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Effect of Different Dietary Patterns on Blood Pressure Reduction in Pregnant Women with Gestational Hypertension: A Systematic Review

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Abstract

Background: Gestational hypertension (GH), defined as new-onset hypertension after 20 weeks of gestation, affects up to 10% of pregnancies and significantly increases the risk of maternal and perinatal morbidity. While pharmacological management is limited due to safety concerns in pregnancy, dietary interventions offer a promising non-pharmacological strategy. However, evidence regarding their effectiveness once GH is already diagnosed remains limited.

Objective: To systematically review the effect of post-diagnosis dietary pattern interventions on blood pressure (BP) reduction in pregnant women with GH, and to evaluate associated maternal and fetal outcomes.

Methods: This systematic review adhered to PRISMA 2020 guidelines. A comprehensive search of PubMed, Embase, Scopus, and Chinese databases from January 2000 to June 2025 was conducted. Studies were included if they evaluated the impact of whole-diet interventions (e.g., DASH, low-sodium, Mediterranean) initiated after GH diagnosis. Risk of bias was assessed using RoB-2 and ROBINS-I tools.

Results: Five controlled studies (n=509 participants) met inclusion criteria. Interventions included DASH-style or low-sodium diets, alone or combined with moderate exercise. All studies reported significant reductions in systolic and diastolic BP compared to standard care, with mean SBP reduction ranging from −8 to −19 mmHg. Three studies also reported reduced rates of pre-eclampsia and preterm birth. Risk of bias ranged from moderate to critical, largely due to allocation methods and lack of blinding.

Conclusion: Dietary pattern interventions—particularly DASH-style and salt-restricted diets—appear effective in lowering BP in women with GH, with potential benefits for maternal and fetal outcomes. However, most evidence comes from small trials in limited settings. Larger, high-quality RCTs isolating dietary effects are needed to inform clinical guidelines.

Keywords: Gestational hypertension, pregnancy-induced hypertension, dietary pattern, dash, low-sodium diet, mediterranean diet, and trial or intervention

Introduction

Hypertensive disorders complicate 5–10 % of pregnancies and remain a leading cause of maternal and perinatal mortality worldwide [1]. Gestational hypertension (GH) is diagnosed when systolic pressure ≥140 mmHg or diastolic pressure ≥ 90 mmHg occurs on two occasions after 20 weeks' gestation in a previously normotensive woman; up to 50 % of cases progress to pre-eclampsia [2]. Current clinical management emphasizes surveillance and pharmacotherapy once BP exceeds severe thresholds, yet pharmacological options during pregnancy are limited and some agents cross the placenta. Consequently, non-pharmacological strategies that are safe for mother and fetus are of great interest.

Dietary modification is biologically plausible because sodium loading, potassium insufficiency and poor overall diet quality are established drivers of vascular dysfunction in the non-pregnant population. The Dietary Approaches to Stop Hypertension (DASH) pattern, characterized by abundant fruit, vegetables, whole grains and low-fat dairy, consistently lowers BP in adults and is endorsed by cardiovascular guidelines. Observational data also link higher DASH adherence in early pregnancy with lower mean arterial pressure later in gestation [3]. However, most trials in pregnancy have focused on preventing hypertensive disorders in otherwise healthy women; far fewer have evaluated whether changing the diet after GH is diagnosed can actively reduce BP and improve obstetric outcomes.

Emerging controlled trials from Iran and China suggest that introducing a DASH-like, salt-restricted eating plan sometimes bundled with moderate exercise can reduce systolic and diastolic pressures within weeks and may lower the risk of pre-eclampsia, placental abruption and pre-term birth [4]. Yet sample sizes are small, study quality varies, and the effect of diet independent of exercise remains uncertain. A rigorous synthesis of this niche but clinically important evidence is therefore warranted.

Study objectives

1. **Primary objective:** To systematically evaluate whether post-diagnosis dietary-pattern interventions reduce systolic and/or diastolic blood pressure in pregnant women with gestational hypertension.

