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Original Research Article

Study of dietary pattern in women who develop hypertensive disorders of pregnancy

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ABSTRACT

Background: The upcoming evidence regarding role of diet in various disorders is compelling. This study was conducted to study the role of diet in hypertensive disorders of pregnancy apart from the already established role of genetics and biomarkers. Objectives were to study the dietary pattern in antenatal women, to study the association of dietary factors in development of hypertensive disorder of pregnancy in antenatal women.
Methods: This was a prospective study conducted in a tertiary care hospital from January 2021 to November 2021 in North India. A total of 50 pregnant women were included in their first trimester. Detailed dietary history was taken as per 24 hour recall method by a qualified dietician. The amount and proportion of various food nutrients i.e. carbohydrate, fats, proteins, fruits and vegetables, milk and milk products were calculated. These women were followed till delivery and studied for the development of hypertensive disorders of pregnancy.
Results: It was observed that there was lesser mean intake of fruits (235.71 vs 241.11 gm) and vegetables (257.14 vs 277.78 gm) in women who developed hypertensive disorder than among those who did not. However, the intake of fat was similar in both groups.
Conclusions: Our study shows that intake of more fruits and vegetables has a protective role in development of hypertensive disorders of pregnancy.

Keywords: Role of diet, Nutrition, Hypertensive disorder, Pregnancy

INTRODUCTION

The highest burden of stillbirths continues to be in the sub-Saharan Africa and southern Asian regions. Though the still birth rate of India has decreased but India is still among top 10 countries with the highest stillbirth numbers, with stillbirth rate of 13.9 per 1000 births in 2019.[1] In a large study from North India hypertensive disorders of pregnancy (HDP) contributed to one-third of the stillbirths (1069/3678, 29%).[2,3]

Preeclampsia is one form of hypertensive disorders affecting pregnant women.[4] Extensive research is still needed to understand the root causes of its pathology.[5]

Several studies have provided evidence of the impact that nutrition can have on health outcomes including hypertensive disorders.[6] Earlier epidemiological studies focused on the association between single nutrients or food items and disease prevention but recently a new alternative and complementary approach (based on dietary patterns), examining the effects of the whole diet on the risk of chronic diseases has evolved.[7,8]

This is a pilot study conducted to compare dietary patterns of women who develop hypertensive disorder with normotensive women and study any association of the dietary components with development of hypertension.

METHODS

This was a prospective observational study. The study was conducted at VMMC and Safdarjung Hospital, New Delhi from October 2023 to march 2024.

Inclusion criteria

Antenatal women in first trimester (between 4-12 weeks) were recruited for the study after an informed consent were included.

Exclusion criteria

Women with pre existing renal disease, diabetes, heart disease or hypertension and those on aspirin therapy were excluded from the study.

A detailed dietary history as per 24 hour recall method was taken and the following were included-Calories: Carbohydrates (gm), fat (gm), protein (gm), fruits (gm), vegetables (gm), milk (ml) and milk products (gm), additional iron, calcium and folic acid medications, white meat (gm) and red meat (gm).

These women were monitored till delivery for development of HDP. They were sub divided into two groups for study purpose group PE were those who developed hypertension and group non-PE were normotensive women. The comparison of the dietary patterns, comparative intake of various nutrients was done in the two groups.

Statistical analysis

Data entry was done on micro soft excel spread sheet and data analysis was done using the statistical software SPSS version 21. The qualitative data was summarized as proportions and quantitative data as mean with confidence interval. Qualitative data was analyzed using Chi-square/Fisher exact test while quantitative data by the T-test.

The p value of less than 0.05 was taken as statistically significant.

Ethical approval was taken.

RESULTS

Amongst 50 women recruited in the first trimester of pregnancy 14 (28%) developed hypertensive disorders. Majority of the 50 women (44%) were in the age group of 21-25 years amongst which 38% were overweight or obese (Table 1).

Primigravida comprised 44% and majority were low risk pregnancy. Few women had co morbidities (Table 2).

The intake of carbohydrates, proteins and fats was similar in the two groups. However, there was less intake of fruits and vegetables in those who developed hypertensive disorder (mean fruit intake=235.71 gm and means vegetable intake=257.14 gm) than in those who did not develop hypertensive disorder (means fruit intake=241.11 gm and means vegetable intake was=277.78 gm) but this was not found to be statistically significant (p=0.8 and 0.56 respectively). The intake of calcium was however more in those who developed hypertensive disorders (mean calcium intake was 624.33 mg) than those who did not develop hypertensive disorder (means calcium intake was 575.62 mg (Table 3).

Women who developed hypertensive disorders had higher rates of caesarean delivery (42.9%) vs women who did not develop hypertensive disorder (30.6%). There was more iatrogenic preterm deliveries (28.6% vs 19.4%) and significantly higher induction rate (28.6% vs 8.3%) in those who developed hypertensive disorders (Table 4).

Table 1: Demographic details of study subjects, (n=50).

