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Review Article

Vitamins supplementation affects the onset of preeclampsia

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Preeclampsia may affect between 2–8% of all pregnancies. It seriously affects maternal health after pregnancy. This meta-analysis was performed to define the efficacy of vitamins supplementation on the risk of preeclampsia. Potential articles were systematically searched on the databases of Pubmed, Embase and Web of Science up to May 2016. Relative risk (RR) and 95% confidence intervals (95%CIs) were used to analyze the relationship of vitamins supplementation with risk of preeclampsia. Cochran Q test was used to test inter-study heterogeneity. Begg's funnel plot was adopted to assess the potential publication bias. 28 eligible studies were selected. Pooled results indicated that vitamins supplementation could reduce the risk of preeclampsia (RR = 0.74, 95%CI = 0.64–0.86). The studies with non-randomized controlled trial (RCT) analysis also suggested the significant relationship of vitamins supplementation with risk of preeclampsia (RR = 0.60, 95%CI = 0.42–0.85). However, negative results were observed in studies with RCT analysis. Subgroup analysis by vitamin type was performed among the studies with RCT analysis. The results indicated that vitamin D supplementation could significantly reduce the risk of preeclampsia (RR = 0.41, 95%CI = 0.22–0.78). Similar results were observed in the studies with multivitamins supplementation (RR = 0.69, 95% CI = 0.51–0.93). Vitamins supplementation could reduce the onset of preeclampsia.

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Introduction

Preeclampsia is a main cause of perinatal and maternal mortality worldwide, which is tightly related with hypertension, proteinuria, and end-organ disease. It has been demonstrated that preeclampsia may affect between 2–8% of all pregnancies.[1,2] It seriously affects maternal health after pregnancy.[3] Zhang et al. suggested that women with preeclampsia and eclampsia showed 3- to 25-fold increased risk of thrombocytopenia, abruption placentae, pulmonary edema, disseminated intravascular coagulation, and aspiration pneumonia.[4] Oxidative stress has been regarded as a pathogenic mechanism of this disease.[5,6] Therefore, it was hypothesized that antioxidants supplementation might blunt the diseases' severity or prevent the disorder.

Oxidative stress is commonly brought about by the increased level of reactive oxygen species (ROS) or lack of antioxidants. It has been demonstrated that lack of antioxidants may be related with the onset of preeclampsia.[7,8] Antioxidant vitamins contribute to stabilizing reactive free radicals, which behave as the first defense line against free radicals and lipid peroxidation.[9] Vitamin C and vitamin E are common powerful antioxidants.[9] Vitamin E, an important lipid-soluble antioxidant, is responsible for protecting cells against inflammatory response and lipid peroxidation,[10] which shows regulatory effects on the blood pressure. It is commonly thought that vitamin C could inhibit the constrictor response of those resistance arteries to various stimuli. Chappel et al. reported that supplementation with vitamins C and E may be beneficial in the prevention of preeclampsia.[11] In addition, vitamin D supplementation was in early pregnancy demonstrated to lower the risk of preeclampsia of pregnant women.[12] Meanwhile, Wen et al. suggested that supplementation of mulitivitamins containing folic acid in the second trimester is associated with reduced risk of preeclampsia.[13] These evidences indicate the crucial role of vitamin supplementation in the pathogenesis of preeclampsia.

Therefore, this meta-analysis was initiated to extract a conclusion about the definitive role of vitamins supplementation in the pathogenesis of preeclampsia.

Methods

Data sources

This meta-analysis was performed according to the PRISMA statement. Systematic search was performed on the databases of Pubmed, Embase and Web of Science for studies investigating the relationship of vitamin supplement with risk of preeclampsia. Data were collected up to May 2016. The used terms were preeclampsia OR pre-eclampsia OR hypertension AND vitamin OR antioxidants. Only the articles in English were considered. The references of obtained articles were checked for possible studies.

Inclusion criteria

The relevant studies were reviewed to assess the eligibility according to the following inclusion criteria: a. Pregnant women was provided with vitamins; b. Relationship of vitamins supplementation with onset of preeclampsia was investigated; c. Preeclampsia of pregnancy was defined as primary outcome.

Exclusion criteria were as follows: a. Case report; b. Review articles; c. Articles with unavailable data.

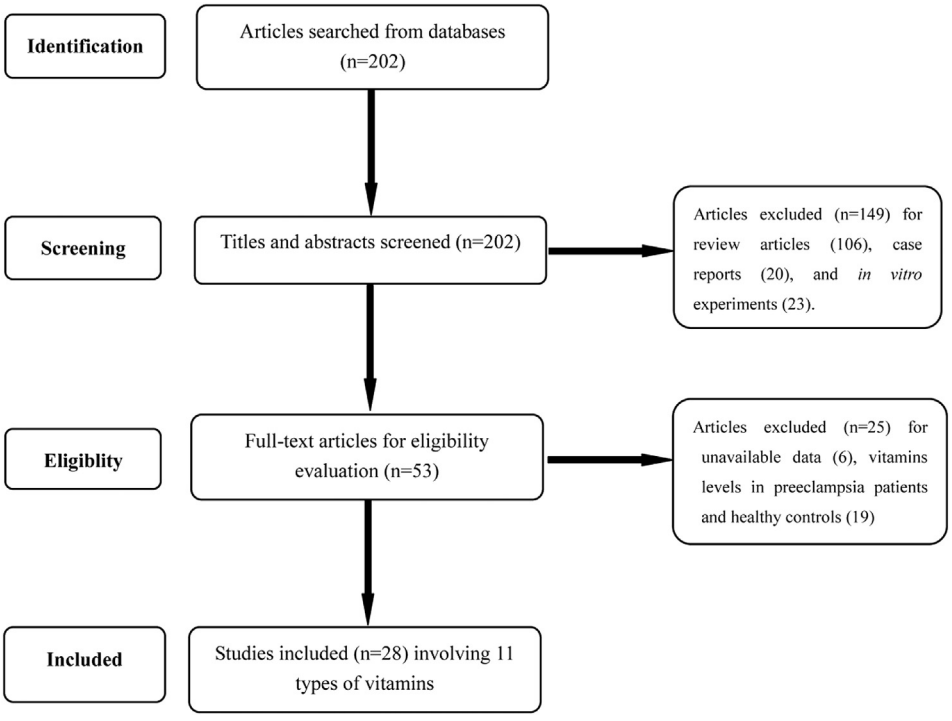

Figure 1 Flow chart about article selection.

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