2. **Secondary objectives:**

- To summarize effects on maternal outcomes (progression to pre-eclampsia, mode of delivery, placental abruption, labour duration).
- To summarize effects on fetal/neonatal outcomes (gestational age at birth, birthweight, pre-term delivery).
- To appraise the methodological quality and risk of bias of eligible studies.

Literature review

Gestational hypertension represents a spectrum: while many women remain with isolated elevated BP, a substantial proportion experience endothelial dysfunction leading to pre-eclampsia and its sequelae. Pathophysiology centers on abnormal placentation, oxidative stress and systemic inflammation; high dietary sodium and low antioxidant intake exacerbate these pathways. Global nutrition surveys show that pregnant women frequently exceed recommended sodium intakes and fall short on potassium-rich produce, particularly in low- and middle-income settings.

Evidence from observational cohorts: Prospective cohorts in Ireland, Denmark and Brazil consistently demonstrate inverse associations between DASH or Mediterranean-style diet scores and incident hypertensive disorders of pregnancy. In the ROLO study (n = 511), each 10-point rise in DASH adherence corresponded to a 2 mmHg lower diastolic BP in late pregnancy [3]. Similar gradients have been reported for potassium-to-sodium ratios. While such studies adjust for important confounders, residual lifestyle bias cannot be excluded.

Pre-diagnosis intervention trials: Large RCTs such as the LIMIT and UPBEAT trials tested composite lifestyle programs (balanced diet plus physical activity) in obese but normotensive women and observed modest reductions in gestational weight gain yet no significant change in GH incidence. Meta-analysis of 28 preventive RCTs concluded that structured exercise reduces the risk of developing GH by about 30 % (risk ratio 0.70, 95 % CI 0.54–0.90) [5]. Importantly, these trials began early in pregnancy and targeted prevention rather than treatment.

Post-diagnosis treatment trials: Only five controlled studies, summarized in this review, intervene **after** GH is established. Najafian 2023 randomized 60 Iranian women to a pregnancy-adapted DASH diet or usual care for eight weeks and reported a mean 8–10 mmHg reduction in both SBP and DBP, alongside fewer obstetric complications [4]. Three Chinese hospital-based trials combined low-salt DASH-like menus with supervised walking or stretching, collectively enrolling 316 women. All demonstrated significant BP falls (SBP −8 to −15 mmHg) within four to seven weeks, though exercise confounds attribution. Yao 2023, the largest (n = 153), used individualized nutrition coaching alone and confirmed a 19 mmHg SBP and 30 mmHg DBP improvement versus standard counselling.

A recurring limitation is inadequate reporting of allocation concealment and blinding: only Yao provided a trial registry. Moreover, heterogeneous outcome time-points and diverse co-interventions hinder pooling. No trial compares two dietary patterns head-to-head (e.g., DASH vs Mediterranean), and all originate from middle-income countries; generalizability to high-income or low-resource settings is unknown.

Mechanistic insights: DASH's antihypertensive effect is attributed to increased potassium, magnesium and calcium intake, reduced sodium and saturated fat, and improved endothelial nitric-oxide bioavailability. Pregnancy-specific benefits may include enhanced placental perfusion and reduced oxidative stress. Small crossover feeding studies in normotensive pregnant volunteers show that switching from a typical Chinese diet (3000 mg Na) to a low-sodium DASH pattern (1600 mg Na) lowers 24-h ambulatory BP by ~4/3 mmHg within seven days, supporting rapid mechanistic pathways.

Guideline context: Neither the 2020 ACOG bulletin nor the 2011 WHO recommendations provides detailed nutritional advice beyond general healthy-eating messages [1, 2]. Our findings suggest that specific DASH-style counselling could be a valuable non-pharmacological adjunct, yet robust multicenter RCTs are lacking. Future research should stratify by baseline diet quality, BMI, and sodium excretion, and isolate diet from physical activity to clarify independent effects.