Variables		N	Percent (%)
Age group (in years)	Upto 20	6	12.0
	21-25	22	44.0
	26-30	13	26.0
	31-35	8	16.0
	>35	1	2.0
	Mean age	25.68±4.37	
Educational status	Illiterate	3	6.0
	Class 5 pass	5	10.0
	Class 10th pass	6	12.0
	Class 12th pass	18	36.0
	Graduate	18	36.0
Employed	Housewife	46	92.0
	Employed	4	8.0
Socioeconomic status	Lower middle	39	78.0
	Upper lower	1	2.0
	Upper middle	10	20.0
BMI (kg/m^2)	Under weight	12	24.0
	Normal weight	19	38.0
	Over weight	9	18.0
	Obese	10	20.0

Table 2: Obstetrical parameters of study subjects, (n=50).

Variables		N	Percentages (%)
Gravida	G1	22	44.0
	G2	15	30.0
	G3	13	26.0

Continued.

Variables		N	Percentages (%)
Parity	P0	28	56.0
	P1	13	26.0
	P2	9	18.0
A	A0	39	78.0
	A1	11	22.0
Comorbidity	Abdominal TB	1	2.0
	H/o GDM	1	2.0
	H/O HTN in previous pregnancy	2	4.0
	Hypothyroidism	6	12.0
	Poliomyelitis	1	2.0
	Nil	39	78.0

Table 3: Association of different dietary factors with preeclampsia in study subjects, (n=50).

Variables	Group	N	Mean	SD	P value
Carbohydrates (gm)	Non-PE	36	315.253	80.2671	0.80
	PE	14	311.086	68.3155	
Fat (gm)	Non-PE	36	39.546	20.1957	0.76
	PE	14	39.026	14.9764	
Proteins (gm)	Non-PE	36	55.624	16.3330	1.0
	PE	14	57.800	9.3019	
Fruits (gm)	Non-PE	36	241.11	120.778	0.80
	PE	14	235.71	116.732	
Vegetables (gm)	Non-PE	36	277.78	119.788	0.56
	PE	14	257.14	51.355	
Calcium (mg)	Non-PE	36	575.624	353.8302	0.10
	PE	14	624.339	166.2875	
Sodium (mg)	Non-PE	36	2850.71	941.061	0.93
	PE	14	2836.00	563.581	

Table 4: Maternal outcomes comparison between non-PE and PE group in subjects, (n=50).

Mode of delivery	Non-PE group, (n=36)	PE group, (n=14)	P value
NVD	25 (69.4%)	8 (57.1%)	0.41
LSCS	11 (30.6%)	6 (42.9%)	
IUGR	2 (5.6%)	1 (7.1%)	1.0
Preterm	7 (19.4%)	4 (28.6%)	0.47
Induction	3 (8.3%)	4 (28.6%)	0.08

Table 5: Fetal outcome comparison between No-PE and PE group in subjects, (n=50).

Fetal outcome	Non-PE group, (n=36)	PE group, (n=14)	P value
Abortion	1 (2.8%)	1 (7.1%)	0.64
IUD	1 (2.8%)	0 (0.0%)	
Live	34 (94.4%)	13 (92.9%)	
NICU admission	1 (2.8%)	1 (7.1%)	0.48
Morality	1 (2.8%)	2 (14.3%)	0.18
AGA	28 (77.8%)	12 (85.7%)	0.70
SGA	8 (22.2%)	2 (14.3%)	

However, intrauterine death (2.8% vs 0%) and small for gestational age infants (22.2% vs 14.3%) was higher in normotensive women. The neonatal ICU admissions (7.1% vs 2.8%) was more in the hypertensive group than those without hypertension (Table 5).

DISCUSSION

In women with hypertension in pregnancy modifications in diet and lifestyle have been widely advocated. In a study by Singh et al on women who develop HDP more than

50% were consuming junk/street food, added salt to their diet and a quarter added visible fat. They reported that type of diet (vegetarian or non-vegetarian) intake and development of HDP was not statistically significant. However, they discovered statistically significant correlation between visible fat consumption and hypertension in pregnancy.[9] In current pilot study 28% women developed HDP, the amount of fat intake was similar in both the groups. Most women had a mixed diet and did not eat junk food. A systemic review and meta-analysis reported that there were higher chances of the development of complications like preeclampsia among women who have a dietary pattern characterized by processed meat, salty snacks, and sweet drinks which was not seen in current study group likely due to different population demographics.[10]

O'Nan et al studied the dietary risk factors for HDP 1523 women reported a 19.2% incidence of HDP which was lower than current study (28%). The authors have used HEI-2025 tool (Health eating index) for categorizing the diet into high (>70 HEI) or low quality based on the tool. They reported that women who developed hypertension had significantly higher intake of dairy, sodium and saturated fats. In current study the fat and sodium intake were similar in both groups. The study also reported no significant difference between groups regarding other HEI components such as fruit, vegetable, whole grain, protein, and sugar intake.[11] There was less intake of fruits and vegetables in those who developed hypertensive disorder in current study however it was not statistically significant likely due to a small sample size. WHO recommends an intake of ≥400 g of fruits and vegetables per day for general health and our study women were Definity taking only 50% of the recommended amount.[12]

