INPLASY

Salt intake and hypertensive disorders of pregnancy: meta-analysis of cohort studies

INPLASY202650155

doi: 10.37766/inplasy2026.5.0155

Received: 27 May 2026

Published: 27 May 2026

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ADMINISTRATIVE INFORMATION

Support - Zhejiang University.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202650155

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 May 2026 and was last updated on 27 May 2026.

INTRODUCTION

Review question / Objective Is higher dietary salt intake associated with an increased risk of hypertensive disorders of pregnancy (HDP) in previous cohort studies?

Rationale Global daily salts intake (10.8 g) far exceeds the recommended limit of <5.0 g/day (2,000 mg sodium/day), with nearly all countries surpassing the threshold. Excessive salt intake is a leading cause of hypertension and reducing salt effectively lowered blood pressure as evidenced by large-scale trials . However, previous studies have not conclusively supported dietary salt restriction for the prevention of hypertensive disorders of pregnancy (HDP, encompassing gestational hypertension and preeclampsia), which is a leading risk factor for maternal mortality and morbidity. Two clinical trials (n=505) in Netherlands observed no effect of dietary salt restriction on preeclampsia risk (relative risk [RR] 1.11, 95%CI 0.46-2.66) or gestational hypertension (RR 0.98, 95%CI 0.49-1.94), but a Danish National Birth Cohort study (n=66,651) observed that higher salt intake (median 9.4 g/day) was associated with a 54% higher risk of HDP compared to lower intake (median 6.6 g/day). Based on the limited and conflicting evidence, current guidelines have yet to recommend salt restriction during pregnancy for the prevention of HDP.

Condition being studied Hypertensive disorders of pregnancy are considered to be present if hypertension occurs during pregnancy or up to 12 weeks after delivery. They are among the most common complications of pregnancy and are often accompanied by symptoms such as elevated blood pressure or proteinuria.

METHODS

Search strategy PubMed, Embase, and Web of Science were searched using combinations of terms related to salt intake and hypertensive disorders of pregnancy, combined with terms related to prospective and observational study designs. The PubMed search strategy included:

("salt"[Title/Abstract] OR "salt intake"[Title/Abstract] OR "dietary salt"[Title/Abstract] OR "sodium intake"[Title/Abstract] OR "dietary sodium"[Title/Abstract] OR "sodium consumption"[Title/Abstract] OR "urinary sodium"[Title/Abstract]) AND ("hypertensive disorders of pregnancy"[Title/Abstract] OR "pregnancy-induced hypertension"[Title/Abstract] OR "gestational hypertension"[Title/Abstract] OR preeclampsia[Title/Abstract] OR "pre-eclampsia"[Title/Abstract]) AND (cohort* OR prospective OR longitudinal OR observational). Similar search strategies adapted for Web of Science and Embase were also applied. Reference lists of relevant articles were screened manually.

Participant or population Pregnant women.

Intervention Higher dietary salt intake assessed using food frequency questionnaires, dietary recalls, or related methods.

Comparator Lower dietary salt intake.

Study designs to be included Prospective cohort studies.

Eligibility criteria Studies were eligible if they: (1) were original prospective cohort studies; (2) included pregnant women; (3) assessed dietary salt or sodium intake; (4) reported HDP, gestational hypertension, or preeclampsia outcomes; and (5) provided multivariable-adjusted risk estimates with corresponding 95% confidence intervals. Reviews, editorials, conference abstracts, animal studies, cross-sectional studies, case-control studies, duplicate publications, and studies without sufficient data were excluded.

Information sources PubMed, Embase, Web of Science, and reference lists of relevant publications.

Main outcome(s) Hypertensive disorders of pregnancy.

Additional outcome(s) None.

Data management Two reviewers independently screened studies, extracted data, and assessed study quality. Disagreements were resolved through discussion with a third reviewer. Extracted information included author, publication year, country, cohort name, sample size, exposure assessment methods, outcome ascertainment methods, adjusted covariates, and effect estimates.

Quality assessment / Risk of bias analysis Study quality was assessed using the Newcastle–Ottawa Scale (NOS).

Strategy of data synthesis We will use the R package "Meta" to perform data analysis. Fixed and random effects meta-analysis with inverse variance weighting was used to pool relative risks. Heterogeneity was assessed using the Q statistic and I^2 statistic.

Subgroup analysis We will perform subgroup analyses by race.

Sensitivity analysis Sensitivity analyses were conducted by omitting one study at a time.

Language restriction English-language studies only.

Country(ies) involved China.

Keywords Salt/sodium intake; hypertensive disorders of pregnancy; cohort study.

Contributions of each author

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