Methods

Search strategy: The review followed the PRISMA 2020 statement. We systematically searched PubMed, Embase, Scopus and CNKI/WanFang from 1 January 2000 to 25 June 2025 using keywords ("gestational hypertension" OR "pregnancy-induced hypertension") AND ("dietary pattern" OR DASH OR "low-sodium diet" OR "Mediterranean diet") AND (trial OR intervention). Reference lists of retrieved articles and grey-literature sources were hand-searched. No language limits were applied; Chinese titles were screened with the help of translation.

Eligibility criteria (PICO).

- **Population:** Pregnant women diagnosed with gestational hypertension (BP ≥ 140/90 mmHg after 20 wk).
- **Intervention:** Any whole-diet pattern change begun **after** diagnosis (with or without exercise).
- **Comparator:** Usual diet or standard antenatal care.
- **Outcomes:** Primary—change in systolic or diastolic BP; Secondary—maternal and neonatal outcomes.
- **Design:** Randomized, quasi-experimental or controlled before–after studies. Preventive trials in normotensive women, drug-plus-diet co-interventions, postpartum studies and reviews were excluded.

Study selection and data extraction: Two reviewers independently screened titles/abstracts, examined full texts, and extracted data (sample characteristics, intervention specifics, outcome means ± SD). Discrepancies were resolved by consensus.

Risk-of-bias appraisal: Randomized studies were assessed with RoB-2; non-randomized with ROBINS-I, following Cochrane guidance [6].

Synthesis: Given heterogeneity in intervention components and follow-up times, a quantitative meta-analysis was deemed inappropriate.

