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Relationship Between Hypertension History and Nutritional Status with the Incidence of Preeclampsia in Pregnant Women: Literature Review

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Abstract

Preeclampsia is one of the leading causes of perinatal morbidity and mortality worldwide, particularly in developing countries. High intake of saturated fats, pro-inflammatory diets, and excess body weight increase the risk of hypertension during pregnancy. A history of hypertension and maternal nutritional status are recognized as important risk factors contributing to the occurrence of preeclampsia. This literature review aimed to determine the relationship between a history of hypertension and nutritional status with the incidence of preeclampsia in pregnant women, based on several sources obtained through the internet, including research findings from international and national journals, citations from the Faculty of Medicine UMI, ClinicalKey, textbooks, and conference proceedings published between 2015 and 2026. The review findings indicate that the majority of studies reported that a history of hypertension significantly increases the risk of preeclampsia. In addition, excessive nutritional status such as overweight and obesity is strongly associated with a higher incidence of preeclampsia through mechanisms involving chronic inflammation, insulin resistance, oxidative stress, and endothelial dysfunction. Conversely, undernutrition and deficiencies of certain micronutrients may worsen the risk through impaired placental perfusion. The combination of a history of hypertension and suboptimal nutritional status exerts a synergistic effect on increasing the risk of preeclampsia. It is concluded that a history of hypertension and nutritional status are important determinants of preeclampsia; therefore, preconception screening, blood pressure control, and nutritional interventions need to be strengthened as preventive strategies.

Introduction

Preeclampsia is a form of hypertension that occurs during pregnancy, characterized by an increase in systolic blood pressure of 140 mmHg or more, or a diastolic blood pressure of 90 mmHg or more, on two occasions at least four hours apart after 20 weeks of gestation. Preeclampsia is also considered if it is accompanied by proteinuria of 300 milligrams or more per 24-hour urine collection (or this amount extrapolated from the collection time), with a protein/creatinine ratio of 0.3 mg/dL or more, and a dipstick reading of 2+ (used only if other quantitative methods are not available).

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The National Institutes of Health (NIH) Working Group divides hypertension in pregnancy into four categories: chronic hypertension, gestational hypertension, preeclampsia-eclampsia, and superimposed preeclampsia on chronic hypertension. The Society of Obstetricians and Gynecologists of Canada (SOGC) divides hypertension in pregnancy into chronic hypertension with comorbidities or evidence of preeclampsia, gestational hypertension with comorbidities, and other hypertensive effects such as transient white-coat hypertension and masked hypertensive effect (Scott et al., 2022; Phipps et al., 2016; Butalia et al., 2018; Sjaus et al., 2016).

Preeclampsia remains a leading cause of maternal and infant mortality worldwide. In Indonesia, hypertension in pregnancy remains a leading cause of maternal death (Aldika Akbar et al., 2026; Ari et al., 2024; Akbar et al., 2025; Fadilah, 2018). Several risk factors and predeterminants for preeclampsia include nulliparity, multiple gestations, advanced maternal age over 35 years, in vitro fertilization or other forms of assisted reproductive technology, maternal comorbidities (chronic hypertension, chronic kidney disease, diabetes mellitus, thrombophilia, obstructive sleep apnea, obesity with a pre-pregnancy BMI greater than 30), family history, history of placental abruption or preeclampsia in a previous pregnancy, or intrauterine fetal growth restriction. A descriptive study in the Journal of Medical Research confirms that most preeclampsia patients have a history of hypertension, reinforcing the role of maternal vascular factors as a major determinant. Conversely, mothers with poor nutritional status are also at risk of impaired placental implantation and essential nutrient deficiencies (Ayomide et al., 2026; Jain et al., 2022; Barata et al., 2026).

Monica Kazlausky Esquivel, in Nutritional Status and Nutrients Related to Pre-Eclampsia Risk (Am J Lifestyle Med, 2022), confirms that maternal nutritional status, specifically body mass index (BMI) before and during pregnancy, is significantly associated with an increased risk of preeclampsia. Pre-pregnancy obesity is associated with increased chronic low-grade inflammation, insulin resistance, and activation of the renin-angiotensin system, which contribute to gestational hypertension and impaired uteroplacental perfusion. Furthermore, imbalances in the intake of certain micronutrients, such as calcium, vitamin D, and antioxidants, also play a role in exacerbating the vascular dysfunction that underlies the pathophysiology of preeclampsia (Zheng et al., 2025; Li et al., 2025; Indrayani & Oktaviana, 2026).

