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# Rate and Factors Related to the Appropriate use of Prophylactic Asperin in High-Risk Preeclampsia Pregnant Women: A Cross-Sectional Study at Tu Du Hospital, Vietnam

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## ABSTRACT

Objectives: To assess how well pregnant women adhere to aspirin therapy aimed at preventing preeclampsia at Tu Du Hospital. Methods: This study was cross-sectional and included 182 pregnant women classified as high risk for preeclampsia. These participants were between 24 and 36 weeks pregnant, received a prescription for preventative aspirin, and visited Tu Du Hospital for prenatal checkups from 11/2024 to 5/2025. Results: The adherence rate to aspirin prophylaxis for preeclampsia in high-risk pregnant women, assessed using the MMAS-8 questionnaire, was 25.3%. Statistically significant factors associated with adherence were: a history of hypertensive disorders during pregnancy and a family history of hypertension. Conclusion: The rate of pregnant women at high risk of preeclampsia who use aspirin correctly for prevention is still very low. Appropriate measures are needed in terms of approach and counseling to increase treatment adherence among pregnant women in this group.

**Keywords:** Aspirin, follow-up, preeclampsia, prophylactic treatment, treatment adherence.

## 1. INTRODUCTION

Preeclampsia is a major cause of death for mothers and newborns in obstetrics around the world. The World Health Organization estimates that about 2-10% of all pregnancies result in preeclampsia. In Vietnam, a series of studies conducted in Hue from 2012 to 2016 showed a preeclampsia prevalence of approximately 2.8-5.5% (Thanh et al., 2015; Duc et al., 2014). This condition increases the risk of serious maternal complications such as eclampsia, organ damage, cerebral hemorrhage, and death. Preeclampsia also affects the fetus and newborn, leading to intrauterine growth restriction, low birth weight, stillbirth, premature birth, and neonatal death (Mayrink et al., 2018). The definitive treatment for preeclampsia is delivery; therefore, screening pregnant women at high risk for preeclampsia for prevention and close monitoring should be prioritized.

Daily aspirin use has been shown to reduce the risk of preeclampsia. The American College of Obstetricians and Gynecologists (ACOG, 2018) advises that high-risk pregnant women take a daily low-dose aspirin, preferably starting before

the 16th week of pregnancy, to help lower the chances of developing preeclampsia. As per the 2021 guidelines from the Ministry of Health, high-risk pregnant women are recommended to begin aspirin prophylaxis between 11 to 13+6 weeks of pregnancy and continue it up to 36 weeks. Aspirin treatment helps prevent and reduce the risk of death from complications of preeclampsia (MOH, 2021).

Treatment adherence in pregnant women at high risk of preeclampsia affects the effectiveness of preeclampsia prophylaxis. A study, the Multiple Factor Preeclampsia Screening and Aspirin Prophylaxis Trial (ASPRE), demonstrated the importance of aspirin adherence, with adherence rates of 75% in the ≥90% group compared to 40% in the <90% group. This demonstrates that adhering to the aspirin regimen nearly doubles the preventive benefits against preeclampsia compared to non-adherence. Several factors affect how well pregnant women follow their medication plans. Studies show that many expectant mothers experience significant reluctance, primarily due to fears about safety and the overwhelming amount of contradictory information available on the internet. Without a strong sense of support from their clinical team, many choose to bypass their prescriptions, treating medication only as a last resort when they feel the fetus's health is at immediate risk (Nordeng et al., 2010). Besides increasing the likelihood of disease progression, non-adherence also wastes medication and increases the burden on healthcare, such as visits and hospitalizations. Therefore, identifying the causes of aspirin non-adherence is essential for achieving high effectiveness in the prophylactic treatment of preeclampsia.

We recognized the necessity of the project 'Assessment of aspirin prophylaxis adherence for preeclampsia in pregnant women' to determine the adherence rate among high-risk patients at Tu Du Hospital. This study aims to provide a clinical foundation for developing targeted interventions to improve adherence, thereby maximizing prophylactic efficacy and reducing the healthcare burden on maternal and fetal health.

## 2. SUBJECTS AND METHODS OF STUDY

**Research design**

Cross-sectional study.

