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Effect of natrium on hypertension in pregnancy: a systematic review

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Abstract

Introduction: Hypertension itself in pregnancy is still a matter of concern and a major challenge in antenatal practice, this will have an impact on both the mother and the fetus. Hypertension plays an important role in up to 15% of complications during pregnancy and postpartum. One of the risk factors for hypertension is high sodium consumption. **Objective:** to summarize effect of natrium on hypertension in pregnancy. **Methods:** Protocol for the Reporting of Systematic Reviews and Meta-Analyses (PRISMA) was followed in this research. From 2015 to 2023, three databases were utilized: PubMed, Science Direct, and Springerlink. After that, we did a rigorous evaluation of the articles that passed the inclusion and exclusion tests. This systematic review found 8 publications. **Results:** The results show that there is at least one research mentioning the intervention of a high-salt diet and a low-potassium diet. New guidelines for Na intake before pregnancy are needed to avoid hypertensive problems in pregnancy, according to this research. There is a significant correlation between the prevalence of hypertensive diseases of pregnancy and the amount of salt that pregnant women consume. Pregnant women with preeclampsia should have their blood magnesium levels monitored for interventional and prognostic purposes. **Conclusion:** Preeclampsia women could avoid hypertension throughout pregnancy by maintaining a healthy salt and magnesium intake in their diets and monitoring their blood magnesium levels regularly.

CCS CONCEPTS • General and reference; • Document type; • General conference proceedings

Additional Keywords and Phrases: Natrium, Hypertension, Pregnancy, systematic review

1 INTRODUCTION

A pathogenic process may follow pregnancy, endangering the health of both the mother and the baby. At this time it requires special attention, because it determines the quality of life hereafter, especially for children or babies in the womb [1]. About 15% suffer from severe complications, with one third having preeclampsia. One of the causes of high maternal and fetal mortality is preeclampsia [2].

Preeclampsia is closely related to hypertension experienced by pregnant women. Preeclampsia is a disease with symptoms of hypertension, edema and proteinuria that appears during pregnancy, generally occurs during the second and third trimesters [3]. Hypertension itself in pregnancy is still a matter of concern and a major challenge in antenatal practice, this will have an impact on both the mother and the fetus. The risk factor profile of pregnant women is very important in determining the identification of those who may experience hypertensive disorders during pregnancy [4].

Up to fifteen percent of postpartum and pregnancy problems are attributable to hypertension [5]. Among pregnant women, hypertension diseases include gestational age, preeclampsia, eclampsia, and a history of hypertension; [6-8]. the estimated prevalence for reproductive-aged women is 5-10%. numbers 6–8. Worldwide, 30,000 mothers die from hypertension-related causes every year, with a further 10-15% of these fatalities occurring in low- and middle-income nations [9, 10]. A research undertaken in four developing countries (Nigeria, Pakistan, Mozambique, and India) has shown that hypotensive disorders of pregnancy remain a significant cause of maternal mortality in Indonesia, resulting in fewer than three deaths per day [11] Consuming an excessive amount of salt is associated with an increased risk of hypertension. [12].

Consistent with other research, it has been shown that pregnancies characterized by a high-salt diet and low-potassium consumption are associated with an increased risk of maternal and newborn morbidity compared to pregnancies characterized by a low-salt diet and high-potassium intake [13]. A study done at the VK Maternity Room at RSUD doctor Doris Sylvanus Palangkaraya revealed a correlation between salt intake habits and the occurrence of preeclampsia in pregnant women [14]. This systematic review seeks to address the question, "How does natrium affect hypertension in pregnancy?" by examining the pertinent literature from a number of nations. Summarizing the impact of natrium on hypertension in pregnancy is the goal of this study.

2 MATERIALS AND METHODS

2.1 Protocol:

Protocol for the Reporting of Systematic Reviews and Meta-Analyses (PRISMA) [15]. was followed in this study. Formula Criteria for Inclusion and Exclusion (PICO) was used to choose articles for this study [16].

2.2 Eligibility Criteria

Specifically, we are looking for publications that address the impact of natrium on hypertension in pregnancy; we will not be reviewing any articles that do not address this topic. Pregnant women make up the demographic covered by the articles. In order to facilitate researchers' comprehension and analysis of the article's content, the review includes both English and Indonesian articles. All articles written between 2015 and 2023 will be published. This includes only original study and full-text papers. Articles that include irpertinent opinions, evaluations, suggestions, or policies will not be included.