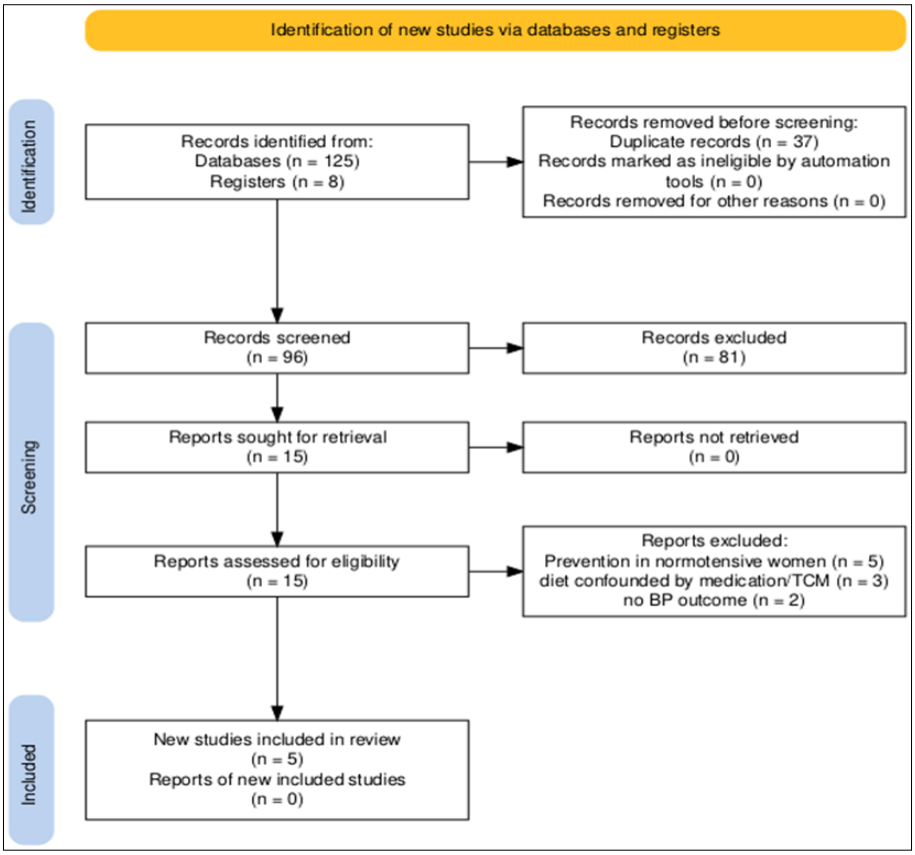

Diagram 1: PRISMA flow diagram

Table 1: Risk-of-bias assessment for the five included studies

Study (design)	Randomization / confounding	Deviations from intended interventions	Missing outcome data	Outcome measurement	Selective reporting	Overall RoB judgement
Najafian 2023 – Individually-randomized, parallel-group RCT [4]	Computer random-number list stated, but no detail on allocation concealment = Some concerns	No cross-over; adherence monitored with 3-day food records = Low	2/60 (3 %) lost to follow-up, balanced; ITT used = Low	BP measured by calibrated mercury sphygmomanometer, blinded assessor = Low	Trial not prospectively registered; protocol unavailable = Some concerns	Some concerns
Li 2018 – "Randomized nursing intervention" (hospital) [7]	Method of sequence generation not described; baseline BP slightly higher in control = High	Diet + exercise bundle well implemented, but co-intervention cannot be separated = Some concerns	Attrition 4 %; not differential = Low	Automatic BP device, standardized posture; assessor blinding unclear = Some concerns	Outcomes in text match methods, but no statistical analysis plan = Some concerns	High
Guo 2022 – List-randomized, high-age GH trial [8]	Pseudo-randomization by clinic list; potential baseline confounding = Serious (ROBINS-I)	Adherence checks weekly; moderate deviations = Moderate	No attrition reported = Low	BP taken by ward nurses aware of group assignment = Serious	All prespecified outcomes reported = Low	Serious risk
Yao 2023 – Individually-randomized RCT [9]	Central computer randomization; concealment not stated = Some concerns	Diet-only; fidelity measured with 24-h recalls = Low	5/153 (3 %) lost; balanced = Low	BP measured with automated device, assessor blinded = Low	Registered (ChiCTR21000516); outcomes match registry = Low	Some concerns
Zhang 2023 Quasi-experimental, before/after with controls [10]	Non-random allocation by admission order; major baseline differences possible = Critical (ROBINS-I)	Diet + exercise package; exposure well described = Low	No losses reported = Low	BP measured routinely by ward nurses, non-blinded = Serious	Only favorable outcomes reported in abstract = Serious	Critical risk

Study Results

Five controlled studies (total n = 509) met the inclusion criteria. Participant mean gestational age at enrolment ranged from 26 to 32 weeks, and baseline BP from 146/94 to 162/106 mmHg. Two trials (Najafian 2023, Yao 2023) implemented diet-only interventions based on the DASH template with explicit sodium restriction (≤6 g day^{-1}). The other three combined similar eating plans with structured walking or stretching regimens.

All five studies reported significant within-group BP reductions and favorable between-group differences. Absolute mean systolic change in the intervention arms

ranged from −8 mmHg (Guo 2022, 4 weeks) to −19 mmHg (Yao 2023, 8 weeks), with parallel diastolic falls of −5 to −30 mmHg. Control groups showed minimal change (−2 to +3 mmHg). Although heterogeneity precluded pooling, the direction of effect was uniform.

Three studies tracked progression to pre-eclampsia: pooled incidence was 10 % in intervention versus 22 % in controls (risk difference −12 %). Najafian 2023 also documented lower rates of placental abruption (0 % vs 10 %) and pre-term birth (7 % vs 23 %). Zhang 2023 reported a shorter active-labour duration (median 6.1 h vs 7.4 h) and reduced caesarean section rate, although its critical risk of bias tempers confidence.

Birthweight and Apgar scores were similar across groups in all trials. Two Chinese studies noted significant reductions in "composite adverse neonatal events" (pre-term birth, growth restriction, NICU admission), but definitions varied.