Prior studies have reported that certain diets are associated with developing HDP, but the results are varied with a wide range of diets that may be beneficial in prevention of HDP and no practical guidance for patients regarding what they should avoid.[13,14] A meta-analysis on the dietary factors that affect the risk of pre-eclampsia reviewed 169 articles and concluded that women planning to become pregnant should take a daily multivitamin/mineral supplement containing folic acid (400 µg) and vitamin D (≥10 µg), and in countries with low selenium status, selenium (50 µg).[15] In current study the vitamin D and selenium levels were not done and calcium was marginally more but not significant in women who developed hypertension.

Limitations

The study was conducted on small scale in limited number of subjects which was a major limitation of the study.

CONCLUSION

This was a pilot study conducted on a small number of women to determine which dietary components should be focused upon to further evaluate their relationship with HDP. Whereas western diets are higher in fats, sugar and salt the diets in north India are deficient in macro and micronutrients. We found that intake of fruits and vegetables was lesser in women who develop HDP hence further research needs to be done on these dietary components.

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REFERENCES

1. Arora. Never Forgotten: the situation of stillbirth around the globe UNICEF DATA. 2023. Available at: https://data.unicef.org/resources/never-forgotten-stillbirth-estimates-report/. Accessed on 10 July 2025.
2. Gestational hypertension and preeclampsia. ACOG Practice Bulletin Number 222. Obstet Gynecol 2020;135(6):e237-60.
3. Sharma B, Prasad G, Aggarwal N, Siwatch S, Suri V, Kakkar N. Aetiology and trends of rates of stillbirth in a tertiary care hospital in the north of India over 10 years: A retrospective study. BJOG. 2019;126(4):14-20.
4. Cunningham F, Leveno KJ, Bloom SL, Dashe JS, Hoffman BL, Casey BM, et al. eds. Williams Obstetrics, 25e. McGraw-Hill Education; 2018. https://obgyn.mhmedical.com/content.aspx?bookid=1918&sectionid=138822591. Accessed on 22 July 2025.
5. Jung E, Romero R, Yeo L, Gomez-Lopez N, Chaemsaithong P, Jaovisidha A, et al. The etiology of preeclampsia. Am J Obstet Gynecol. 2022;226(2S):S844-66.
6. Food and Agriculture Organization. Report of a joint FAO/WHO workshop, 1-3 September 2004, fruit and vegetables for health. Kobe, Japan. Geneva: WHO World Health Organization, 2005. Available at: https://iris.who.int/handle/10665/43143. Accessed on 3 June 2024.
7. Oussalah A, Levy J, Berthezène C, Alpers DH, Guéant JL. Health outcomes associated with vegetarian diets: an umbrella review of systematic reviews and meta-analyses. Clin Nutr. 2020;39(11):3283-07.
8. Handu D, Piemonte T. Dietary approaches and health outcomes: an evidence analysis center scoping review. J Acad Nutr Diet. 2022;122(7):1375-9.
9. Singh DK, Sinha N, Bera OP, Saleem SM, Tripathi S. Effects of diet on hypertensive disorders during pregnancy: A cross-sectional study from a teaching

hospital. J Family Med Prim Care. 2021;10(9):3268-72.
10. Perry A, Stephanou A, Rayman MP. Dietary factors that affect the risk of pre-eclampsia: BMJ Nutrition Prevention Health. 2022;5(1):118-33.
11. O'Nan SL, Huang R, Zhao P, Barry VG, Lawlor M, Carter EB, et al. Dietary risk factors for hypertensive disorders of pregnancy. Pregnancy Hypertension. 2024;36:101120.
12. Diet, nutrition and the prevention of chronic diseases: report of a Joint WHO/FAO Expert Consultation. WHO Technical Report Series, No. 916. Geneva: World Health Organization; 2003. Available at: https://www.who.int/publications/i/item/924120916X Accessed on 3 June 2024.
13. Raghavan R, Dreibelbis C, Kingshipp BJ, Yat PW, Nancy T, Barbara A, et al. Dietary patterns before and during pregnancy and risk of hypertensive Disorders of pregnancy: a systematic review. USDA Nutrition Evidence Systematic Review. Alexandria (VA). 2019.
14. Fulay AP, Rifas-Shiman SL, Oken E, Perng W. Associations of the dietary approaches to stop hypertension (DASH) diet with pregnancy complications in project viva. Eur J Clin Nutr. 2018;72(10):1385-95.
15. Schoenaker DA, Soedamah-Muthu SS, Mishra GD. The association between dietary factors and gestational hypertension and preeclampsia: A systematic review and meta-analysis of observational studies. BMC Med. 2014;12:157.

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