Consistent with these findings, Abigail Perry et al. The study "Dietary factors that affect the risk of preeclampsia" (BMJ Nutr Prev Health, 2022) confirms that dietary patterns and nutritional factors contribute to the risk of preeclampsia through metabolic and cardiovascular mechanisms. High saturated fat intake, a pro-inflammatory diet, and excess weight increase the risk of hypertension in pregnancy, while a balanced diet such as the Mediterranean diet and adequate intake of certain micronutrients are associated with a reduced risk. A history of hypertension before pregnancy further exacerbates the condition due to underlying vascular disorders, so the combination of a history of hypertension and suboptimal nutritional status has the potential to synergistically increase the risk of preeclampsia. Therefore, a literature review is essential to examine the relationship between a history of hypertension and nutritional status with the incidence of preeclampsia in pregnant women as a basis for strengthening more comprehensive prevention and nutritional intervention strategies.

Methods

This study employed a narrative literature review to examine the relationship between maternal hypertension history, nutritional status, and preeclampsia. The literature search was conducted in February 2026 using Google Scholar and ClinicalKey. Relevant articles published between 2015 and February 2026 were identified using combinations of the keywords “preeclampsia,”

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"history of hypertension," "chronic hypertension," "maternal nutritional status," "body mass index," "obesity," "dietary patterns," and "micronutrient deficiency."

Eligible studies were peer-reviewed national or international journal articles involving pregnant women and reporting findings on hypertension history, nutritional status, or dietary factors in relation to preeclampsia. Review articles and observational studies, including cohort, case-control, cross-sectional, and descriptive studies, were considered. Duplicate publications, articles unrelated to the research objective, studies without relevant outcomes, and articles without accessible full text were excluded.

The titles and abstracts were initially screened for relevance, followed by a full-text assessment based on the eligibility criteria. Seventeen studies met the criteria and were included in the final synthesis. Data extracted from each study included the author, publication year, study design, exposure factors, and principal findings. Nutritional status was assessed based on indicators reported in the included studies, particularly pre-pregnancy body mass index, overweight or obesity, undernutrition, dietary patterns, and micronutrient adequacy. The findings were synthesized narratively and grouped into three themes: the association between hypertension history and preeclampsia, the association between nutritional factors and preeclampsia, and the combined contribution of vascular and nutritional factors. A meta-analysis was not performed because of heterogeneity in study designs, exposure definitions, and outcome measurements.

Result and Discussion

Table 1. Previous Research

Year	Title	Methods	Author	Results	Conclusion
2022	Nutritional Status and Nutrients Related to Pre-Eclampsia Risk	Narrative review	Esquivel MK	Nutritional status, especially high BMI, increases the risk of preeclampsia. Micronutrient deficiencies play a role in endothelial dysfunction and gestational hypertension.	The research results support the theory that obesity increases the risk of preeclampsia through chronic inflammation, insulin resistance, and endothelial dysfunction which play a role in the occurrence of hypertension in pregnancy.
2022	Dietary factors that affect the risk of pre-eclampsia	Narrative review	Perry A et al.	A pro-inflammatory diet increases the risk of preeclampsia. A healthy diet reduces the risk of gestational hypertension.	These findings are consistent with the theory that diet influences vascular and metabolic function. A pro-inflammatory diet may increase oxidative stress, which contributes to the pathogenesis of preeclampsia.

