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GESTATIONAL HYPERTENSION IN RELATION TO DIET OF WOMEN IN UDAIPUR CITY

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ABSTRACT

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 was 153.28cm, 59.6 kg and 23.9kg/m² 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 percent 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 (1230.16 Kcal/d), protein (34.37g/d), carbohydrate (159.71g/d), fiber (5.23g/d), calcium (504.06mg/d), iron (10.13mg/d), β carotene (1464.72 μ g/d), thiamin (0.973mg/d), riboflavin (0.847mg/d), niacin (7.26mg/d), potassium (1155.45mg/d) and zinc (3.91mg/d) consumption were 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*

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) represent a group of conditions associated with high blood pressure during pregnancy, proteinuria and in some cases convulsions. The most serious consequences for the mother and the baby result from pre-eclampsia and eclampsia. These are associated with vasospasm, pathologic vascular lesions in multiple organ systems, increased platelet activation and subsequent activation of the coagulation system in the micro-vasculature (AbouZahr and Guidotti, 1998). 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 percent (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 (Conde-Agudelo and Beliza, 2000).

Several risk factors have been found to be associated with an increased risk of developing preeclampsia: the presence of type 1 diabetes, gestational diabetes, twin birth and obesity with BMI more than 29 (Ros *et al.*, 1998). The likelihood of progression from gestational hypertension to pre-eclampsia may be increased by a prior miscarriage (Saudan *et al.*, 1998; Lankoande *et al.*, 1997). A study on a large cohort

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of Latin American and Caribbean women identified the following risk factors for developing pre-eclampsia: nulliparity, multiple pregnancies, history of chronic hypertension, gestational diabetes, maternal age over 35 years, fetal malformation and obesity. Using the same source of data (the Latin American and Caribbean Perinatal System database) Conde-Agudelo et al. showed that inter pregnancy intervals longer than 59 months are associated with an increased risk of pre-eclampsia and eclampsia. 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.

METHODS

One hundred pregnant women aged between 20-40 years 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 measured thrice at different intervals 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 ;WHO 1992) (Garrow *et al.*, 1996).

RESULTS

General information

Table1: Percent distribution of subjects by their obstetric history and complications of pregnancy

Information	Percentage of subjects (n=100)
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

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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 percent subjects were housewives and rest of the respondents was employed. Information on obstetric history (Table-1) revealed that the gestation period of 36 percent of subjects was of 8 months and 42 percent 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 percent of subjects reported history of abortions or miscarriages while 92 percent did not face any such problem (Table1).

Anthropometry

Nutritional anthropometry (Table-2) implicated that mean height, weight and BMI among the subjects were 153.28cm, 59.6 kg and 23.9kg/m² respectively. Majority of subjects were found to be normal with BMI ranging between 20-25 kg/m² while 31per cent and 3per 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. It was found that risk of gestational hypertension increased with increase in body mass index.

Table 2: Distribution of subjects in different classes of BMI

BMI	Presumptive diagnosis	BMI (Mean + SD)	Percent subject (n=100)
<16.0	CED Grade III	15.2 ±0.002	4
16.0 – 17.0	CED Grade II		-
17.0- 18.5	CED Grade I	17.9 ±0.01	13
18.5- 20	Low weight normal	19.3±0.07	6
20- 25	normal	23.8±0.10	43
25- 30	Obese grade I	27.3±0.07	31
>30.0	Obese grade II	32.4±0.02	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 percent of subjects had systolic blood pressure of ≥ 210 mm Hg (Stage 4 hypertension), whereas 86 percent subjects had diastolic blood pressure in Stage 1 (90-99 mmHg) and 2 percent of subjects had diastolic blood pressure of ≥ 120 mm 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 (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

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(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.

Table 3: Distribution of subjects according to their blood pressure

Blood pressure (mm Hg)	Percentage of subjects (n=100)	Blood pressure (Mean ± SD)
Systolic blood pressure (mm Hg)		
Stage 1 (140-159)	88	145±10.3
Stage 2 (160-179)	8	169±3.8
Stage 3 (180-209)	3	191±5.1
Stage 4 (≥ 210)	1	235±0.0
Diastolic blood pressure (mm Hg)		
Stage 1 (90-99)	86	94±7.9
Stage 2 (100-109)	11	105±9.2
Stage 3 (110-119)	1	115±0.0
Stage 4(≥ 120)	2	136±1.2

