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Gestational hypertension in relation to diet of women in Udaipur city

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A prospective study was conducted on one hundred pregnant women (free from any disease) aged between 20-40 years and having systolic blood pressure 140 mm Hg or higher and a diastolic blood pressure of 90 mm Hg or higher, after completing 20 weeks of gestation. Results revealed that majority of women were Hindu (85%), graduate (41%) and housewives (82%). Mean height, weight and BMI among the subjects were 153.28 cm, 59.6 kg and 23.9 kg/m^2, respectively. Information on blood pressure revealed that systolic blood pressure of majority of subjects (88%) was in range of 140-159 mm Hg (Stage 1), whereas 86 per cent subjects had diastolic blood pressure in Stage 1 (90-99 mmHg). Information on nutrient intake revealed that intake of fat 38.07 g/d), vitamin C (71.69 mg/d), sodium (5.21g/d) and folic acid (1.18 mg/d) was higher whereas energy (1118.71 Kcal/d), protein (34.37g/d), carbohydrate (159.71g/d), fibre (5.23g/d), calcium (504.06mg/d), iron (10.13mg/d), β-carotene (1464.72 µg/d), thiamin (0.973mg/d), riboflavin (0.847mg/d), niacin (7.26mg/d), potassium (1155.45mg/d) and zinc (3.91mg/d) consumption was lesser compared to RDA. Correlation analysis between selected nutrients and blood pressure revealed that there was a negative correlation of protein with the diastolic blood pressure and potassium and calcium with the systolic blood pressure during pregnancy while sodium, folic acid and zinc were not significantly correlated with the blood pressure during gestational hypertension.

Key Words : Gestation, Hypertension, Toxemia, Odema, Diet

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INTRODUCTION

Gestational hypertension or hypertension during pregnancy is defined as a systolic blood pressure of 140 mm Hg or higher or a diastolic blood pressure of 90 mmHg or higher, occurs after 20 weeks gestation in previously normotensive women (Nadkarni *et al.,* 2001). It is the most common medical disorder which has been identified as a major world wide health problem, associated with increased perinatal morbidity and mortality. The frequency of hypertensive disorders of pregnancy have been found to be between 7-10 per cent (Waller, 2006). As a result of gestational hypertension, placental abruption (premature detachment of the placenta from the uterus), intrauterine growth restriction (poor fetal growth) and stillbirths may occur in some pregnancies. The most common symptoms of gestational hypertension are increased blood pressure, oedema, sudden weight gain, visual changes such as blurred or double vision (only in severe cases of gestational hypertension), nausea and vomiting, dizziness. To date, there is no known cause for pregnancy induced hypertension. It is thought that the condition may begin in early pregnancy, during embryo implantation.

Since the period of pregnancy is one of the most vulnerable periods for the deficiencies to occur, this can affect both mother and fetus and lead to various complications like malnutrition and gestational hypertension. Maternal undernutrition due to an insufficient food supply places a mother and her fetus at risk. Therefore, the study has been planned with the objectives to assess nutritional status of women suffering from gestational hypertension and to find out correlation of diet with the gestational hypertension.

METHODOLOGY

One hundred pregnant women aged between 20-40 years

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were selected purposively from Pannadhay Janana Hospital, a unit of Maharana Bhopal Hospital, Udaipur. Women who have completed 20 weeks of gestation, free from pre-existing hypertension and pre-eclampsia, having systolic blood pressure 140 mmHg or higher and a diastolic blood pressure of 90 mmHg or higher were selected. Willingness of women to participate in the study was assured. Information on personal particulars, obstetric history and on nutritional profile with respect to anthropometric measurements, diet and blood pressure was collected. Anthropometric measurements *viz.* height, weight was taken. Pre pregnancy weight was recorded by asking the subjects and BMI values obtained were interpreted as per classification by James *et al.* (1998). Blood pressure was estimated by using mercury sphygmomanometer, and values were interpreted as per classification given by Whelton, 1994. Dietary intake was obtained by 24 hours recall method and compared with the balanced diet and the nutrient content of diet calculated was compared with the RDA for pregnant women (ICMR, 1989) and WHO 1992 (Garrow and James, 1996).