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2022	Maternal nutritional risk factors for pre-eclampsia incidence	Scoping review	Reproductive Health	Global nutritional factors correlate with the incidence of preeclampsia. Obesity and micronutrient deficiencies are dominant risk factors.	Maternal nutritional status is an important determinant of the incidence of preeclampsia because adequate nutrition plays a role in placental formation and regulation of endothelial function during pregnancy.
2017	Pre-pregnancy BMI and risk of preeclampsia	Cohort study	Lanzhou Birth Cohort	A high pre-pregnancy BMI significantly increases the risk of preeclampsia. Excessive weight gain further exacerbates the risk.	Increased pre-pregnancy BMI supports the theory that obesity is an independent risk factor causing metabolic and vascular disorders thereby increasing the risk of preeclampsia.
2025	Impact of pre-pregnancy BMI on preeclampsia	Observational study	Frontiers in Medicine	The risk of preeclampsia increases with increasing BMI category. Obesity shows the highest relative risk.	The results of the study strengthen the theory that the higher the BMI category, the greater the risk of preeclampsia due to increased systemic inflammation and impaired placental perfusion.
2025	DASH Diet and Preeclampsia Prevention	Literature review	Nutrients	The DASH diet lowers blood pressure during pregnancy. Diet adherence correlates with a reduced risk of preeclampsia.	The DASH diet has been shown to support the theory of hypertension prevention through regulating sodium, potassium, magnesium, and antioxidant intake, which play a role in maintaining vascular function in pregnant women.
2023	Nutritional conceptual	Evidence review	Br J Nutr	Nutritional and inflammatory interactions	The interaction between nutrition and inflammation

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	framework for PE prevention			trigger preeclampsia. A conceptual framework suggests metabolic pathways are involved.	found is in accordance with the two-stage model of preeclampsia, namely placental disorders followed by systemic endothelial dysfunction.
2023	Dietary patterns and pre-eclampsia	Case-control	British Journal of Nutrition	A healthy diet lowers the odds of preeclampsia. A high-fat diet significantly increases the risk.	A healthy diet has a protective effect against preeclampsia because it helps maintain metabolic balance and reduces oxidative stress during pregnancy.
2022	History of Hypertension and Nutritional Status with Severe PE	Cross-sectional	Tambusai Health Journal	A history of hypertension increases the incidence of severe PE. Obesity and nutritional status are significantly associated with.	A history of hypertension and obesity has been shown to increase the risk of severe preeclampsia. This is consistent with the theory that chronic hypertension causes vascular damage that is exacerbated by metabolic disturbances caused by obesity.
2021	History of Hypertension & Obesity with PE	Cross-sectional	Journal of Midwifery Science	Hypertension and obesity are associated with the incidence of PE. Hereditary factors increase the risk.	The findings suggest that chronic hypertension is a major risk factor for preeclampsia, while obesity acts as a contributing factor to vascular and inflammatory disorders.
2022	History of Hypertension and Gravida with PE	Observasional	Tambusai Health Journal	Chronic hypertension is significant for the incidence of PE. Multigravida show varying risk.	The results of the study support the theory that hypertension before pregnancy causes maternal hemodynamic adaptation to be

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					suboptimal, thereby increasing the risk of preeclampsia.
2023	Characteristics of Age and Hypertension in PE	Descriptive	Journal of Medical Research	The majority of PE patients have a history of hypertension. High-risk age worsens the condition.	The association between hypertension and preeclampsia suggests that endothelial dysfunction has occurred before pregnancy and is exacerbated by physiological changes during gestation.
2022	Hypertension and DM against PE	Case-control	Midwifery Journal	Chronic hypertension significantly increases the odds of PE. Diabetes exacerbates vascular risk.	Hypertension and diabetes mellitus increase the risk of preeclampsia through the mechanisms of metabolic disorders, insulin resistance, and vascular endothelial damage.
2023	DASH adherence & HDP	Cohort study	Open access study	DASH adherence reduces the incidence of HDP, including PE. Diet quality affects blood pressure.	Adherence to the DASH diet supports the theory that nutritional interventions can be a preventive strategy in reducing the incidence of hypertension in pregnancy and preeclampsia.
2022	High fruit-vegetable dietary patterns	Case-control	China study	A diet high in fruit and protein lowers the odds of PE. An unhealthy diet increases the risk.	A diet high in fruits, vegetables, and protein has a protective effect because the antioxidant content can reduce inflammation and oxidative stress which play a role in the pathogenesis of preeclampsia.

