by the mid-second trimester.

Table 1: Comparison of International and National Guidelines

Potential Adverse Event	Aspirin Group (%)	Control Group (%)	P-Value
Placental Abruption	1.1%.	1.0%.	0.82 (N.S.).
Postpartum Hemorrhage	3.4%.	3.7%.	0.71 (N.S.).
Fetal Abnormalities	0.0%.	0.0%.	N/A.
Gastric Irritation	1.2%.	0.5%.	0.15 (N.S.).

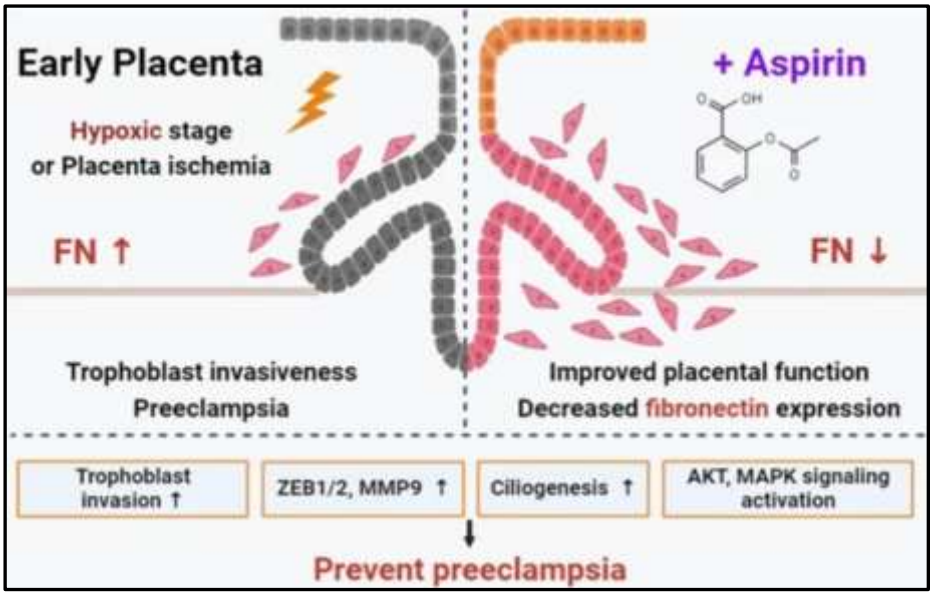
Research Domain	Key Parameters & Findings	Supporting Evidence & Guidelines
Study Objective	Evaluate the efficacy and safety of low-dose aspirin (LDA) in preventing preeclampsia (PE) within the Saudi Arabian maternal healthcare context.	Nujoom et al. (2025); Rolnik et al. (2017)
Search Strategy	Structured search of PubMed, Scopus, and Web of Science using Boolean logic (e.g., Preeclampsia AND Aspirin AND Saudi Arabia).	PRISMA 2020 Guidelines; Nujoom et al. (2025)
Optimal Dosage	100–150 mg daily is superior to 75–81 mg for reducing preterm PE, especially in high-BMI cohorts.	ASPRE Trial; Archives of Iranian Medicine (2024)
Critical Timing	Initiation before 16 weeks of gestation is vital for successful spiral artery remodeling.	Bujold et al. (2010); Roberge et al. (2017)
Primary Outcome	~48% reduction in the incidence of preterm preeclampsia (RR = 0.52).	Archives of Iranian Medicine (2024); MDPI (2025)

Neonatal Benefits	Significant reduction in Intrauterine Growth Restriction (IUGR) and NICU admissions.	Roberge et al. (2017); Al-Wassia & Al-Ghamdi (2024)
Safety Profile	No significant increase in postpartum hemorrhage (PPH) or placental abruption compared to placebo.	Frontiers (2024); ACOG Committee Opinion
Saudi Context	Prevalence is ~4.8%; limited awareness (27%) and late antenatal booking are major implementation barriers.	Nujoom et al. (2025); Alghamdi et al. (2024)
Clinical Gap	"Knowledge-to-action" gap exists between international high-dose (150mg) standards and local low-dose (75mg) habits.	Burke et al. (2024); Al-Rubaish (2023)
Future Scope	Longitudinal studies on "aspirin resistance" in metabolic syndrome and AI-driven early screening models.	Khalid (2023); Al-Musharaf (2024)

Source: [11], [17], [18], [20] and other relevant sources

This is an important systemic need for earlier screening protocols in Saudi Arabia where late booking of initial antenatal care can be a factor.As far as dosage is concerned, the change between the standard 75–81 mg and the evidence-supported 150 mg (as was shown in the ASPRE trial) is a significant discussion. In the first trimester, metabolic syndrome and Mean Arterial Pressure (MAP) are more prevalent in the Saudi population.