OBSERVATIONS AND ASSESSMENT

The result of the present study have been discussed and presented under the following heads:

General information:

General information about the subjects revealed that majority of subjects (85%) was Hindu and belonged to nuclear families. Majority of selected women (41%) were graduates. About 82 per cent subjects were housewives and rest of the respondents was employed. Information on obstetric history (Table 2) revealed that the gestation period of 36 per cent of subjects was of 8 months and 42 per cent subjects were going to be first time mother. Complications of pregnancy reported by the women were oedema (48%), nausea and vomiting (25%), food aversions (5%), headache (20%) and problems like giddiness (2%). It was found that 8 per cent of subjects reported history of abortions or miscarriages while 92 per cent did not face any such problem (Table 1).

Anthropometry:

Nutritional anthropometry (Table 2) implicated that mean height, weight and BMI among the subjects were 153.28cm, 59.6 kg and 23.9kg/m^2, respectively. Majority of subjects were found to be normal with BMI ranging between 20-25 kg/m^2 while 31 per cent and 3 per cent were suffering from obesity grade I and II, respectively. An insignificant per cent (4%) of women were suffering from chronic energy deficiency grade III while 13 per cent subjects were chronic energy deficient grade I. Risk of gestational hypertension increases with increase in body mass index (Bodnar *et al.,* 2005).

Table 1. Per cent distribution of subjects by their obstetric history and complications of pregnancy (n=100)

Information	Percentage of subjects
Month of pregnancy	
Sixth	17
Seventh	30
Eighth	36
Ninth	17
Number of children	
Nulliparous	42
One child	25
Two children	22
Three children	11
History of abortion or miscarriages	
Faced the problem	8
Not faced the problem	92
Complications of pregnancy	
Oedema	48
Nausea, vomiting	25
Food aversions	5
Headache	20
Giddiness	2

Table 2: Percentage distribution of subjects in different classes of BMI (n=100)

BMI	Presumptive diagnosis	Per cent of subjects
<16.0	CED grade III	4
16.0- 17.0	CED grade II	-
17.0- 18.5	CED grade I	13
18.5- 20	Low weight normal	6
20- 25	Normal	43
25- 30	Obese grade I	31
> 30	Obese grade II	3

Blood pressure:

Table 3 revealed that systolic blood pressure of majority of subjects (88%) was in range of 140-159 mm Hg (Stage 1 hypertension) and only 1 per cent of subjects had systolic blood pressure of = 210 mm Hg (Stage 4 hypertension), whereas 86 per cent subjects had diastolic blood pressure in Stage 1 (90-99 mmHg) and 2 per cent of subjects had diastolic blood pressure of = 120 m Hg (Stage 4).

Diet profile:

Results on dietary intake (Table 4) revealed that diets of all subjects in comparison to balanced diet were substantially inadequate in cereals (143.44g/d), pulses (38.90g/d), milk and milk products (299.13ml/d), roots and tubers (86.23g/d), green leafy vegetables (76.33g/d), fats and oils (23.32g/d) and sugar

Table 3. Percentage distribution of subjects according to their blood pressure (n=100)

Blood pressure (mm Hg)	Percentage of subjects
Systolic blood pressure (mm Hg)	
Stage 1 (140-159)	88
Stage 2 (160-179)	8
Stage 3 (180-209)	3
Stage 4 (≥ 210)	1
Diastolic blood pressure (mm Hg)	
Stage 1 (90-99)	86
Stage 2 (100-109)	11
Stage 3 (110-119)	1
Stage 4(≥ 120)	2

Table 4. Mean daily intake of food by the subjects (n=100)

Food groups(g)	Balanced diet (g/d)	Mean ± SE	% of balanced diet
Cereal	350	143.44 ± 6.29	40.98
Pulses	60	38.90 ± 4.10	64.83
Green leafy vegetables	150	76.33 ± 8.98	50.88
Roots and tubers	100	86.23 ± 6.33	86.23
Other vegetable	75	110.15 ± 7.24	146.86
Fruits	100	102.19 ± 11.74	102.19
Milk and products	325	299.13 ± 20.63	92.04
Fats and oils	30	23.32 ± 0.78	77.73
Sugar and jaggery	40	17.87 ± 0.82	44.67