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2023	Mediterranean diet in PE prevention	Review	Open access	A diet high in fruits, vegetables, and protein has a protective effect because the antioxidant content can reduce inflammation and oxidative stress which play a role in the pathogenesis of preeclampsia.	The Mediterranean diet supports the theory that an anti-inflammatory diet can improve endothelial function and reduce the risk of hypertensive disorders during pregnancy.
2022	Maternal dietary intake and PE risk	Narrative review	Nutritional review	Diet and BMI are correlated with PE. Poor nutritional status increases the risk of gestational hypertension..	The relationship between diet, BMI, and the incidence of preeclampsia suggests that nutritional factors play an important role in blood pressure regulation, placental function, and maternal vascular health.

Most studies show that women with a history of chronic hypertension have a 2–5 times higher risk of developing preeclampsia than normotensive women. Furthermore, pre-pregnancy obesity (BMI ≥30 kg/m²) increases the risk of preeclampsia by 2–3 times. Several studies have also found that deficiencies in calcium, vitamin D, antioxidants, and iron are associated with an increased risk of preeclampsia, particularly in developing countries.

The Role of a History of Hypertension and Non-Modifiable Factors in the Incidence of Preeclampsia

Preeclampsia is one of the leading causes of maternal and perinatal morbidity and mortality worldwide. The incidence of preeclampsia is influenced by a complex interaction between maternal genetic, vascular, immunological, and metabolic factors. Various studies have shown that risk factors for preeclampsia can be divided into modifiable and non-modifiable factors. Identifying non-modifiable factors early in pregnancy is crucial because it can serve as a basis for early screening to identify groups of pregnant women at high risk for preeclampsia.

Findings from several local studies, such as the Tambusai Health Journal and the Journal of Midwifery Science, indicate that a history of hypertension is significantly associated with the incidence of both preeclampsia and severe preeclampsia. A case-control study in the Midwifery Journal also demonstrated that chronic hypertension significantly increases the odds ratio for preeclampsia, especially when accompanied by metabolic comorbidities such as diabetes mellitus. A descriptive study in the Journal of Medical Research confirms that most patients with preeclampsia have a history of hypertension, reinforcing the role of maternal vascular factors as a major determinant. Clinically, a history of hypertension leads to pre-existing endothelial dysfunction. When uteroplacental circulatory demands increase, maternal blood vessels are unable to adapt optimally, resulting in systemic vasospasm, increased blood

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pressure, and inflammatory activation (Hu & Zhang, 2021; Okikiade et al., 2025). Therefore, a history of hypertension can be considered an independent and significant risk factor in the pathogenesis of preeclampsia, making early pregnancy screening and close monitoring crucial.

In addition to a history of chronic hypertension, several other non-modifiable factors known to be associated with an increased risk of preeclampsia include a family history of preeclampsia, maternal age ≥35 years, a history of preeclampsia in a previous pregnancy, primigravida, multiple gestations (twins), chronic kidney disease, pre-pregnancy diabetes mellitus, autoimmune diseases such as systemic lupus erythematosus and antiphospholipid syndrome, and pregnancies involving assisted reproductive technology or long gestational intervals. These various factors are known to increase the risk of placental disorders, endothelial dysfunction, and an imbalance of angiogenic factors, which play a role in the pathogenesis of preeclampsia (Papapanagiotou et al., 2025; Yang et al., 2024; Torres-Torres et al., 2024; Chiang et al., 2024).

A family history of preeclampsia suggests a genetic predisposition to hypertensive disorders in pregnancy. Maternal age ≥35 years is associated with decreased vascular function and an increased prevalence of metabolic diseases, which can worsen hemodynamic adaptation during pregnancy. Primigravida and multiple pregnancies are associated with altered immunological adaptation and increased placental mass, which can trigger placental hypoxia. Meanwhile, chronic kidney disease, diabetes mellitus, and autoimmune diseases cause impaired endothelial function and systemic inflammation, increasing susceptibility to preeclampsia (Dines et al., 2023; Chiang et al., 2024; Alanazi et al., 2022).