2.3 Information Sources

Databases are used for literary searches because they are quicker and more trustworthy than manual library searches [17] Springerlink, Science Direct, and PubMed were the databases that were used.

2.4 Search Strategies

To find the most pertinent papers, we used Boolean operators (AND, OR, and NOT) to refine our search and identified pertinent keywords to perform our literature search.[18] When searching for pertinent material, we employ the following terms as if they were titles or abstracts: PubMed, using the terms ((natrium OR sodium intake OR serum magnesium) AND (hypertension) OR (preeclampsia) OR (pregnancy) OR (pregnant); Science Direct, has used the keywords ((effect natrium OR effect sodium intake or effect serum magnesium) AND (hypertension) OR (preeclampsia) AND (pregnancy) OR (pregnant); Springerlink, has used the keywords (effect natrium or sodium intake or serum magnesium) AND (hypertension or preeclampsia) AND (pregnancy or pregnant)'.

2.5 Selecting of Sources of Evidence

Mendeley, a reference management system, was used to perform the article selection process. The first step in selecting papers is for the first researcher to independently examine the titles and abstracts. Also, the first and second researchers went over the publications' whole texts to determine their eligibility. The article's compatibility with the qualifying criteria was double-checked by the second researcher [19].

2.6 Data Charting Process and Data Items

While creating the charts, we made care to record both particular and general information about the study's author, publication year, title, children's ages, study design, population, intervention type, variables assessed, and study outcomes [20].

2.7 The Synthesis Process Comprises

Four steps were involved in the data synthesis process: the first involved extracting concepts and themes from pertinent research; the second step included arranging the outcomes of this extraction into significant discoveries; the third step required classifying these discoveries; and the fourth step involved amalgamating the categories into a central theme, which was modified according to the developed conceptual framework [21].

Using the aforementioned keywords, 203 publications from PubMed, 154 articles from Science Direct, and 128 articles from Springerlink were identified out of 237 selected papers. Removing 287 articles from consideration based on their abstracts and titles was the first round of the screening process. The second approach comprises selecting qualifying papers from among 172 full-text articles. Eighteen publications dealt with irpertinent populations, forty-two with irpertinent interventions, thirty-nine lacked original research, thirty-four dealt with subjects unconnected to natrium, salt intake, or serum magnesium, twenty-three dealt with outcomes unrelated to pregnancy, and six had no study papers at all. A total of 164 publications were subsequently removed from consideration after this third round of screening. A total of eight selected publications were considered for the study (Figure 1).