Table 5. Mean values of per day nutrient intake by the subjects

Nutrients	RDA	Mean ± SE	% of RDA
Energy (kcal/d)	2175*	1118.71 ± 21.35	51.43
Protein (g/d)	65*	34.37 ± 0.837	52.87
Fat (g/d)	30*	38.07 ± 0.955	126.9
Carbohydrate (g/d)	200*	159.71 ± 3.79	79.85
Fiber (mg/d)	40*	5.23 ± 0.178	13.075
Calcium (mg/d)	1000*	504.06 ± 22.25	50.40
Iron (mg/d)	38*	10.13 ± 0.28	26.65
β carotene (µg/d)	2400*	1464.72 ± 141.20	61.03
Thiamin (mg/d)	1.1*	0.973 ± 2.50	88.45
Riboflavin (mg/d)	1.3*	0.847 ± 2.97	65.15
Niacin (mg/d)	14*	7.26 ± 0.22	51.85
Vitamin C (mg/d)	40*	71.69 ± 4.92	179.22
Folic acid (µg/d)	400*	1000.18 ± 5.76	250.04
Sodium (mg/d)	3900**	5210.00 ± 178.30	133.58
Potassium (mg/d)	2000**	1155.45 ± 29.21	57.77
Zinc (mg/d)	15**	3.91 ± 0.11	26.06

*RDA by ICMR 1989. **RDA by WHO 1992 (Garrow and James, 1996)

(17.87g/d) whereas the intake of other vegetables (110.15g/d) and fruits (102.19g/d) was higher than the balanced diet.

Information on nutrient intake (Table 5) revealed that intake of energy (1118.71 kcal/d), fat (38.07 g/d), vitamin C (71.69 mg/d), sodium (5.21g/d) and folic acid (1.18 mg/d) was higher whereas protein (34.37g/d), carbohydrate (159.71g/d), fiber (5.23g/d), calcium (504.06mg/d), iron (10.13mg/d), β carotene (1464.72 µg/d), thiamin (0.973mg/d), riboflavin (0.847mg/d), niacin (7.26mg/d), potassium (1155.45mg/d) and zinc (3.91mg/d) consumption was lower when compared to RDA.

Correlation of nutrients with gestational hypertension:

Correlation analysis between selected nutrients and blood pressure (Table 6) revealed that there was a negative correlation of protein intake with the diastolic blood pressure and potassium and calcium intake with the systolic blood pressure during pregnancy. Calcium supplementation reduces the incidence of high blood pressure in pregnant women at high risk of pregnancy induced hypertension as well as pregnant women with low dietary calcium intake (Keshinro and Ijarotimi, 2008). Sodium, folic acid and zinc were not significantly correlated with the blood pressure during gestational hypertension. Studies have documented that a low sodium diet or increasing zinc intake in diet has not been shown to have a significant effect in reducing high blood pressure during pregnancy (Sonia *et al*., 2002).

Table 6. Correlation of nutrients with the blood pressure

Nutrients	Blood pressure Systolic B.P. Diastolic B.P.	
	(mm Hg)	(mm Hg)
Protein	0.170	-0.032
Sodium	0.018	0.193
Potassium	-0.142	0.064
Zinc	0.193	0.129
Calcium	-0.082	0.000
Folic acid	0.304	0.257

Conclusion:

Information on blood pressure revealed that systolic blood pressure of majority of subjects was in range of 140-159 mm Hg (Stage 1), whereas 86 per cent subjects had diastolic blood pressure in Stage 1 (90-99 mmHg). Nutrient intake revealed that intake of fat, vitamin C, sodium and folic acid was higher whereas energy, protein, fibre, calcium, iron, β carotene, thiamin, riboflavin, niacin, potassium and zinc consumption were lesser as compared to RDA. There was a negative correlation of protein with the diastolic blood pressure and potassium and calcium with the systolic blood pressure during pregnancy while sodium, folic acid and zinc were not significantly correlated with the blood pressure during gestational hypertension.

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