

HYPERTENSION AND ITS RISK FACTORS- A CROSS SECTIONAL STUDY IN RURAL AREA

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ABSTRACT

BACKGROUND

An elevated arterial pressure is probably the most important public health problem in developing & developed countries. Hypertension is the commonest cardiovascular disorder and one of the major risk factor for cardiovascular mortality.

MATERIALS AND METHODS

The present study was conducted in rural field practice area of the Department of Community medicine Katihar Medical College, Katihar. A sample of 500 families was selected by systematic sampling technique from all the families registered at Health Centre and all the persons aged 20 years and above residing in these families were selected for the purpose of the study.

RESULTS

In total 1680 study subjects, 602 persons (35.8%) aged 20 years & above were found to be hypertensive. It shows that hypertension increased with increasing age with peak in 60 + years category (65.6%). The prevalence was found to be 66.2% in persons with high salt intake and 31.2% and 20.3% respectively in average and low salt intake. The prevalence of hypertension was 40.3% in non-vegetarians and 34.7% among vegetarians. The prevalence was 48.4% in persons consuming saturated fats, 39.1% in those consuming unsaturated fats and 32.6% in both types of fat consumers. The prevalence of hypertension was 37.9% in those engaged in light physical activity while it was found to be 29.6% in moderate and 28.6% in heavy physical activity. It was found to be 91.2% in obese with while this was 23.4% and 18.9% respectively in normal and underweight. It showed that prevalence of hypertension was 38.3% in occasional, 40.0% in frequent and 73.1% in constant group and only 33.0% in group with no mental stress.

CONCLUSION

This study shows that the prevalence of hypertension was high in the subjects having low physical activity, High BMI and high saturated fat/salt intake and high level of mental stress.

KEYWORDS

Hypertension/BMI/Physical Activity/Saturated Fat/Unsaturated Fat.

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BACKGROUND

Worldwide, hypertension is estimated to cause 7.5 million deaths, about 12.8% of the total deaths. Hypertension accounts for 57 million disability adjusted life years (DALYS) or 3.7% of total DALYS.¹ High blood pressure is ranked as the third most important risk factor for attributable burden of disease in south Asia.² Hypertension (HTN) exerts a substantial public health burden on cardiovascular health status and healthcare systems in India. HTN is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India.³ High dietary salt intake presents a major challenge to the kidneys to

excrete large amounts of salt administered. One of the main organ systems vulnerable to the adverse effects of excessive sodium in the diet is the cardiovascular system. Excess dietary sodium predisposes to high BP.^{4,5} Vegetarians have a much lower prevalence of hypertension compared to meat eaters⁶ Hypertensive men reported higher dietary intakes of fat and salt and hypertensive women reported higher dietary intakes of protein and salt than normotensive age-matched men and women, respectively. The findings reported high intake of fat, protein and salt to the risk factors for Hypertension in India.⁷ An increase in BMI was significantly associated with increased SBP and DBP.⁸ Physical activity is commonly recommended as an important lifestyle modification that may aid in the prevention of hypertension. Recent epidemiologic evidence has demonstrated a consistent, temporal, and dose dependent relationship between physical activity and the development of hypertension.^{9,10} Stress can cause hypertension through repeated blood pressure elevations as well as by stimulation of the nervous system to produce large amounts of vasoconstricting hormones that increase blood pressure.

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Factors affecting blood pressure through stress include white coat hypertension, job strain, race, social environment, and emotional distress. Furthermore, when one risk factor is coupled with other stress producing factors, the effect on blood pressure is multiplied. Overall, studies show that stress does not directly cause hypertension, but can have an effect on its development.¹¹

There is need to creating awareness regarding personal and dietary factors related to hypertension in community.

Objectives

The objectives of present study were (1) To know the prevalence of hypertension in a rural population aged 20 years and above (2) To study the risk factors associated with hypertension in rural population.

MATERIALS AND METHODS

The present cross sectional study was carried out in rural population of Katihar district with the objective of finding out the prevalence of hypertension in persons aged 20 years and above and to study the epidemiological factors influencing the disease.

The prevalence of hypertension in various studies comes out to be 6 to 10% in 20-60 age group.¹² Therefore by taking prevalence of 6% confidence level 95% with a relative precision of 20% the sample size was calculated by adopting the formula:

$$n = \frac{Z^2 \times P \times Q}{d^2}$$

Where Z = (Value of Z at 95 % = 1.96)

P = Prevalence

q = (100-P)

d = Probable error (absolute or relative precision).