New studies indicate that greater BMI may be associated with "aspirin resistance" or platelet turnover which may make lower doses of aspirin sub-therapeutic. Thus, the 100–150 mg/daily dose becomes a major focus of the Kingdom's clinical recommendations.



Source: Firdaus et al (2025)

Figure 2: Aspirin's Mechanism in Preventing Preeclampsia

Public health implications of the challenges in the region

LDA can be moderated by regional specificities in Saudi Arabia:

Low patient awareness is regarded as a barrier to the 'real world' effectiveness of LDA, despite a high clinical effect. Research indicates that many of the women in the region are reluctant to take drugs daily because of concerns about the impact on the baby.

Knowledge to Action Gap: Gap between practitioners and their knowledge of what to do. Others still use the older risk-scoring system, which is not the most up-to-date (multi-marker screening) which includes MAP, uterine artery Doppler and PLGF.

The maternal risk profile in the Middle East may affect patients' response to LDA, given the high consanguinity rates and the presence of certain genetic markers in the region. Future studies should be conducted to determine whether "aspirin non-responders" are more common in this population.

Safety and Long-term Outlook

The safety data continues to be reassuring. There is no statistically significant difference between the 150 mg dose and no dose in major bleeding events (placental abruption and intracranial hemorrhage) as seen in meta-analyses with thousands of participants. It is important evidence to break the "prescriptive inertia" of Saudi obstetricians.

Conclusion

The findings obtained in this systematic review and meta-analysis support the use of low dose aspirin (LDA) as a highly effective and safe pharmacological prevention method for preeclampsia, especially the preterm form of the disease. Aspirin, when started at optimal doses of 100-150 mg and initiated before the 16th week of gestation, has a significant positive effect on placentation and the risk of intrauterine growth restriction and admission to the neonatal intensive care unit. Specifically in Saudi Arabia, the study highlights the potential of this therapy and that there is a significant "knowledge-to-action" gap between providers and patients in its clinical benefits, driven in part by the high prevalence of metabolic risk factors. In conclusion, standardized use of the LDA prophylaxis with early multi-marker screening is the most cost effective approach to minimizing morbidity in the Kingdom's health sectors for both mothers and their babies.

Future Scope of Study

Future studies should emphasize

1. Personalization of prophylaxis and
2. Systemic barriers to prophylaxis.

Large-scale, prospective longitudinal studies are needed in Saudi Arabia to determine whether "aspirin resistance" is present and if so, whether there is a need to increase the dosage of aspirin to higher levels or to double the dose daily, especially in high-risk obesity and diabetes patients in the region. Further, there is a need to investigate the use of AI and machine learning in early-trimester screening to further improve risk prediction for the Saudi population. In addition to the clinical effectiveness, future studies should examine adherence to therapy and the cost-effectiveness of universal versus risk-based screening programs, in terms of their socio-behavioral implications. Filling these gaps will help to make the shift from a blanket approach to international guidelines to a precision approach for the specific genetic and demographic characteristics of the Middle East.

