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First Trimester Screening for Preeclampsia and Prevention with Aspirin Prophylaxis

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First Trimester Screening for Preeclampsia & Prevention with Aspirin Prophylaxis

An Integrative Review of Literature

Background:

Preeclampsia is a hypertensive disorder of pregnancy affecting multiple organ systems complicating 2-8% of pregnancies. It is defined as new-onset hypertension and proteinuria, or hypertension and significant end-organ dysfunction, typically presenting after 20 weeks of gestation.

It is caused by placental and maternal vascular dysfunction and resolves with delivery of the fetus, which causes complications to the fetus depending on the gestational age at the time of delivery. It is considered a heterogeneous disorder, meaning the mechanism leading to the development of the disease can differ in women with various risk factors. Maternal risk factors include: past history of preeclampsia, chronic hypertension, pregestational diabetes, multifetal gestation, chronic kidney disease, assisted reproductive technologies, and some autoimmune diseases.

The exact pathophysiology of preeclampsia remains unknown but it is suggested to involve both maternal and fetal/placental factors. Biophysical measurements to aid in the early detection of preeclampsia include mean arterial pressure (MAP) and uterine artery Doppler analysis. Several biomarkers have been studied for their effectiveness in predicting preeclampsia. Combining maternal risk factors with biomarker measurements taken in the first trimester could allow for early detection of preeclampsia and initiation of low-dose aspirin to improve maternal and fetal outcomes.

Research Questions:

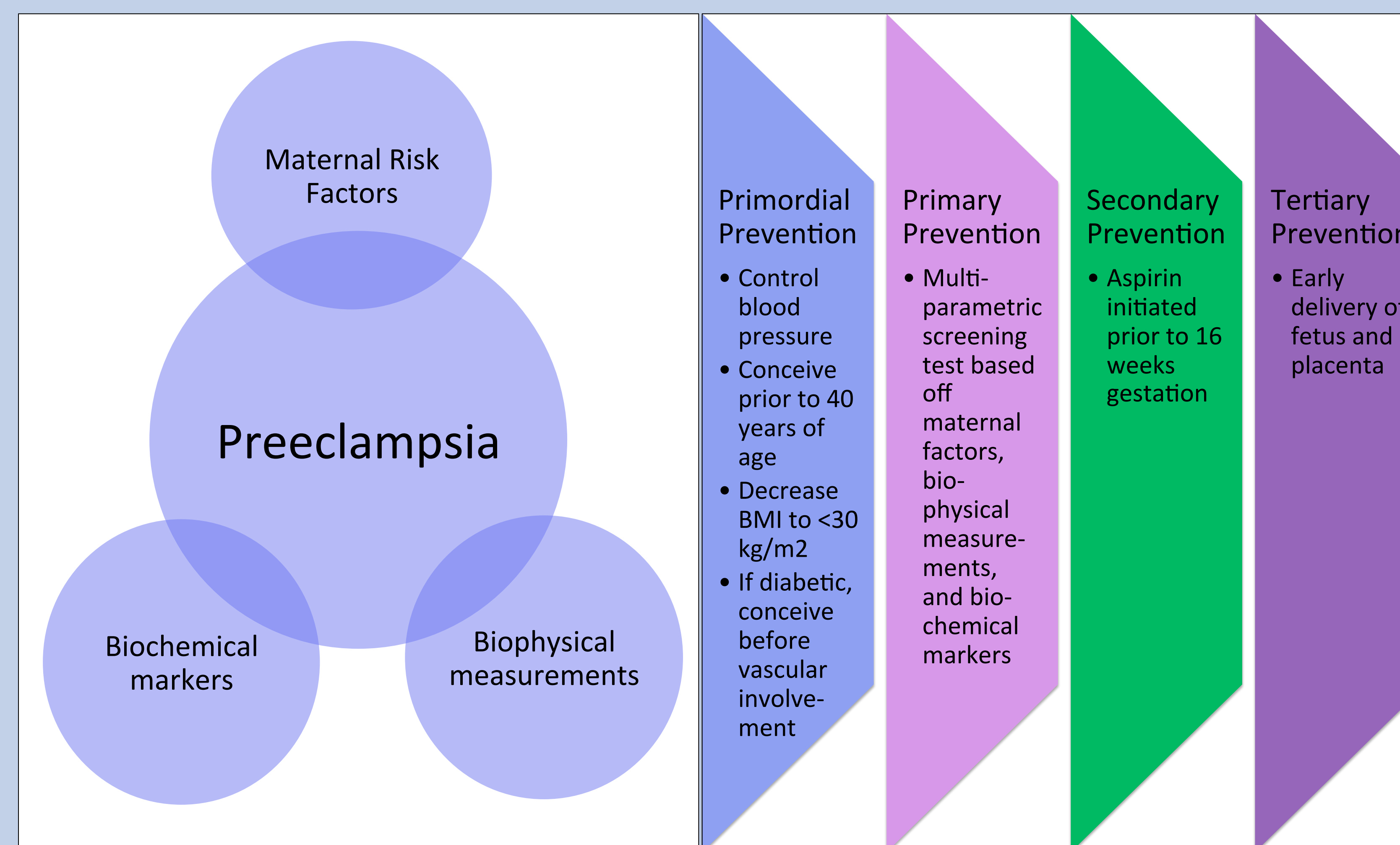
1. What maternal risk factors, biophysical measurements, and biochemical markers are associated with preeclampsia?
2. What factors in combinations can be used to predict preeclampsia in the first trimester?
3. Can aspirin given prior to 16 weeks gestation prevent preeclampsia in high-risk women?

