

Effects of diet on hypertensive disorders during pregnancy: A cross-sectional study from a teaching hospital

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ABSTRACT

Background: Pregnancy is a positive, fulfilling experience for many, but it can put the mother at the risk of suffering ill-health, disability, or even maternal death. The common causes of maternal death include pregnancy-induced hypertension (PIH) or gestational hypertension or hypertensive disorders in pregnancy (HDP), post-partum hemorrhage, and pulmonary embolism. Modifications in lifestyle and diet have been widely advocated as a cost-effective strategy to prevent PIH. **Objectives:** To assess the role of dietary factors in PIH attending antenatal care services at a teaching hospital. **Materials and Methods:** Pregnant women who were attending the antenatal clinic who were diagnosed with hypertension in pregnancy and normotensive before the pregnancy were included in the study. As per the protocol, informed written consent, demographic details with clinical data were obtained from the patients. A total of 225 antenatal cases having hypertension in pregnancy were included in our study. **Results:** Majority of the study subjects (81.8%) were taking mixed diets, 50.2% consumed additional salt in their diet, the intake history of visible fat was given by 25.3% and 96.4% consumed tea while 52.9% had a history of consuming junk food. Among the 41 vegetarian study subjects with hypertension in pregnancy, the maximum subjects (73.1%) had preeclampsia followed by gestational hypertension in 23.6% the subjects. The relation between the type of diet and hypertension in pregnancy was found to be statistically insignificant. The relation between visible fat consumption and hypertension in pregnancy was found to be statistically significant. **Discussion:** The association of dietary factors with HDP could be explained by several factors. One being the high-calorie intake by women with known HDP and those without HDP. The imbalance between the energy intake and expenditure is a potential risk factor and leads to overweight or obesity. **Conclusion:** The consumption of additional salt in the diet, visible fat, and obesity was found to be associated with HDP in our study.

Keywords: Diet, hypertension, preeclampsia, pregnancy, pregnancy-induced

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Introduction

Pregnancy is a physiological process in which a pregnant mother experiences anxiety, happiness, excitement, and fear altogether during pregnancy. Pregnancy is a positive, fulfilling experience for many, but it can put the mother at the risk of suffering ill-health, disability, or even maternal death.^[1] The common causes of maternal death include pregnancy-induced hypertension (PIH) or gestational hypertension, post-partum hemorrhage (PPH), and pulmonary embolism.^[2] “PIH is the development of hypertension in pregnant women who have never been hypertensive before but develop new-onset hypertension after 20 weeks of gestation without other preeclampsia signs. The pregnant women should have blood pressure (Systolic Blood Pressure (SBP) \geq 140 mmHg and Diastolic Blood Pressure (DBP) \geq 90 mmHg) on two separate occasions at least 6 h apart.”^[3]

Besides pharmacological treatment for PIH, modifications in lifestyle and diet have been widely advocated as a cost-effective strategy and with a massive potential to prevent PIH in the first place. Interventions like weight loss regimens, reduced salt intake, restraining from alcohol consumption, potassium supplementation, and changed dietary patterns are some proven and successful strategies in this area.^[4] “dietary approaches to stop hypertension” (DASH) or DASH diet is one of the most well-known nutritional plans to lower blood pressure among normotensive people or those with known hypertension.^[5,6] In many randomized control trials, a DASH diet rich in vegetables and fruits and low in saturated and total fats has been tried on individuals with obesity, hypertension, and diabetes mellitus with consistent results.^[7,8] Over many years, scientists have intense shreds of evidence for macronutrients’ effectiveness in achieving weight loss. For that reason, they have proposed to manipulate macronutrients like carbohydrates, proteins, and fats in the diet for improving the lipid profile and complement weight-loss strategies.^[9] However, on the other side, micronutrients like sodium play a vital role in the normal functioning of the human body but have been associated with causing hypertension.^[10] Sodium as table salt is an integral part of many foods and beverages, and more specifically food habits and culture context dictate how much sodium intake we use.^[11] A DASH diet with lower sodium content was found to have more significant effects on the individual’s blood pressure than a high sodium-containing DASH diet hovering a query among researchers of whether concurrent potassium consumption can be a cause for such findings.^[12] It has also been reported that supplementation of potassium to hypertensive patients on high salt-rich diets has substantially reduced blood pressure.^[13] It is quite clear from the above discussion that the dietary approach to maintaining blood pressure to optimum has a vital role in developing strategies for health promotion specific to cardiovascular health. Many cultural, societal, and commercial interests are barriers to an individual who tries to adopt and follow such a diet pattern as the DASH diet. The scope of exploring the role of dietary factors in preventing HDP is immense. Considering this background, the present study was carried out with the main objective to assess