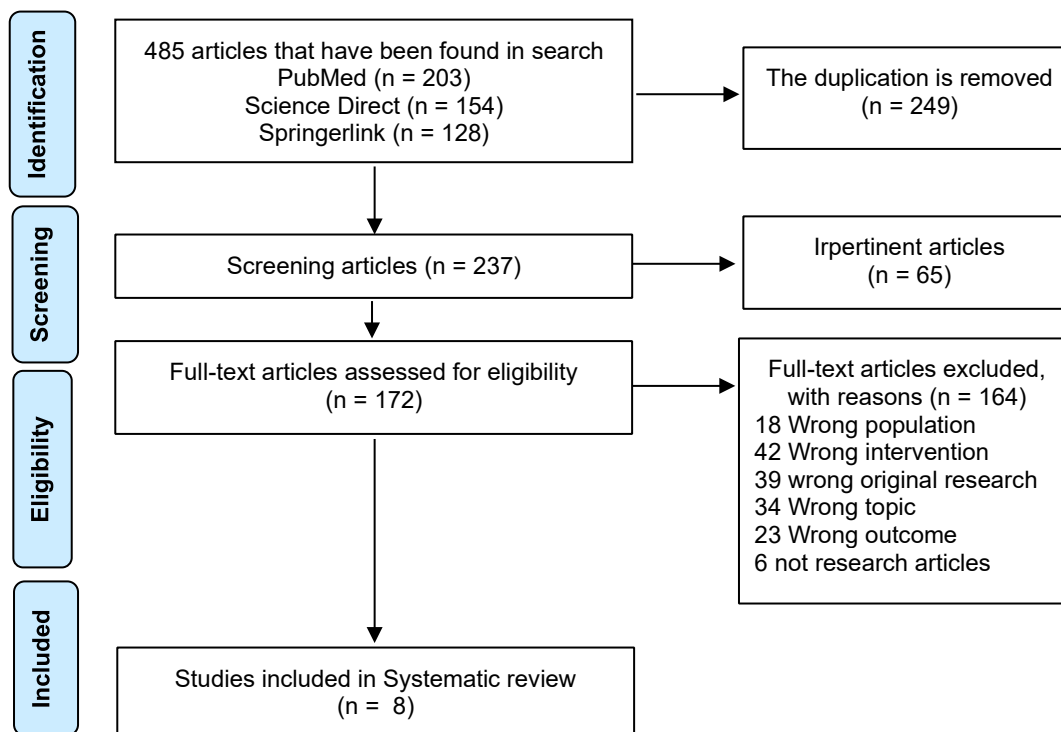


Figure 1. Flow diagram based on PRISMA guideline

3 RESULTS

From 2015 to 2023, a total of eight years of study were carried out. Preeclamptic pregnant women ate too much salt and not enough potassium, according to eight studies. Blood pressure was not associated with potassium or sodium. Association between the pattern of salt intake and the prevalence of preeclampsia in pregnant women. Both increased and decreased sodium intake before conception raises the chance of hypertensive complications during pregnancy. As a supplementary method and predictive indication, blood magnesium levels should be considered for pregnant women with preeclampsia. Magnesium and calcium levels in the blood decrease in pregnancy-induced hypertension. Table 1 is a summary for your convenience.

4 DISCUSSION

This study confirms the findings of three earlier studies that found that a high-salt diet during pregnancy had a comparable impact on hypertension [13, 14, 24]. Two studies [25, 27]. found that pregnant women with hypertension had decreased serum magnesium and calcium levels. Using Na before getting pregnant raises the risk of hypertensive complications in a pregnancy with a short gestational age, according to one study [23]. Two studies have shown no correlation between salt consumption and the occurrence of hypertensive problems during pregnancy [22, 26].

According to the results, previous studies have looked at the potential benefits of reducing potassium intake and reducing salt intake in the diet. This is shown by looking at the study methods employed in each publication and by using the quasiexperimental study design [13]. Four further studies compared two groups to determine the impact of serum magnesium, salt intake, and Na on hypertension. Case control and cohort studies, two forms of study approaches, make this very clear in their design [23, 24, 26, 27].

In addition, the study also found whether sodium intake has an effect on hypertension in pregnancy. The results obtained from two studies stated that there was an effect of sodium intake or serum magnesium on hypertension of pregnancy [14, 25], but one study stated that there was no relationship between sodium intake or serum magnesium on hypertension of pregnancy [22].

New recommendations for Na intake before to conception are necessary to prevent hypertensive complications during pregnancy, as shown in this study. The risk of hypertension complications during pregnancy is significantly associated with the amount of salt consumed by pregnant women. In order to assess the prognosis and potential interventions for pregnant women with preeclampsia, it is important to measure their blood

magnesium levels. Several studies have linked magnesium and calcium to the development of pregnancy-induced hypertension [23-25, 27].

The limitation of this study is that there has not been much development on the provision of Na or sodium intake or serum magnesium for gestational hypertension in one study. Not much research has been done on the effect of Na and sodium intake or serum magnesium on gestational hypertension. Intervention is needed by developing Na and sodium intake and serum magnesium by involving all components in gestational hypertension

5 CONCLUSION

Prevention of hypertension pregnancy in preeclampsia mothers must be carried out continuously and continuously through dietary Na and sodium intake and serum magnesium. To increase dietary Na and sodium intake and serum magnesium in preventing pregnancy hypertension, it is necessary to develop dietary Na or sodium intake or serum magnesium in the current situation and conditions.