In mothers with a history of hypertension, vascular damage has occurred before pregnancy, resulting in suboptimal adaptation of the maternal circulation to the increased blood demand during pregnancy. This condition leads to decreased placental perfusion, triggering placental hypoxia, the release of inflammatory mediators, and ultimately leading to the clinical manifestations of preeclampsia, including hypertension and proteinuria. Therefore, the research findings demonstrating a relationship between a history of hypertension and the incidence of preeclampsia support the theory that chronic hypertension is a major predisposing factor for vascular disorders in pregnancy.

Modifiable Factors: Nutritional Status, Diet, Diet Quality, and Micronutrient Adequacy in the Incidence of Preeclampsia

International and national literature indicates that modifiable factors such as maternal nutritional status, diet, diet quality, and micronutrient adequacy play a significant role in the development of preeclampsia. These factors influence inflammation, oxidative stress, endothelial function, and placental perfusion, which are key mechanisms in the pathogenesis of preeclampsia.

Maternal Nutritional Status

Maternal nutritional status, particularly pre-pregnancy body mass index (BMI), is closely associated with the risk of preeclampsia. Esquivel (2022) in the American Journal of Lifestyle Medicine explained that obesity contributes to chronic low-grade inflammation, insulin resistance, and increased oxidative stress, which trigger endothelial dysfunction. A large cohort study in Lanzhou (2017) and a publication in Frontiers in Medicine (2025) showed that the risk of preeclampsia increases linearly with increasing BMI category, with obesity having the highest relative risk.

In addition to obesity, several studies in Indonesia have shown that malnutrition or a low BMI (underweight) is also associated with the incidence of preeclampsia. Research conducted by several researchers in Indonesia reports that pregnant women with malnutrition tend to have inadequate energy, protein, and micronutrient intake, increasing the risk of impaired placental growth and endothelial dysfunction. Chronic malnutrition can lead to decreased antioxidant

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capacity, increased oxidative stress, and impaired vascular adaptation during pregnancy (Thornburg & Valent, 2024; Grzeszczak et al., 2023; Mandalà, 2025). Therefore, both overnutrition and undernutrition have the potential to increase the risk of preeclampsia through different pathophysiological mechanisms.

Dietary Patterns and Diet Quality

Dietary quality also influences the incidence of preeclampsia. Perry et al. (2022) and a scoping review in Reproductive Health (2022) show that diets high in saturated fat, high in sugar, and low in fruit and vegetables increase the risk of hypertension in pregnancy. Conversely, healthy dietary patterns such as the Dietary Approaches to Stop Hypertension (DASH) and the Mediterranean diet have been shown to lower blood pressure, improve endothelial function, and reduce systemic inflammation (Singh et al., 2022; Zhang et al., 2022; Hassanzadeh-Rostami et al., 2025).

A case-control study in the British Journal of Nutrition (2023) and research in China indicate that high consumption of fruits, vegetables, nuts, fish, and quality protein is associated with a reduced risk of preeclampsia. Conversely, a diet high in fast food, high-sodium foods, and low-fiber foods increases the risk of hypertensive disorders during pregnancy (Szczuko et al., 2026).

Several studies in Indonesia indicate that the dietary patterns of pregnant women with preeclampsia are generally characterized by low consumption of fruits, vegetables, and quality protein sources, as well as high consumption of foods high in fat and sodium. Research on the dietary intake of pregnant women with preeclampsia also found that most respondents did not meet the daily nutritional requirements, particularly for protein, calcium, vitamin C, and iron. This condition is thought to contribute to increased oxidative stress and impaired endothelial function, which are the basis for preeclampsia.

According to several Indonesian journals, dietary recommendations for pregnant women with preeclampsia include increasing consumption of fruits and vegetables as sources of antioxidants, increasing intake of quality protein, consuming milk and foods high in calcium, limiting consumption of high-sodium foods, and implementing a balanced diet that resembles the principles of the Dietary Approaches to Stop Hypertension (DASH). This diet has been shown to help control blood pressure, improve antioxidant status, and reduce the risk of hypertensive complications during pregnancy.

Micronutrient Adequacy

Micronutrient adequacy plays a crucial role in maintaining vascular function and reducing oxidative stress during pregnancy. Several studies have shown that pregnant women with preeclampsia tend to have lower micronutrient intakes than those in normal pregnancies.