the role of dietary factors in hypertension among the antenatal mothers attending a teaching hospital for their routine checkups. This study’s results can create awareness and bring behavioral changes among pregnant women regarding diet in the prevention of hypertension in pregnancy.

Materials and Methods

The study was a cross-sectional study conducted at the obstetrics and gynecology department in a teaching hospital. The study duration was 1 year, and the Institutional Ethics Committee granted the ethical clearance for this study. Pregnant women who were attending the antenatal clinic and diagnosed with hypertension in pregnancy and normotensive before the pregnancy were included in the study. As per the protocol, informed written consent, demographic details with clinical data were obtained from the patients.^[14] Pregnant women who were mentally incompetent or those who were not able to communicate properly due to the seriousness of their illness were excluded from the study.

The blood pressure of the included participants was taken using a non-mercury sphygmomanometer with the required cuff size measurements while they were in a sitting position. The measurement was taken as per SOP. Our sample size was 225. It was calculated using the formula “ $n = 4PQ \times N/L \times L \times N - 1 + 4PQ$

P = Prevalence of HDP,

L = allowable error,

N = total population (6,000)”

These 225 hypertensive pregnant women were included as the study subjects to study the risk factors associated with hypertension in pregnancy. A total of 225 antenatal cases having hypertension in pregnancy were included in our study. Data were entered in a Microsoft Excel spreadsheet to organize and tabulate data for statistical analysis. SPSS 17 version was used for statistical analysis. The Chi-square test was used for qualitative data and various other tests were used appropriately wherever deemed necessary.

Results

The demographic details has been described in the [Table 1]. In the present study, it was observed that a majority of the study subjects 184 (81.8%) were mixed in their dietary habits followed by 41 (18.2%) vegetarians [Table 2].

We found that 113 (50.2%) of the cases used to add salt in their diet, 57 (25.3%) of them take visible fat in their diet, 217 (96.4%) of them used to take tea while 119 (52.9%) of them used to consume junk food (high salt and high sugar) [Table 3].

In the present study, it was observed that 8 (3.6%) did not consume tea. Among the rest 117 subjects who consumed tea,

a majority of the subjects 133 (59.1%) consumed two cups of tea daily followed by 61 (27.1%) subjects who consumed three cups of tea daily while 15 (6.7%) subjects consumed four or

more cups of tea daily, and 8 (3.6%) subjects consumed one cup of tea [Table 4].

Table 1: Sociodemographic characteristics of the study participants

Sociodemographic Characteristics		n (%)
Age (Years)	<19	16 (17)
	20-35	183 (72)
	≥35	26 (11)
Education	Illiterate	25 (11)
	Primary	47 (21)
	Higher Secondary	110 (49)
	Intermediate	25 (11)
Occupation	Graduate and above	18 (8)
	Homemaker	189 (84)
	Laborer	13 (6)
	Business	19 (8)
Family	Job	4 (2)
	Nuclear	128 (57)
	Joint	88 (40)
Socioeconomic Status	3 Generations	9 (4)
	Upper class	5 (2)
	Upper middle	33 (15)
	Lower middle	72 (32)
	Upper lower	112 (50)
	Lower	3 (1)

Table 2: Distribution of study subjects according to diet

Diet	n (%)
Vegetarian	41 (18.2)
Mixed	184 (81.8)
Total	225 (100)