**Sampling criteria**

All pregnant women at high risk of preeclampsia with gestational ages between 24 and 36 weeks who are prescribed prophylactic aspirin treatment from 14 to 16 weeks of gestation and who attend prenatal checkups at Tu Du Hospital from November 2024 to April 2025 and meet the selection criteria are eligible for inclusion.

*Admission criteria:*

Pregnant women are identified as being at high risk of preeclampsia according to the FMF algorithm.

Pregnant women are prescribed aspirin for treatment.

The pregnant woman agreed to participate in the study.

*Exclusion criteria:*

The pregnant woman was unable to communicate.

The pregnant woman had been prescribed aspirin before becoming pregnant.

The participants may be unable to complete the questionnaire in its entirety.

**Sample size:**

The sample size needed was calculated using a formula for estimating a single proportion:

$$n \geq \frac{Z^2_{1-\alpha/2} \times p(1-p)}{d^2}$$

Z=1.96; d=0.05; p=0.119 (according to Abheiden's study: the non-adherence rate for aspirin use is 11.9%) (Abheiden et al., 2016). From this, we estimated the minimum sample size to be 162 samples.

**Sampling method**

A convenience sampling method would be employed at Tu Du Hospital from November 2024 to April 2025.

**Method of implementation**

Step 1: Conduct navigation research and test data collection questionnaires.
Step 2: Screening and selecting research subjects, signing consent forms to participate in the study.
Step 3: Conduct interviews and collect data.
Step 4: Import and clean the data.
Step 5: Data analysis and processing.

**Primary variables**

We utilized the MMAS-8 questionnaire to assess how consistently expectant mothers took their prescribed aspirin. The scale divides adherence into three tiers: high, medium, and low, corresponding to scores of 8, 6–7, and less than 6, respectively. In this study, we adopted a binary classification for further analysis; only those reaching a perfect score of 8 were considered 'adherent,' whereas those in the medium-to-low brackets (scores <8) were grouped as 'non-adherent'.

**Data management and analysis**

After cleaning the dataset, we used Stata 16.0 for all statistical analyses. In the descriptive phase, we calculated means and standard deviations with a 95% confidence level. The analysis was divided into two parts: first, we conducted univariate tests, then moved on to a multivariable regression model. This second part was essential for controlling confounding variables and obtaining the adjusted POR (aPOR). A p-value under 0.05 indicated statistical significance.

## 3. RESULTS

From 11/2024 to 05/2025, we found 182 cases that met our criteria for inclusion. All participants provided their voluntary consent to be part of the study. A detailed breakdown of the participants' demographic and clinical characteristics is presented in Table 1.

**Table 1**. Characteristics of the study objects

| Characteristic | Number (n=182) | Ratio (%) |
|---|---|---|
| **Mother's age*: 32.3 ±5.9 (min=17; max=50)** | | |
| < 35 | 116 | 63.7 |
| ≥35 | 66 | 36.3 |
| **Address** | | |
| Ho Chi Minh city | 39 | 21.4 |
| Other provinces | 143 | 78.6 |
| **People** | | |
| Kinh | 179 | 98.4 |
| Other | 3 | 1.7 |
| **Job** | | |
| Intellectual labor | 65 | 35.7 |
| Manual labor | 62 | 34.1 |
| Housewife | 55 | 30.2 |
| **Educational level** | | |
| ≤Elementary school | 3 | 1.7 |
| Secondary school | 89 | 48.9 |
| >High school | 90 | 49.5 |
| **BMI before pregnancy: 23.3 ±4 (min=15.8; max=35.7)** | | |
| Low | 14 | 7.7 |
| Normal | 87 | 47.8 |

| Characteristic | Number (n=182) | Ratio (%) |
|---|---|---|
| Overweight - Obesity | 81 | 44.5 |

**Table 2**. Treatment adherence rates

| Adherence to treatment | Frequency (n=182) | Ratio (%) |
|---|---|---|
| Adherence | 46 | 25.3 |
| No-adherence | 136 | 74.7 |

Results showed that 25.3% of participants demonstrated high adherence (8 points). Among the remaining participants, 43.96% exhibited medium adherence (6–7 points), while 30.77% had low adherence (less than 6 points). Detailed distributions are presented in Table 2.