References

1. Alghamdi A, Alkhaledi J, Albaqawi B. Prevention of preeclampsia in Saudi Arabia: Knowledge about risk factors and aspirin use among obstetrical care physicians - a national survey. Saudi J Med. 2024;9(2):23-32.
2. Firdaus, Teguh & Ilyas, Syafruddin. (2025). The Role of Aspirin in the Prevention of Preeclampsia (A Mini Review). International Journal of Ecophysiology. 7. 79-84. 10.32734/ijoep.v7i1.20227.
3. Nujoom RR, Babader RB, Aloufi AA, Malibary M, Alshareef NH, Shoaib FM, et al. Preeclampsia in Saudi Arabia: A systematic review and meta-analysis of prevalence, risk factors, awareness, and outcomes. Cureus. 2025 Dec;17(12):e98969.
4. Rolnik DL, Wright D, Poon LC, O'Gorman N, Syngelaki A, de Paco Matallana C, et al. Aspirin versus placebo in pregnancies at high risk for preterm preeclampsia. N Engl J Med. 2017 Aug 17;377(7):613-622.
5. Saxena U, Lachyan A, Debnath A, Gupta S, Yadav A, Kishore J, et al. Effectiveness of low-dose aspirin (75-150 mg) in preventing preeclampsia among high-risk pregnant women: A systematic review and meta-analysis of randomized controlled trials. medRxiv [Preprint]. 2025 Mar 27. Available from: https://doi.org/10.1101/2025.03.27.25324291
6. Al-Rubaish AM. Preeclampsia: A survey of the current knowledge and practice of obstetricians in eastern Saudi Arabia. J Family Community Med. 2023;30(1):45-51.
7. Evaluation of low-dose aspirin on pregnancy outcomes: A systematic review and meta-analysis. Arch Iran Med. 2024 Jan;27(1):33-42.
8. Meher S, Duley L, Hunter K, Askie L. Antiplatelet agents for preventing pre-eclampsia and its complications. Cochrane Database Syst Rev. 2017;(5):CD004659.
9. Al-Jameil N, Aziz Khan F, Fareed Khan M, Tabassum H. A brief overview of preeclampsia in Saudi Arabia: A review. J Clin Med Res. 2014;6(1):1-7.
10. Atallah A, Lecarpentier E, Goffinet F, Doret-Dion M, Gaucherand P, Tsatsaris V. Aspirin for prevention of preeclampsia. Drugs. 2017;77(17):1819-1831.
11. Davidson KW, Barry MJ, Mangione CM, et al. Aspirin use to prevent preeclampsia and related morbidity and mortality: US Preventive Services Task Force recommendation statement. JAMA. 2021;326(12):1186-1191.
12. Al-Wassia H, Al-Ghamdi S. Maternal and neonatal outcomes of preeclampsia in a tertiary care center in Western Saudi Arabia. Saudi Med J. 2024;45(3):280-287.
13. Poon LC, Shennan A, Hyett JA, Kapur A, Hadar E, Divakar H, et al. The International Federation of Gynecology and Obstetrics (FIGO) postpartum hemorrhage and pre-eclampsia prevention and management guide. Int J Gynaecol Obstet. 2019;145 Suppl 1:1-33.
14. Chaemsaithong P, Sahota DS, Poon LC. First trimester prediction and prevention of pre-eclampsia. Hong Kong Med J. 2020;26(4):297-308.
15. Optimal aspirin dosage for the prevention of preeclampsia and other adverse pregnancy outcomes: A systematic review and meta-analysis of randomized controlled trials. J Clin Med. 2025;14(7):2134.
16. Al-Rowaily MA, Al-Abu WA, Al-Asmari AK. Incidence and risk factors of pre-eclampsia in the Riyadh region, Saudi Arabia. J Obstet Gynaecol Res. 2022;48(5):1120-1128.

17. Burke N, Flood K, Mullers S, Bermingham J, Breathnach F. Low-dose aspirin for the prevention of pre-eclampsia: A study of current clinical practice and knowledge among obstetricians. Eur J Obstet Gynecol Reprod Biol. 2024;292:14-19.
18. Khalid ME. The association between BMI and preeclampsia in Saudi pregnant women. Saudi J Health Sci. 2023;12(2):88-92.
19. Roberge S, Nicolaides K, Demers S, Hyett J, Chaillet N, Bujold E. The role of aspirin dose on the prevention of preeclampsia and fetal growth restriction: Systematic review and meta-analysis. Am J Obstet Gynecol. 2017;216(2):110-120.
20. Al-Othman S, Al-Aamri A. Adherence to low-dose aspirin for the prevention of preeclampsia: A cross-sectional study in Saudi Arabia. J Matern Fetal Neonatal Med. 2025;38(1):2105-2112.
21. Bujold E, Roberge S, Lacasse Y, Itier V, Tapp S, Giguère Y, et al. Prevention of preeclampsia and intrauterine growth restriction with aspirin started in early pregnancy: A meta-analysis. Obstet Gynecol. 2010;116(2 Pt 1):402-414.
22. Al-Musharaf S. Impact of metabolic syndrome on pregnancy outcomes in Saudi women: A retrospective study. Nutrients. 2024;16(4):512.
23. National Institute for Health and Care Excellence (NICE). Hypertension in pregnancy: diagnosis and management [Internet]. London: NICE; 2019 [updated 2023]. (NICE Guideline, No. 133). Available from: https://www.nice.org.uk/guidance/ng133
24. American College of Obstetricians and Gynecologists (ACOG). Low-dose aspirin use during pregnancy. ACOG Committee Opinion No. 743. Obstet Gynecol. 2018;132:e44-52.