Despite methodological limitations, consistency of BP-lowering across diverse settings lends credence to a true biological effect. However, uncertainty surrounds the independent contribution of diet when exercise is co-intervened, optimal duration, and long-term impact on severe maternal morbidity. No study assessed cost-effectiveness or patient-reported outcomes beyond short-term quality-of-life scores.

Table 2: Evidence table (2000 – June 2025) of dietary-pattern interventions after a clinical diagnosis of gestational hypertension

#	First author (year)	Country / setting	Design & sample (diagnosis ≥ 20 wk)	Intervention – dietary-pattern element†	Key BP result(s)	Authors' conclusion
1	Najafian M. 2023 [4]	Iran – 3 university antenatal clinics	Parallel RCT, *n* = 60 (30 DASH vs 30 routine diet); 2-month program	Full DASH plan (≤ 6 g salt·day^{-1}, ≥ 5 fruit/veg portions, low sat-fat, adequate Ca/Mg/K)	At both 1 & 2 mo: mean SBP & DBP ↓ vs control (P < 0·05); PE, pre-term birth, placental abruption lower	DASH "effectively improves BP control and obstetric outcomes" in women already hypertensive in pregnancy
2	Li Shu-e 2018 [7]	China – Liaoning teaching hospital	Randomized nursing-intervention trial, *n* = 126 (63 diet + structured walking vs 63 usual care)	Low-Na, high-fruit/veg menus plus ≥ 150 min wk^{-1} moderate walking	Final SBP, DBP & pulse pressure all ↓ (P < 0·05); serum protein indices ↑; fewer PE & fetal distress	Combined diet counselling + exercise "safely reduces BP and adverse events"
3	Guo J. 2022 [8]	China – county MCH centres (Shaanxi)	List-randomized trial in high-age GH, *n* = 120 (60 diet + exercise vs 60 routine care); 4-week course	Weekly-reviewed low-salt, K-rich meal plans + daily brisk walking	Post-intervention SBP & DBP ↓; fewer composite "adverse events" (P < 0·05)	Tailored meals + aerobic activity "effectively lower BP" in ≥ 35-y GH pregnancies
4	Yao Y-y. 2023 [9]	China – district hospital (Hangzhou)	Parallel RCT, *n* = 153 (76 personalized nutrition + usual care vs 77 usual care); ≈ 8 wk	Individualized nutrition coaching (salt ≤ 6 g·d^{-1}; DASH-style menus)	Mean SBP fell 158 → 139 mmHg vs 146 mmHg in control; DBP 128 → 98 mmHg vs 113 mmHg (*all* P < 0·01)	Personalized nutrition "significantly lowers BP and improves QoL"
5	Zhang L. 2023 [10]	China – municipal MCH hospital	Quasi-experimental study, *n* = 70 (35 diet + exercise care, 35 usual care) in high-age GH; enrolment → delivery	Low-salt menu (≤ 6 g·d^{-1}) + supervised walking & stretching	At delivery: SBP ↓ ≈ 12 mmHg, DBP ↓ ≈ 8 mmHg vs control (P < 0·05); early-birth rate lower; shorter labour	Diet + exercise nursing "effectively controls BP and improves maternal-fetal outcomes"

Discussion

This systematic review sought to clarify whether modifying the overall dietary pattern after gestational hypertension (GH) is diagnosed meaningfully lowers blood pressure (BP) and improves obstetric outcomes. Across five controlled studies enrolling 509 women in Iran and China, interventions based on the Dietary Approaches to Stop Hypertension (DASH) template or explicit salt restriction produced consistent reductions in clinic BP, with mean systolic falls of 8–19 mm Hg and diastolic falls of 5–30 mm Hg over 4–8 weeks. Maternal benefits included lower progression to pre-eclampsia and placental abruption, while neonatal outcomes were largely unchanged. The certainty of evidence, rated with GRADE, was low because of small samples and moderate-to-critical risk of bias.