Initially, we evaluated fourteen variable pairs through univariate analysis to find possible factors influencing treatment adherence. After that, we moved on to a multivariable regression stage, including 8 factors that showed significance at $p < 0.25$. This approach helped us account for confounding factors and obtain more precise estimates. Table 3 highlights the specific factors selected for this multivariable adjustment.

**Table 3**. Results of multivariate analysis

| | No-Adherence n = 136 (%) | Adherence n = 46 (%) | POR* | POR** | KTC 95% | p** |
|---|---|---|---|---|---|---|
| **Mother's age** | | | | | | |
| < 35 | 92 (79.3) | 24 (20.7) | 1 | 1 | | |
| ≥35 | 44 (66.7) | 22 (33.3) | 1.91 | 1.97 | 0.93-4.15 | 0.076 |
| **Address** | | | | | | |
| HoChiMinh iity | 32 (82.1) | 7 (17.9) | 1 | 1 | | |
| Other | 104 (72.7) | 39 (27.3) | 1.71 | 2.54 | 0.92-7.00 | 0.071 |
| **Job** | | | | | | |
| Intellectual labor | 53 (81.5) | 12 (18.5) | 1 | 1 | | |
| Manual labor | 46 (74.2) | 16 (25.8) | 1.54 | 1.44 | 0.57-3.66 | 0.443 |
| Housewife | 37 (67.3) | 18 (32.7) | 2.15 | 1.94 | 0.78-4.85 | 0.154 |
| **History of hypertensive disorders during pregnancy** | | | | | | |
| No | 122 (77.7) | 35 (22.3) | 1 | 1 | | |
| Yes | 14 (56.0) | 11 (44.0) | 2.74 | 2.81 | 1.09-7.24 | **0.033** |
| **History of medical conditions associated with a high risk of preeclampsia.** | | | | | | |
| No | 123 (76.9) | 37 (23.1) | 1 | 1 | | |
| Yes | 13 (59.1) | 9 (40.9) | 2.3 | 1.60 | 0.56-4.61 | 0.380 |
| **Family history of hypertension** | | | | | | |
| No | 92 (81.4) | 21 (18.6) | 1 | 1 | | |
| Yes | 44 (63.8) | 25 (36.2) | 2.49 | 2.59 | 1.21-5.54 | **0.014** |
| **Adherence to aspirin use helps reduce the risk of TSG.** | | | | | | |
| No | 25 (83.3) | 5 (16.7) | 1 | 1 | | |
| Yes | 111 (73.0) | 41 (27.0) | 1.85 | 2.15 | 0.71-6.53 | 0.176 |
| **Time to discontinue aspirin treatment** | | | | | | |
| Wrong | 21 (63.6) | 12 (36.4) | 1 | 1 | | |
| Correct | 115 (77.2) | 34 (22.8) | 0.52 | 0.51 | 0.21-1.27 | 0.149 |

POR *: Univariate regression POR**: Multivariate regression p**: p-value of multivariate regression

The results indicated two factors associated with aspirin treatment adherence: a history of hypertensive disorders during pregnancy and a family history of hypertension.

Pregnant women with a history of gestational hypertension had a 2.81-fold higher incidence of POR** and adherence to aspirin treatment [95% CI: 1.09-7.24] compared to pregnant women without a history of gestational hypertension; this association was statistically significant ($p^{**} < 0.05$). And the adjusted POR changed by > 10% compared to the POR in univariate analysis (2.81 vs. 2.74).

Pregnant women with a family history of hypertension had a treatment adherence POR** ratio that was 2.59 times higher [95% CI: 1.21-5.54] than the group without a family history of hypertension. And the adjusted POR changed by >10% compared to the POR when analyzed univariately (2.59 vs. 2.49).