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REFERENCES

1. Situmorang RB, Sapitri E. Asuhan kebidanan pada ny. P umur 32 tahun G3P2A0H2 dengan hipertensi gestasional di Poli Kebidanan Rumah Sakit M. Yunus Bengkulu tahun 2018. *Journal of Midwifery*. 2018;6(2):26-34. DOI: <https://doi.org/10.37676/jm.v6i2.631>
2. Agil L, Pratiwi D. Pengembangan Bahan Berbasis Kontekstual Pada Mata Kuliah Biologi Umum. *Jurnal Pendidikan Biologi*. 2015. DOI: [10.24127/bioedukasi.v6i1.155](https://doi.org/10.24127/bioedukasi.v6i1.155)
3. Rahyani NKY, Lindayani IK, Suarniti NW, Mahayati NMD, Astiti NKE, Dewi IN. *Buku Ajar Asuhan Kebidanan Patologi Bagi Bidan*. Yogyakarta: Penerbit Andi; 2020.
4. Nath A, B S, Raj S, Metgud CS. Prevalence of hypertension in pregnancy and its associated factors among women attending antenatal clinics in Bengaluru. *Journal of Family Medicine and Primary Care*. 2021;10(4). DOI: [10.4103/jfmipc.jfmipc.1520.20](https://doi.org/10.4103/jfmipc.jfmipc.1520.20)
5. World Health Organization. Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019. Report No.: 9241516488.
6. Regitz-Zagrosek V, Roos-Hesselink J, Bauersachs J, Blomstrom-Lundqvist C, Cifkova R, Bonis M, Jung B, Johnson MR, Kintscher U, Kranke P, Lang IM, Morais J, Pieper PJ, Presbitero P, Price S, Rosano GMC, Seeland U, Simoncini T, Swan L, Warnes CA, ESC Scientific Document Group. 2018 ESC guidelines for the management of cardiovascular diseases during pregnancy. *Eur Heart J*. 2018;39:3165241. DOI: [10.1093/eurheartj/ehy340](https://doi.org/10.1093/eurheartj/ehy340)
7. Umesawa M, Kobashi G. Epidemiology of hypertensive disorders in pregnancy: prevalence, risk factors, predictors and prognosis. *Hypertension Research*. 2017;40(3):213-20. doi: 10.1038/hr.2016.126
8. Brown MA, Magee LA, Kenny LC, Karumanchi SA, McCarthy FP, Saito S, et al. Hypertensive disorders of pregnancy: ISSHP classification, diagnosis, and management recommendations for international practice. *Hypertension*. 2018;72(1):24-43. DOI: [10.1161/HYPERTENSIONAHA.117.10803](https://doi.org/10.1161/HYPERTENSIONAHA.117.10803)
9. Wu P, Haththotuwa R, Kwok CS, Babu A, Kotronias RA, Rushton C, et al. Preeclampsia and future cardiovascular health: a systematic review and meta-analysis. *Circulation: Cardiovascular Quality and Outcomes*. 2017;10(2):e003497. DOI: [10.1161/CIRCOUTCOMES.116.003497](https://doi.org/10.1161/CIRCOUTCOMES.116.003497)
10. World Health Organization. Maternal Mortality Key Facts: WHO 2018 2018 [Available from: <http://www.who.int/news-room/fact-sheets/detail/maternal-mortality>].
11. Magee LA, Sharma S, Nathan HL, Adetoro OO, Bellad MB, Goudar S, et al. The incidence of pregnancy hypertension in India, Pakistan, Mozambique, and Nigeria: a prospective population-level analysis. *PLoS medicine*. 2019;16(4):e1002783. DOI: [10.1371/journal.pmed.1002783](https://doi.org/10.1371/journal.pmed.1002783)
12. Baharuddin M, Amelia D, Suhowatsky S, Kusuma A, Suhargono MH, Eng B. Maternal death reviews: A retrospective case series of 90 hospital-based maternal deaths in 11 hospitals in Indonesia. *International Journal of Gynecology & Obstetrics*. 2019;144:59-64. DOI: [10.1002/ijgo.12736](https://doi.org/10.1002/ijgo.12736)
13. Yılmaz ZV, Akkaş E, Türkmen GG, Kara Ö, Yücel A, Uygur D. Dietary sodium and potassium intake were associated with hypertension, kidney damage and adverse perinatal outcome in pregnant women with preeclampsia. *Hypertension in pregnancy*. 2017;36(1):77-83. DOI: [10.1002/ijgo.12736](https://doi.org/10.1002/ijgo.12736)