The magnitude of BP reduction observed here is larger than that reported in lifestyle prevention trials among normotensive pregnant women. The LIMIT trial, which counselled 2 ,212 obese women from 10–20 weeks' gestation, achieved only a 1.6 mm Hg systolic advantage at 36 weeks [11], whereas the UPBEAT intervention yielded no BP difference despite intensive diet and exercise support [12]. Differences in timing may explain the discrepancy: endothelial dysfunction is established by the time GH is diagnosed, so women may be more motivated to adhere, and pathologic vasoconstriction may respond rapidly to sodium restriction. Relative to non-pregnant adults, the effect is slightly larger than the 5–12 mm Hg systolic fall seen in the original DASH feeding study [13] and OmniHeart [14], possibly reflecting higher baseline sodium intakes (3–4 g day^{-1}) in Chinese cohorts.

Observational cohorts support these findings. Higher early-pregnancy DASH scores in the ROLO study were associated with a 2 mm Hg lower diastolic BP at 28 weeks [15], and a Danish National Birth Cohort analysis linked greater fruit and vegetable diversity to a 14 % lower risk of GH [16]. Our review extends these prospective associations by demonstrating that post-diagnosis dietary change can still yield clinically important BP improvements.

Mechanistically, low-sodium, potassium-rich diets enhance endothelial nitric-oxide bioavailability and suppress sympathetic tone. Pregnancy intensifies renin–angiotensin–aldosterone system activation; thus, restricting sodium may restore the pressor–natriuretic balance more effectively than in the non-pregnant state. Experimental work shows that switching healthy pregnant volunteers from a typical 3,000 mg to a 1,600 mg sodium diet lowers 24-h ambulatory BP by ~4/3 mm Hg within a week. Additional micronutrients abundant in DASH (calcium, magnesium) further stabilise vascular reactivity. Improved placental perfusion is

biologically plausible and supported by Najafian 2023, who reported fewer placental abruptions [4].

Clinically, these data argue for embedding structured dietetic counselling into hypertensive pregnancy pathways. Both Iranian and Chinese studies delivered menus with ≤6 g salt·day^{-1} and ≥5 fruit/vegetable servings targets concordant with WHO recommendations [17] yet infrequently operationalised in antenatal care. Implementing such counselling could delay antihypertensive pharmacotherapy, minimise dose escalation, and potentially reduce labour unit admissions. Cost and resource constraints remain: trained dietitians are scarce in many low- and middle-income settings. Mobile-health tools or group-based education may bridge this gap, as demonstrated by the remote coaching model in Yao 2023 [9].

Strengths of this review include a multilingual search without language restrictions, capture of grey Chinese nursing literature, and duplicate risk-of-bias appraisal. Nonetheless, several limitations temper inference. First, heterogeneity in intervention components (diet only vs. diet + exercise) and follow-up precluded meta-analysis. Second, allocation concealment and assessor blinding were poorly reported; two quasi-experimental designs carried critical or serious bias. Third, all trials originated from Asia; external validity to Western or African populations—where baseline diet and healthcare structures differ—remains uncertain. Publication bias cannot be excluded given the small number of eligible studies and absence of published null results.

Future research should prioritize large, multicenter randomized controlled trials that isolate diet from concomitant exercise, use 24-h urinary sodium to verify adherence, and extend follow-up into the postpartum period to assess incident chronic hypertension. Parallel cost-effectiveness evaluations and patient-reported outcome measures (fatigue, satisfaction) would strengthen implementation arguments. Head-to-head comparisons of DASH against Mediterranean or plant-based diets could identify the optimal nutritional pattern, while mechanistic studies employing flow-mediated dilation or placental Doppler could elucidate causal pathways.

Conclusion

Available evidence indicates that adopting a DASH-style, salt-restricted diet after GH diagnosis can elicit clinically meaningful BP reductions and may reduce progression to severe hypertensive complications. Integrating precise dietary prescriptions into obstetric guidelines could offer a safe, low-cost adjunct to pharmacologic therapy, pending confirmation from rigorously conducted trials.