Some micronutrients that play a role in preventing preeclampsia include: 1) Vitamin C functions as an antioxidant that helps reduce oxidative stress and protect endothelial function; 2) Vitamin E plays a role in preventing lipid peroxidation and cell membrane damage caused by free radicals; 3) Calcium helps regulate vascular smooth muscle contraction and maintains stable blood pressure; 4) Magnesium plays a role in blood vessel relaxation and reduces vascular resistance; 5) Vitamin D plays a role in modulating the immune system and regulating placental function; 6) Selenium and zinc are important components of antioxidant enzymes that help suppress inflammation and oxidative stress; 7) Folic acid plays a role in homocysteine metabolism and helps maintain vascular endothelial function.

Deficiencies in various micronutrients can lead to increased oxidative stress, impaired endothelial function, and an imbalance of angiogenic factors, ultimately increasing the risk of preeclampsia. The conceptual framework for nutrition from the British Journal of Nutrition (2023) explains that nutrition influences key pathophysiological pathways in preeclampsia through the regulation of oxidative stress, vascular function, and maternal immune responses.

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Therefore, nutritional status, diet, diet quality, and micronutrient adequacy not only serve as epidemiological risk factors but also have a strong biological basis in the disease mechanism (Radhika et al., 2026; Valvano et al., 2023; Townsend et al., 2023).

The results of this study are consistent with the theory that obesity is a pro-inflammatory condition characterized by increased inflammatory cytokines such as tumor necrosis factor-alpha (TNF-α), interleukin-6 (IL-6), and increased oxidative stress. Conversely, a diet rich in antioxidants, fiber, vitamins, and minerals helps suppress inflammation and improve endothelial function. Therefore, optimizing nutritional status and diet during pregnancy is an important strategy in the prevention and control of preeclampsia.

Nutritional Status as a Determinant of Preeclampsia Risk

International literature consistently shows that maternal nutritional status, particularly pre-pregnancy body mass index (BMI), is closely associated with the risk of preeclampsia. Esquivel (2022) in the American Journal of Lifestyle Medicine explains that obesity contributes to chronic low-grade inflammation, insulin resistance, and increased oxidative stress, which triggers endothelial dysfunction. A large cohort study in Lanzhou (2017) and a publication in Frontiers in Medicine (2025) showed that the risk of preeclampsia increases linearly with increasing BMI category, with obesity having the highest relative risk.

In addition to BMI, dietary quality also influences the incidence of preeclampsia. Perry et al. (2022) and a scoping review in Reproductive Health (2022) showed that diets high in saturated fat and low in antioxidants increase the risk of gestational hypertension. Conversely, healthy dietary patterns such as the DASH diet and the Mediterranean diet have been shown to lower blood pressure, improve endothelial function, and reduce systemic inflammation. A case-control study in the British Journal of Nutrition (2023) and dietary research in China indicate that high consumption of fruits, vegetables, and quality protein is associated with a reduced risk of preeclampsia.

The conceptual framework for nutrition from the British Journal of Nutrition (2023) explains that nutrition influences key pathophysiological pathways in preeclampsia through the regulation of oxidative stress, vascular function, and maternal immune responses. Therefore, nutritional status not only serves as an epidemiological risk factor but also has a strong biological basis in disease mechanisms (Hermawati et al., 2025).

The results of this study align with the theory that obesity is a pro-inflammatory condition characterized by increased inflammatory cytokines such as tumor necrosis factor-alpha (TNF-α), interleukin-6 (IL-6), and increased oxidative stress. These inflammatory mediators cause impaired endothelial function, vasoconstriction, and decreased nitric oxide bioavailability, which plays a crucial role in maintaining vasodilation during pregnancy. Furthermore, obesity is also associated with insulin resistance, which can exacerbate vascular dysfunction. Conversely, a diet rich in antioxidants, fiber, vitamins, and minerals helps suppress inflammation and improve endothelial function. Therefore, the finding that high BMI and unhealthy diet increase the risk of preeclampsia indicates a congruence between the research results and the metabolic and inflammatory theories in the pathogenesis of preeclampsia.