Table 3: Distribution of study subjects according to dietary pattern

Hypertension		n (%)
Additional salt intake (n=225)	Yes	113 (50.2)
	No	112 (49.8)
Visible fat intake (n=225)	Yes	57 (25.3)
	No	168 (74.7)
Tea intake (n=225)	Yes	217 (96.4)
	No	8 (4.4)
Junk food consumption (n=225)	Yes	119 (52.9)
	No	106 (47.1)

Table 4: Distribution of study subjects according to the number of cups of tea consumed daily

No. of cups of tea consumed	Frequency
0	8 (3.6)
1	8 (3.6)
2	133 (59.1)
3	61 (27.1)
≥4	15 (6.7)
Total	225 (100)

In the present study, it was observed that among the 225 study subjects, 106 (47.1%) did not consume junk food. Among the rest who consumed, a majority 62 (27.6%) of the subjects consumed for less than 2 days per week; 37 (16.4%) subjects consumed junk food for 2–3 days per week, and 20 (8.9%) consumed junk food for 4 or more days per week [Table 5]. Although the term junk food was used, it does not imply high-cost food items. The junk food consumed was mostly street food available at low cost [Figure 1].

Among the 41 vegetarian study subjects with hypertension in pregnancy, the maximum subjects (73.1%) had preeclampsia followed by gestational hypertension (23.6%). Among the 184 subjects with a mixed diet, the maximum subjects (64.6%) had preeclampsia followed by those with gestational hypertension (17.2%). The relation between the type of diet and different types of hypertension in pregnancy was found to be statistically insignificant (P value > 0.05) [Figure 2].

Among the 57 study subjects who consumed visible fat, the maximum subjects (77.1%) had preeclampsia followed by chronic hypertension (10.5%). Among the other group of 168 subjects who did not consume visible fat, a majority (61.9%) of the subjects had preeclampsia followed by those with gestational hypertension (22.0%). The relation between visible fat consumption and various types of hypertension in pregnancy was found to be statistically significant after applying the Chi-square test (P value < 0.05).

Discussion

Our study found that dietary factors are an essential predictor of hypertension during pregnancy. The dietary factors play an important role and have been suggested to play a pivotal role in the prevention of HDP including preeclampsia, but inconsistent findings have been reported. In our study, we found that most of the antenatal mothers were taking mixed food (vegetarian and non-vegetarian) in their diet. In addition to this, we found that nearly half of the study subjects were adding

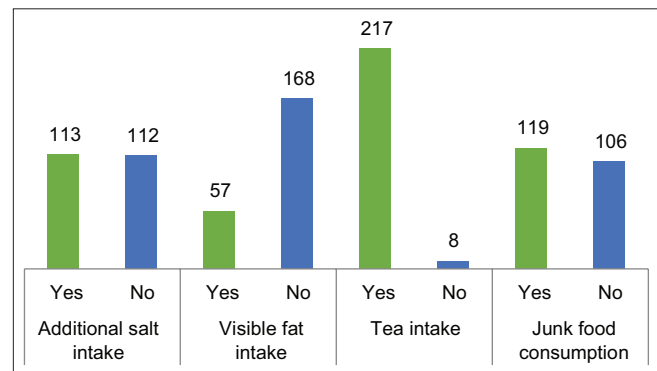


Figure 1: Relationship between dietary habit of subjects and types of hypertension in pregnancy. *Figures in parenthesis indicates percentage. Chi-square value = 3.384 dF = 3 Sig P = .336

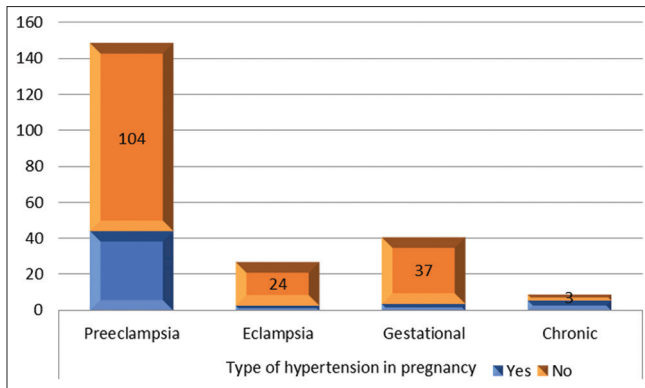


Figure 2: Relationship between visible fat consumption of subjects and types of hypertensions in pregnancy. *Figures in parenthesis indicate percentage. Chi-square value = 17.788 dF = 3 Sig P = .000

