Preventing A Disease with No Definitive Cure

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The only definitive treatment of preeclampsia is delivery. Characterized by a systolic blood pressure greater than or equal to 140 mmHg, or a diastolic blood pressure greater than or equal to 90 mmHg with the addition of proteinuria, preeclampsia is a multisystem inflammatory syndrome. Preeclampsia is not only a maternal disease; it also threatens the life of the fetus. As there is no treatment for preeclampsia other than delivery, which isn't always sustainable for positive maternal and fetal outcomes, prevention is crucial. Low-dose aspirin is currently the first-line preventative therapy for preeclampsia in high-risk mothers. To prevent preeclampsia in the maternal population, it is the nurse's role to advocate for and educate the clients on the risk factors of preeclampsia and the use of low-dose aspirin for its prevention.

Preeclampsia is a life-threatening condition, leading to approximately 76,000 maternal and 500,000 fetal and neonate deaths each year (Vigil-De Gracia et al., 2023). As a multisystem inflammatory syndrome, preeclampsia affects the hepatic, renal, respiratory, and nervous systems of the mother. Preeclampsia poses several significant complications if not managed properly, including eclampsia and HELLP syndrome, which can be fatal for both the mother and fetus. After pregnancy, mothers are at an increased risk for developing chronic hypertension and cardiovascular disease. Preeclampsia also affects fetal outcomes, including an increased risk for premature birth and fetal growth restriction (Ahn & Hwang, 2023). Despite the severity of preeclampsia, there are no published studies on prophylactic pharmaceutical therapies other than low-dose aspirin. Dietary changes, including calcium supplements, have been researched, yet have been shown to be ineffective in clinical trials. In addition, low-molecular-weight heparin and metformin have been studied closely, but have failed to show benefits in their clinical applications (Vigil-De Gracia et al., 2023). Due to the ineffectiveness of other pharmaceutical

interventions and understudied therapies, the use of low-dose aspirin therapy is of even more importance when educating high-risk preeclampsia clients.

While the etiology of preeclampsia is complex, it is understood that preeclampsia is related to the release of bioactive factors in response to ischemia hypoxia, leading to hypertensive properties (Ren et al., 2023). Due to the pathophysiologic uncertainty of preeclampsia, it is difficult to regulate pharmaceutically; however, low-dose aspirin has been widely used to prevent preeclampsia due to its platelet aggregation inhibition and homeostatic properties. Low-dose aspirin inhibits platelet aggregation, which is significantly higher in women with preeclampsia, preventing the formation of small thrombosis. In return, this prevents the likelihood of organ function damage due to thrombosis attachment, which can prevent preeclampsia (Ren et al., 2023). Low-dose aspirin can also regulate the homeostasis of thromboxane and prostacyclin. Compared to a normal placenta, the placenta in a woman with preeclampsia produces seven times as much thromboxane, a lipid important for blood clotting and vasoconstriction, as prostacyclin (Walsh & Strauss, 2021). This is done by the inhibition of thromboxane A2 and the normal secretion of prostaglandin I2. This returned balance is effective in relaxing the vasospasms of blood vessels and lowering blood pressure (Ren et al., 2023). In addition to these actions, low-dose aspirin reduces sFlt-1 production, a protein acting as an anti-angiogenic factor that is high in women with preeclampsia. This reduction in sFlt-1 is correlated to the inhibition of COX-1, an enzyme responsible for blood clotting (Ren et al., 2023). These mechanisms of action have led to low-dose aspirin therapy becoming the first-line choice for preventing preeclampsia in the high-risk maternal population.

Low-dose aspirin’s mechanism of action and rationale for clinical application first began in the 1970s, with its application to preeclampsia prevention ensuing shortly after (Walsh &

Strauss, 2021). One of the first large clinical trials was conducted in 1994, which found there to be a 12% decrease in the likelihood of preeclampsia development in women who began low-dose aspirin therapy before 20 weeks of gestation (Ahn & Hwang, 2023). While this clinical trial had shown that low-dose aspirin therapy was effective for preeclampsia prevention, it signified a need for greater research on effective dosing and the appropriate time of gestation to begin medicating. More recently, the Aspirin for Evidenced-Based PE Prevention (ASPRE) trial was conducted across multiple medical centers. In this trial, 26,941 women were screened, and the 2,641 women identified as high risk for developing preeclampsia were to receive either a placebo or medication. The onset of preeclampsia was documented in 1.6% of the aspirin group compared to 4.3% of the placebo group. From this trial, it was concluded that low-dose aspirin had reduced the likelihood of developing preeclampsia by 82% (Ahn & Hwang, 2023). Similar outcomes were seen in a meta-analysis that reviewed 45 randomized trials. In this systematic review, 50-150mg of aspirin or placebo was administered to 20,909 women, in which there was a reduced risk of preeclampsia development by 47% in those who were administered low-dose aspirin (Vigil-De Gracia et al., 2023). These clinical findings collectively highlight the significant role of low-dose aspirin in reducing the risk of preeclampsia in high-risk populations.