## 4. DISCUSSION

Our findings indicated that only 25.3% (n=46) of the study population achieved a high level of aspirin adherence (Table 2). This statistic is different from global figures. For example, research conducted in the Netherlands by Abheiden et al., (2016) reported an adherence rate of 53.7%. This rate is over twice as high as what we found in our study. Similarly, a study by Hayley et al., (2024) involving 71 pregnant women reported an adherence rate of 31%, with 69% classified as non-adherent. This group included pregnant women with existing health issues like diabetes, various body mass indexes (BMI), different education levels, histories of high blood pressure disorders, and family backgrounds related to hypertension. These patients generally show greater adherence to treatment. This might be because they are more aware of the risks linked to their conditions, leading them to be more consistent in taking their medications. Secondly, the adherence assessment tools used in the studies differed. Specifically, the methodology used to measure adherence varies across studies. Wright et al., (2017) and Shanmugalingam et al., (2020) utilized pill-counting methods, whereas Abheiden et al., (2016) and Hayley et al., (2024) employed the SMAQ and BBQ questionnaires. Studies using the BBQ generally report higher adherence rates as the scoring is based on patients' attitudes and beliefs toward medication. In contrast, the MMAS-8 used in our study—and the SMAQ—focus strictly on medication-taking behavior. MMAS-8's rigorous criteria, where any non-adherent response classifies a participant as non-adherent, likely explains our relatively lower adherence rate. Consequently, enhancing adherence to aspirin prophylaxis is essential to achieving optimal clinical outcomes and maximizing the effectiveness of preeclampsia prevention.

The two most common reasons noted were that pregnant women occasionally forgot to take their medication, accounting for the highest percentage at 43.4%, and difficulty remembering to take all medications, accounting for 59.3%. Our study of pregnant women showed that the average number of medications taken was 4 tablets per day, including aspirin, vitamins, iron, and calcium, taken at different times throughout the day. This may be a reason for poor adherence among pregnant women, as they feel bothered and have difficulty remembering to take their medication. In Shanmugalingam et al., (2020) study, difficulty remembering to take medication was also a major reason for poor adherence among pregnant women, accounting for 74%.

Among pregnant women who did not comply with their treatment (scoring below 8 on the MMAS-8), the primary reason for not taking aspirin, even when their health improved, was intentional non-compliance, at a rate of 11.03%. When we asked them more questions, many said they didn't realize that stopping their medication could reduce the effectiveness of their preventive treatment. Our analysis identified two primary factors significantly linked to better adherence: a personal history of hypertensive disorders of pregnancy (HDP) and a family history of hypertension (Table 3). This indicates that having prior experience with the condition—either personally or through family influence—plays an important role in ensuring consistent treatment. Individuals with a background of HDP showed much higher adherence rates than those without. This greater compliance is probably because women who have had gestational hypertension or preeclampsia understand the risk of it happening again.

Healthcare providers' proactive advice highlights the importance of preventive care, which improves treatment adherence. Our findings align with Wright et al., (2017), who noted that family history significantly influences compliance. Observing hypertensive issues in family members seems to increase a woman's sense of vulnerability. This personal experience connects risk awareness with health-seeking actions, resulting in better medication discipline.

**Novel application**

This research offers important information about how well patients stick to taking aspirin to prevent preeclampsia. The results offer a useful guide for doctors to improve their advice during prenatal meetings. By addressing the factors identified, healthcare providers can implement targeted strategies to improve treatment adherence, ultimately optimizing maternal and neonatal outcomes.

**Limitations**

As a cross-sectional study, this research only assessed medication adherence at a single point in time. Consequently, it does not account for long-term adherence patterns, which may fluctuate or decline as pregnancy progresses. Future longitudinal studies are warranted to evaluate how adherence impacts clinical pregnancy outcomes in both compliant and non-compliant groups.

## 5. CONCLUSION

The adherence rate to aspirin prophylaxis for preeclampsia in high-risk pregnant women was 25.3%, as assessed using the MMAS-8 questionnaire. Therefore, appropriate approaches and counseling are needed to increase adherence to treatment for high-risk pregnant women with preeclampsia, paying particular attention to those without a family history of hypertension or a history of hypertensive disorders during previous pregnancies.

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**Authors' Contributions**

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

**Informed consent**

Written informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

**Ethical approval**

The research study was conducted after being approved by the Ethics Committee in Biomedical Research of the University of Medicine and Pharmacy of Ho Chi Minh City, according to Decision No. 2605/HĐĐĐ-ĐHYD dated September 26, 2024.

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**Conflict of interest**

The authors declare that they have no conflicts of interest, competing financial interests or personal relationships that could have influenced the work reported in this paper.

**Data and materials availability**

All data associated with this study are present in the paper.

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