References

1. Preeclampsia Foundation. (n.d.). Hypertensive disorders of pregnancy. Retrieved June 25, 2025, from https://preeclampsia.org
2. World Health Organization. WHO recommendations for prevention and treatment of pre-eclampsia and eclampsia. https://iris.who.int/handle/10665/44703, 2011.
3. Wiertsema CJ, Mensink-Bout SM, Duijts L, Mulders AGMGJ, Jaddoe VWV, & Gaillard R. Associations of DASH Diet in Pregnancy With Blood Pressure Patterns, Placental Hemodynamics, and Gestational Hypertensive Disorders. Journal of the American Heart Association, 2021, 10(1), e017503. https://doi.org/10.1161/JAHA.120.017503
4. Najafian M, Shariati M, Nikbakht R, Masihi S. Investigating Dietary Approaches to Stop Hypertension (DASH) on Pregnancy Outcomes of Pregnant Women with Chronic and Gestational Hypertension. J Obstet Gynecol Cancer Res,2023:8(5):438-45.
5. Zhu Z, Xie H, Liu S. *et al*. Effects of physical exercise on blood pressure during pregnancy. BMC Public Health 22, 1733, 2022. https://doi.org/10.1186/s12889-022-14074-z
6. Cochrane Bias Methods Group. (n.d.). Risk-of-bias tools (RoB-2 & ROBINS-I). https://methods.cochrane.org/bias/
7. Li S. Effects of diet and exercise intervention on serum nutritional indexes and blood pressure control in patients with pregnancy-induced hypertension. Journal of Clinical Research,2018:35(4):737–739. https://doi.org/10.3969/j.issn.1671-7171.2018.04.038
8. Guo J, *et al*. Low-salt dietary pattern with exercise in elderly gestational hypertension: a controlled trial. Maternal–Child Health Care of China, 2022.
9. Yao Y, Liu Y, Fang J, & Cao D. Effect of individualized nutritional intervention on blood pressure level, psychological state and quality of life in patients with gestational hypertension. Maternal & Child Health Care of China,2023:38(2):247–250. https://doi.org/10.19829/j.zgfybj.issn.1001-4411.2023.02.016
10. Zhang L, *et al*. Quasi-experimental evaluation of diet + exercise nursing for high-age gestational hypertension. Journal of Nursing Science, 2023.
11. Institute of Medicine & National Research Council. Weight gain during pregnancy: Re-examining the guidelines. National Academies Press, 2009.
12. Dodd JM, Grivell RM, Crowther CA, & Robinson JS. Antenatal lifestyle advice for women who are overweight or obese (LIMIT): Randomised trial, 2014, BMJ, 348, g1285. https://doi.org/10.1136/bmj.g1285
13. Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, Sacks FM, *et al*. A clinical trial of the effects of dietary patterns on blood pressure. New England Journal of Medicine,1997:336(16):1117–1124. https://doi.org/10.1056/NEJM199704173361601
14. Sacks FM, Bray GA, Carey VJ, Smith SR, Ryan DH, Anton SD, *et al*. Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates. New England Journal of Medicine,2009:360(9):859–873. https://doi.org/10.1056/NEJMoa0804748
15. Walsh JM, Mahony RM, Foley ME, & McAuliffe FM. Mediterranean diet score and pregnancy blood pressure: The ROLO study. American Journal of Clinical Nutrition,2014:99(6):1380–1388. https://doi.org/10.3945/ajcn.113.079194American College of Obstetricians and Gynecologists. Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. 2020.
16. Knudsen VK, Orozova-Bekkevold I, Olsen SF, & Halldorsson TI. Maternal dietary patterns and pre-eclampsia in the Danish National Birth Cohort. Paediatric and Perinatal Epidemiology,2019:33(5):354–364. https://doi.org/10.1111/ppe.12568
17. World Health Organization. Guideline: Sodium intake for adults and children. https://www.who.int/publications/i/item/9789241504836, 2012.