salt to their diet and took junk food regularly. Although there is no convincing evidence available that stresses restricted salt usage during pregnancy, many studies have reported a high salt diet as a significant risk factor for developing hypertension in non-pregnant states. The risk of the development of conditions like PIH or preeclampsia is even greater when the pregnant mother has developed prehypertension or hypertension before the pregnancy. PIH contributes to the risk of developing hypertension later in life, and clinical entities like preeclampsia and PIH have also been linked to cardiovascular complications in many reported studies. A salt-restricted diet is quite helpful in achieving the desired blood pressure not only during pregnancy but across the lifecycle. It provides easily acceptable and cost-effective dividends to policymakers.^[15-21]

One-fourth of the study subjects in the current study had a common history of intake of visible fat from different sources of food and the majority of the study subjects consumed tea. Among the vegetarian study subjects with HDP, the maximum subjects had preeclampsia, followed by gestational hypertension. Among the study subjects with a mixed diet, a maximum had preeclampsia, followed by those with gestational hypertension. However, the relation between diet and different types of hypertensive pregnancy disorders was statistically insignificant.

A systemic review and meta-analysis found 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.^[22]

Among the study subjects who consumed visible fat, maximum subjects were diagnosed with preeclampsia, followed by chronic hypertension. The relation between visible fat consumption and various types of hypertension in pregnancy was statistically significant.

The association of dietary factors with HDP could be explained by several factors. One being the high-calorie intake by women with known HDP and those without HDP. The imbalance between energy intake and expenditure is a potential risk factor

Table 5: Distribution of study subjects according to the frequency of junk food consumption

Consumption rate	n (%)
(Do not consume)	106 (47.1)
< 2 days/week	62 (27.6)
2-3 days/week	37 (16.4)
≥4 days/week	20 (8.9)
Total	225 (100)

and leads to overweight or obesity and our study findings are consistent with this. Although this study has been conducted in a teaching hospital, the primary care physicians regularly encounter HDP cases. Most of them are easily preventable by simple interventions by nutritional counseling, nutritional profiling, and many more. Our study finds the same.

Although we conducted this study, there are several limitations to our research. First, our study was a cross-sectional study, so we were not able to infer the causal relationships between the dietary factors and HDP. As we know that HDP is multifactorial in origin, and to minimize confounding, randomized controlled intervention trials are warranted. To examine the range of dietary intake among the population, long-term controlled trials are to be conducted which is not an easy task and requires a lot of time and funding. Second, our sample size was small, so we cannot generalize our findings. Third, we have collected our data using the questionnaire method which is prone to errors like random and systematic measurement. The errors could attenuate the associations and may reduce the power to find any association. Fourth, HDP is a heterogeneous condition, and there might be etiological variations according to the severity and mode of onset between disorders; our present study was unable to capture these findings. Further prospective studies are required to provide an evidence base for developing preventive health strategies, mainly focusing on dietary factors during pre-pregnancy and early pregnancy.

Key points

1. In the current study, it was observed that nearly half of the antenatal mothers consumed extra salt in their routine diet.
2. One-fourth of the antenatal mothers used to take visible fat in their diet and nearly one-sixth were taking junk food on a regular basis.
3. Almost one-fourth were pre-obese or obese.
4. The relation between visible fat consumption and various types of hypertension in pregnancy was statistically significant.

Recommendations

1. Nutritional counseling in the OPD and education regarding healthy diets during pregnancy and afterward are required.
2. Dietary and exercise intervention as a health communication package among adolescent girls and young adult women would go a long way in avoiding HDP even among primigravida followed by other women.

Ethical clearance

Taken from Institute Ethical Committee.

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Conflicts of interest

There are no conflicts of interest.

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