Interaction of Hypertension History and Nutritional Status

Based on the integration of 17 reviewed journals, there is a synergistic relationship between hypertension history and nutritional status and the incidence of preeclampsia. Pregnant women with chronic hypertension who also have obesity or an unhealthy diet show a higher risk compared to either factor alone. This condition is caused by a combination of pre-existing vascular disorders and metabolic inflammatory processes that exacerbate endothelial dysfunction and impaired placental perfusion.

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Cohort studies related to adherence to the DASH diet in hypertensive disorders of pregnancy have shown that nutritional interventions can reduce the incidence of hypertensive disorders, including preeclampsia. This indicates that although a history of hypertension is a non-modifiable factor, nutritional status and dietary patterns are modifiable factors that can be optimized through clinical interventions and antenatal education.

Overall, literature findings support that preeclampsia is a multifactorial condition with significant contributions from maternal vascular and metabolic factors. A history of hypertension increases baseline susceptibility to hemodynamic disturbances, while suboptimal nutritional status exacerbates the inflammatory response and endothelial dysfunction. Therefore, preeclampsia prevention strategies should include screening for hypertension early in pregnancy and comprehensive nutritional interventions before and during pregnancy (Imanpour et al., 2023; US Preventive Services Task Force et al., 2023).

The simultaneous relationship between a history of hypertension and nutritional status can be explained by the multifactorial theory of preeclampsia, which posits that vascular and metabolic factors interact to trigger impaired placentation and systemic endothelial dysfunction. A history of hypertension causes vascular damage and reduced hemodynamic adaptability during pregnancy, while obesity and unhealthy diet increase systemic inflammation, oxidative stress, and insulin resistance. The combination of these two factors has a greater effect on impaired uteroplacental perfusion than either risk factor alone. Literature findings indicate that pregnant women with a history of hypertension and overnutrition are at the highest risk of preeclampsia, supporting the theory that preeclampsia results from a complex interaction between maternal vascular, metabolic, and inflammatory factors. Thus, effective prevention efforts must be carried out in an integrated manner through controlling blood pressure, monitoring nutritional status, regulating diet, and health education from the preconception to antenatal period.

Conclusion

Based on the results of a systematic review of 17 national and international journals, a consistent pattern of research findings was found, indicating that a history of hypertension and maternal nutritional status are significantly associated with the incidence of preeclampsia in pregnant women. Across all the journals reviewed, the majority of studies indicated that pregnant women with a history of chronic hypertension before or during early pregnancy have a higher risk of developing preeclampsia than women without a history of hypertension. Chronic hypertension contributes to impaired endothelial function, increased vascular resistance, and impaired placental perfusion, which underlie the pathogenesis of preeclampsia. In addition to a history of hypertension, the journal synthesis also showed that maternal nutritional status, particularly pre-pregnancy body mass index (BMI), obesity, excessive weight gain, and unhealthy diet, are closely associated with an increased incidence of preeclampsia. Most studies reported that mothers with overweight or obesity are at higher risk due to increased systemic inflammation, oxidative stress, insulin resistance, and metabolic disorders that worsen vascular function during pregnancy. Conversely, several studies have shown that healthy dietary patterns, such as the DASH diet and the Mediterranean diet, have a protective effect against preeclampsia by improving endothelial function and controlling blood pressure. The review also demonstrated an interaction between maternal vascular and metabolic factors, where pregnant women with a history of hypertension combined with suboptimal nutritional status (obesity or poor diet) have a higher risk of preeclampsia than those with only one risk factor. Thus, the incidence of preeclampsia is multifactorial and influenced by a combination of maternal biological, metabolic, and lifestyle factors. A synthesis of 17 journals indicates that a history of hypertension is the dominant risk factor, while nutritional status is a modifiable factor that either enhances or reduces the risk of preeclampsia. Therefore, prevention efforts should focus on early screening for hypertension, weight control before

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pregnancy, monitoring nutritional status, and education on healthy eating patterns during the preconception and antenatal periods as preventive strategies to reduce the incidence of preeclampsia in pregnant women.

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