To decrease the incidence of preeclampsia and the risk of complications, the nurse must identify and advocate for high-risk clients early on because prophylactic low-dose aspirin therapy is most effective if initiated before, or early in, the second trimester. This is seen in a meta-analysis published in 2018, where it was found that low-dose aspirin had an effective prophylactic effect only if began before 16 weeks of gestation (Ahn & Hwang, 2023). Similarly, a meta-analysis conducted in 2010 concluded that the likelihood of developing preeclampsia was

significantly reduced if therapy was initiated before 16 weeks of gestation (Ahn & Hwang, 2023). As low-dose aspirin therapy is most effective when started early in the pregnancy, it is crucial to effectively screen and identify individuals at high risk for developing preeclampsia. Currently, the National Institute for Health and Care Excellence (NICE) recommends low-dose aspirin therapy for individuals at high risk for developing preeclampsia (HRPE) beginning at 12 weeks of gestation. NICE identifies women with a history of hypertensive disease, renal disease, diabetes mellitus, or an autoimmune disease as high risk. These guidelines have a 30.4% preeclampsia detection rate (Ahn & Hwang, 2023). The United States Preventive Services Task Force (USPSTF) offers a broader guideline to identify high-risk mothers. The United States Preventive Services Task Force identifies women with a history of diabetes mellitus, multiple pregnancies, autoimmune diseases, chronic hypertension, or kidney disease as a high-risk population. They recommend beginning low-dose aspirin therapy between 12 and 18 weeks of gestation, continuing daily until delivery. The USPSTF screening guideline has a 90% detection rate for preeclampsia; however, it has more of an increased risk of false positives than the NICE screening guidelines (Ahn & Hwang, 2023). In combination with these screening guidelines, nurses should also be aware of additional risk factors of preeclampsia. These include an advanced maternal age of over 35, nulliparity, a family history of preeclampsia, and a BMI of 30 or greater (Vigil-De Gracia et al., 2023). By performing early identification for individuals who are HRPE, healthcare providers can prioritize early interventions, significantly reducing the likelihood of preeclampsia in this population.

In addition to identifying high-risk clients early on, the nurse is responsible for providing risk-based counseling and educating high-risk clients to improve medication adherence. Beginning before conception occurs, education on preeclampsia prevention should occur

throughout pregnancy. In a study conducted by the Acta Obstetricia et Gynecology Scandinavia, researchers studied the education on prophylactic low-dose aspirin for preeclampsia provided to individuals who were HRPE and their adherence to medication therapy. They identified 43% of their research participants as having an increased risk of preeclampsia, with 79% of this cohort reporting they had discussed the implications of low-dose aspirin therapy with their primary healthcare provider; however, only 25% of women identified as high risk by their providers were compliant with low-dose aspirin usage according to protocol (Van Montfort et al., 2020). In the same study, the correlation between medication adherence and the counseling provided by healthcare professionals on preeclampsia risk factors was also researched. It was found that clients educated by a midwife had a 23% medication compliance, compared to those educated by an obstetrician, who had a compliance rate of 42% (Van Montfort et al., 2020). These findings are striking, displaying poor medication compliance among individuals who are HRPE. As this population is of greatest risk, it is crucial to provide ongoing education on the application of low-dose aspirin therapy for preventing preeclampsia to improve compliance. This education should focus on the low prevalence of negative effects low-dose aspirin has on maternal and fetal wellbeing, as this was a high concern for the nonadherent participants of the Acta Obstetricia et Gynecology Scandinavia study (Van Montfort et al., 2020).

In addition to educating all individuals identified as HRPE, education should be modified for different ethnic and racial populations. Education for certain ethnic groups should be focused on the specific enhanced risk factors. In a study published in the American Journal of Obstetrics and Gynecology, researchers explored the rates at which low- and high-risk women developed preeclampsia while taking low-dose aspirin therapy. They further divided their results by ethnicity and race in order to best observe the efficacy of low-dose aspirin in these populations.

The research revealed that “the incidence of preeclampsia was significantly reduced” in the non-Hispanic white population, but not in the Hispanic or non-Hispanic Black population (Tolcher et al., 2020, p. 1). Researchers attribute these disparities to a theorized aspirin resistance in these populations. Although the mechanism of aspirin nonresponse is not well understood, it does not eliminate the need for education in these populations. Rather, nurses should increase advocation for their Hispanic or non-Hispanic Black clients.

Educating on the risk factors associated with preeclampsia and the application of low-dose aspirin for its prevention should be of priority to nurses caring for the maternal population. Preeclampsia is a serious condition with no treatment other than delivery, and it threatens the well-being and life of pregnant mothers and their unborn children. Low-dose aspirin therapy has been recognized as the leading prophylactic intervention with its effectiveness being demonstrated in several clinical trials. Early screening and education by nurses of individuals at HRPE are crucial for early intervention and medication adherence. Further education and advocation are essential amongst diverse ethnic groups, who are at greater risk for developing preeclampsia and are less responsive to low-dose aspirin therapy. First hypothesized in the 1970s, continuous clinical trials have been conducted to analyze the effects of using low-dose aspirin for preeclampsia prevention, making it an excellent example of evidence-based nursing practice. Despite low-dose aspirin therapy becoming the gold standard for preeclampsia prevention in high-risk populations, clinical trials are ongoing to best understand the most effective dosage and medication effectiveness in correlation to initiating therapy.

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