Results & Discussion:

The blueprint for preeclampsia occurs early in gestation, weeks to months prior to the onset of clinical manifestations of hypertension and proteinuria. Developing a screening protocol has been the focus of recent research and suggests that a multiparametric test improves early detection rates. Maternal risk factors, biophysical measurements, and biochemical markers by themselves are not sensitive enough to predict preeclampsia. A combination of the three, detected in the first trimester, increases the sensitivity and positive predictive value, allowing for initiating of aspirin prophylaxis in deemed high-risk patients to be implemented.

Research suggests that a first trimester screening including mean arterial pressure (MAP), uterine artery resistance, PAPP-A and placental growth factor (PIGF) can detect 96% of early onset pre-eclampsia. A multi-parameter screening tool would help increase detection rates, especially in nulliparous women where maternal history and risk factors alone are insufficient screening tools. A first trimester screening tool would allow for the early detection of preeclampsia and initiation of prophylactic low-dose aspirin treatment. It is recommended that low dose aspirin should be started in high-risk women prior to 16 weeks of gestation.

Conceptual Framework



Methods:

A computerized search of literature was conducted using PubMed and Cumulative Index to Nursing and Health Literature (CINAHL). The search terms were as follows: *preeclampsia, risk factors, biomarkers, aspirin*

Inclusion criteria: Peer-reviewed articles over the last 10 years with a nursing or medical focus on maternal factors, biophysical measurements, biochemical markers, or a combination of the three, detected in the first trimester of pregnancy leading to the development of preeclampsia were included.

Exclusion criteria: Articles focusing on the detection of preeclampsia in the second or third trimester, multigestation pregnancies, or prophylactic medication other than aspirin were excluded.

Nursing Practice Implications:

Nursing practice should focus on performing a comprehensive maternal history and obtaining accurate biophysical measurements. Accurate assessment of blood pressure should be obtained after five minutes of rest, with the patient sitting with feet on the ground with legs uncrossed. High-risk women should be started on prophylaxis aspirin for the prevention of preeclampsia. Nurses need to be knowledgeable on the risk factors of preeclampsia and also the clinical presentation so maternal and fetal assessment can be closely monitored.

Problem Statement:

Preeclampsia is a significant cause of maternal and fetal mortality and morbidity, causing 9-26% of maternal deaths and 15% of preterm births. In addition, women with a history of preeclampsia are at increased risk for future cardiovascular and renal disease. Even with known associated risk factors and maternal biomarkers there is currently no definitive screening test to use for the prediction of preeclampsia. Maternal risk factors alone cannot effectively predict preeclampsia, especially in low-risk women.

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