14. Bingan ECS, Hubungan Pola Konsumsi Asupan Natrium Dengan Kejadian Preeklamsia Pada Ibu Hamil. *Jurnal Forum Kesehatan: Media Publikasi Kesehatan Ilmiah*; 2020. DOI:[10.52263/jfk.v10i2.211](https://doi.org/10.52263/jfk.v10i2.211)
15. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Bmj*. 2021;372:n71. doi: 10.1186/s13643-021-01626-4
16. Eriksen MB, Frandsen TF. The impact of patient, intervention, comparison, outcome (PICO) as a search strategy tool on literature search quality: a systematic review. *Journal of the Medical Library Association: JMLA*. 2018;106(4):420. DOI: [10.5195/jmla.2018.345](https://doi.org/10.5195/jmla.2018.345)
17. Cooper C, Booth A, Varley-Campbell J, Britten N, Garside R. Defining the process to literature searching in systematic reviews: a literature review of guidance and supporting studies. *BMC Medical Research Methodology*. 2018;18(1):85. DOI: [10.1186/s12874-018-0545-3](https://doi.org/10.1186/s12874-018-0545-3)
18. Bramer WM, De Jonge GB, Rethlefsen ML, Mast F, Kleijnen J. A systematic approach to searching: an efficient and complete method to develop literature searches. *Journal of the Medical Library Association: JMLA*. 2018;106(4):531. DOI: [10.5195/jmla.2018.283](https://doi.org/10.5195/jmla.2018.283)
19. Xiao Y, Watson M. Guidance on Conducting a Systematic Literature Review. *Journal of Planning Education and Research*. 2017;39(1):93-112. <https://doi.org/10.1177/0739456X17723971>
20. Schmidt L, Olorisade BK, McGuinness LA, Thomas J, Higgins JP. Data extraction methods for systematic review (semi) automation: a living systematic review. *F1000Research*. 2021;10. DOI: [10.12688/f1000research.22781.2](https://doi.org/10.12688/f1000research.22781.2)
21. Schick-Makaroff K, MacDonald M, Plummer M, Burgess J, Neander W. What synthesis methodology should I use? A review and analysis of approaches to research synthesis. *AIMS public health*. 2016;3(1):172. DOI: [10.3934/publichealth.2016.1.172](https://doi.org/10.3934/publichealth.2016.1.172)
22. Lane-Cordova AD, Schneider LR, Tucker WC, Cook JW, Wilcox S, Liu J. Dietary sodium, potassium, and blood pressure in normotensive pregnant women: the National Health and Nutrition Examination Survey. *Appl Physiol Nutr Metab*. 2020;45(2):155-60. DOI: 10.1139/apnm-2019-0186
23. Kyozuka H, Fukusda T, Murata T, Yamaguchi A, Kanno A, Yasuda S, et al. Impact of preconception sodium intake on hypertensive disorders of pregnancy: The Japan Environment and Children's study. *Pregnancy Hypertens*. 2021;23:66-72. doi: 10.1016/j.preghy.2020.11.006
24. Arvizu M, Bjerregaard AA, Madsen MTB, Granström C, Halldorsson TI, Olsen SF, et al. Sodium Intake during Pregnancy, but Not Other Diet Recommendations Aimed at Preventing Cardiovascular Disease, Is Positively Related to Risk of Hypertensive Disorders of Pregnancy. *J Nutr*. 2020;150(1):159-66. <https://doi.org/10.1093/jn/nxz197>
25. Saputri CA, Sunarno I, Usman AN, Arsyad A, Idris I. Serum magnesium levels in normal pregnant women, severe preeclampsia, and severe preeclampsia with complications; a consideration for early supplementation? *Enfermería Clínica*. 2020;30:532-5 <https://doi.org/10.1016/j.enfcli.2019.10.133>
26. Bank TC, Grash J, Chung JH, Mercer BM, McNeil RB, Parry S, et al. The association of sodium intake with the development of hypertensive disorders of pregnancy. *American Journal of Obstetrics and Gynecology*. 2023;228(1, Supplement):S754. DOI: [10.1016/j.ajogmf.2023.101166](https://doi.org/10.1016/j.ajogmf.2023.101166)
27. Pairu J, Triveni G, Manohar A. The study of serum calcium and serum magnesium in pregnancy induced hypertension and normal pregnancy. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2015;4(1):30-5. DOI:[10.5455/2320-1770.ijrcog20150205](https://doi.org/10.5455/2320-1770.ijrcog20150205)