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	t – value
Fat (g/d)	30 ^a	38.07 ± 0.955	126.9	0.179
Carbohydrate (g/d)	200 ^a	159.71 ± 3.79	79.85	0.075
Fiber (mg/d)	40 ^a	5.23 ± 0.178	13.075	0.027*
Calcium (mg/d)	1000 ^a	504.06 ± 22.25	50.40	0.063**
Iron (mg/d)	38 ^a	10.13 ± 0.28	26.65	0.034
β carotene (µg/d)	2400 ^a	1464.72 ± 141.20	61.03	0.215
Thiamin (mg/d)	1.1 ^a	0.973 ± 2.50	88.45	0.233
Riboflavin (mg/d)	1.3 ^a	0.847 ± 2.97	65.15	0.083
Niacin (mg/d)	14 ^a	7.26 ± 0.22	51.85	0.029**
Vitamin C (mg/d)	40 ^a	71.69 ± 4.92	179.22	0.043
Folic acid (µg/d)	400 ^a	1000.18 ± 5.76	250.04	0.541
Sodium (mg/d)	3900 ^b	5210.00 ± 178.30	133.58	0.216**
Potassium (mg/d)	2000 ^b	1155.45 ± 29.21	57.77	0.970*
Zinc (mg/d)	15 ^b	3.91 ± 0.11	26.06	0.324*

RDA^a by ICMR 1989, RDA^b by WHO 1992 (Garrow et al., 1996)

*p≤0.01, **p≤0.05

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Correlation of Nutrients with Gestational Hypertension

Correlation analysis between selected nutrients and blood pressure (Table-6) revealed that there was a negative correlation ($p \leq 0.01$) 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 significantly correlated with systolic 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	Systolic BP (mm Hg)	Diastolic BP (mm Hg)
Protein	0.170	-0.032*
Sodium	0.018*	0.193
Potassium	-0.142*	0.064
Zinc	0.193*	0.129
Calcium	-0.82*	0.000
Folic acid	0.324	0.257

Conclusions

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 percent 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, fiber, calcium, iron, β carotene, thiamin, riboflavin, niacin, potassium and zinc consumption was 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 diastolic blood pressure during gestational hypertension.

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REFERENCES

- AbouZahr C and Guidotti R (1998).** Hypertensive disorders of pregnancy. In: *Health dimensions of sex and reproduction: the global burden of sexually transmitted diseases, maternal conditions, perinatal disorders, and congenital anomalies*, edited by Murray, CJL and Lopez, AD (World Health Organization, Geneva) 90-92.
- Bodnar L, Ness R and Markovik N (2005).** Risk of gestational hypertension increases with increase in pre pregnancy body mass index. *Annals of Epidemiology* **15**(7) 475-482.
- Conde-Agudelo A and Beliza JM (2000).** Risk factors for pre-eclampsia in a large cohort of Latin American and Caribbean women. *British Journal Of Gyneacology* **107**(1) 75-83.
- Garrow JS and James WP (1996).** Dietary reference values. *Human nutrition and dietetics* **9**(1) 792-794.
- ICMR (1989).** Recommended Dietary intake for Indians, Indian Council of Medical Research, New Delhi.

Research Article

James, WPJ, Ferro, LA and Waterlow, JC (1988). The definition of chronic energy deficiency in adults: Report of working party of the intervention dietary energy consultation group. *European Journal of Clinical Nutrition* **42**(7) 969-972.

Keshinro O and Ijarotimi OS (2008). Nutritional knowledge, nutrients intake and nutritional status of hypertensive patients in Ondo State, Nigeria. *Tanzania Journal of Health Research* **10**(2) 59-67.

Lankoande J, Ouedraogo A and Ouedraogo CM (1997). Gynecology-obstetrics at the YalgadoOuedraogo National Hospital Center. Eclampsia: epidemiologic, clinical and prognostic aspects. *Santé* **7**(4) 231-5.

Majhi AK, Mondal A and Mukherjee GG (2001). Safe motherhood - a long way to achieve. *Journal of Indian Medical Association* **99**(3) 132-137.

Nadkarni J, Bahl J and Parekh P (2001). Perinatal outcome in Pregnancy Associated Hypertension. *Indian Pediatrics* **38**(2) 174-178.

Ros HS, Cnattingius S and Lipworth L(1998). Comparison of risk factors for pre-eclampsia and gestational hypertension in a population-based cohort study. *American Journal of Epidemiology* **147**(11) 1062-70.

Saudan P, Brown MA, Buddle ML (1998). Does gestational hypertension become pre-eclampsia? *British Journal of Obstetrics and Gynaecology* **105** 1177-84.

Sonia H, Werler MM, Louik C, Allen AM (2002). Risk of gestational hypertension in relation to folic acid supplementation during pregnancy. *American Journal of Epidemiology* **156**(3) 806-812

Waller R (2006). Gestational hypertension and/or pre-eclampsia: A rose by any othername.

Whelton PK (1994). Classification of Blood Pressure for adults of age 18 years or older. *Epidemiology of Hypertension* **344**(5) 101-106.