By using 6% anticipated prevalence with 20% relative precision, following sample size was obtained for the study.

$$\begin{aligned} n &= \frac{(1.96)^2 \times 6 \times (100 - 6)}{20\% \text{ of } 6 \times 20\% \text{ of } 6} \\ &= \frac{3.84 \times 6 \times 94}{1.2 \times 1.2} \\ n &= 1504 \end{aligned}$$

According to NFHS-3 data.¹³ the average mean size of household in Bihar is 5.48 in rural areas. Considering the population below 20 years being approximately 50% and a family size of 6, a minimum sample of 500 families has been studied. The present study was conducted in rural population of Katihar comprising of 14,661 persons belonging to 1786 families at rural Health Centre, Hazipur,

which is the field practice area of the Department of community medicine, Katihar Medical College. Among 1786 families 500 families selected by systematic random sampling technique. In all 500 families comprised of 2694 individuals. The numbers of persons aged 20 years and above were 1986. Efforts were made to interview and examine all the 1986 eligible persons by making repeated visits to the families, however only 1680 (84.59%) could be interviewed and examined and the rest 306 (15.40%) could not be covered due to non-availability. The information was collected on a structured, pre-coded and pretested schedule. Data was analyzed using statistical package Epi Info 7.0 software. As this study did not involve any patients or patient's records, the institutional ethical committee intimated that ethical clearance was not required.

Salt intake was assessed with the help of salt measures used to take salt to mix in the food during cooking and additional salt added during eating.¹⁴

Individuals were grouped into 3 groups -

- Low salt Intake- One who does not add and never had added salt to cooked food at all and also avoids salty foods.
- Average salt Intake: One who adds salt to cooked food only if, after prior tasting found it insufficiently salty for the palate, and also eats salty foods.
- High Salt Intake: One who adds salt to cooked food routinely, as without prior tasting for degree of saltiness and prefers salty foods.

In the questionnaire the question was asked about type and frequency of saturated and unsaturated fat consumption as cooking medium. Among saturated fat consumption the option given was type of cooking oil subjects using i.e. palm oil, Coconut oil, Ghee, Butter, while among unsaturated fat the cooking medium primarily was Sunflower oil, Rice brawn oil and safflower oil.¹⁵

Physical activity was measured by occupation and Spare time activities.¹⁶

For stress assessment a short 4 item scale was made from (questions 2, 4, 5 and 10) Perceived Stress Scale- 10 item scale and PSS scores are obtained by reversing responses to the two positively stated items. (e.g., 0 = 2, 1 = 1, 2 = 0) 0 = Never 1 = Sometimes 2 = Often

Subjects who had a score of more than 4 were considered as having stress.

OBSERVATION AND RESULTS

In the present study the total sample size was 1680 (Male- 853 and Female- 827). The prevalence of hypertension in community was 35.8%. The prevalence of hypertension among male and female was 34.7% and 37.0% respectively.

Age (yrs.)	Study Population	Male		Study Population	Females		Study Population	Total	
		No.	%		No.	%		No.	%
20-24	102	10	9.8	97	02	2.1	199	12	6.0
25-29	82	17	20.7	99	09	9.1	181	26	14.4
30-34	113	25	22.1	100	17	17.0	213	42	19.7
35-39	95	29	30.5	101	27	26.7	196	56	28.6
40-44	108	37	34.3	76	34	44.7	184	71	36.6
45-49	91	39	42.9	83	47	56.6	174	86	49.4
50-54	93	44	47.3	85	50	58.8	178	94	52.8
55-60	95	41	43.2	97	67	69.1	192	108	56.3
60+	74	54	72.9	89	53	59.6	163	107	65.6
Total	853	296	34.7	827	306	37.0	1680	602	35.8

Table 1. Prevalence of Hypertension According to Age and Sex

Age: $\chi^2 = 276.41$, $df = 8$, $P < 0.001$.

The prevalence of hypertension was gradually increasing with age and maximum in 60+ age group which was statistically significant. The prevalence was more in female (37.0%) as comparison to male subjects (34.7%).

Salt Intake	Study Population		Hypertension	
	Number	Percentage	Number	Prevalence (%)
Low	158	9.4	32	20.3
Average	1250	74.4	390	31.2
High	272	16.2	180	66.2
Total	1680	100.0	602	35.8

Table 2. Salt Intake and Hypertension

$\chi^2 = 137.27$, $df = 2$, $P < 0.001$.

The prevalence of hypertension was found to be significantly higher in persons with high salt intake (66.2%) than those with average and low salt intake (31.2% and 20.3% respectively). The difference was found to be statistically significant. ($P < 0.001$).

Type of Diet	Study Population		Hypertension	
	No.	%	No.	Prevalence (%)
Vegetarian	1467	87.3	509	34.7
Non-Vegetarian	213	12.7	93	43.7
Total	1680	100.0	602	35.8

Table 3. Type of Diet and Hypertension

$\chi^2 = 6.50$, $df = 1$, $P = 0.01$.

A majority of study population were vegetarian (87.3%) with only 12.7% being non-vegetarians. It was found that the prevalence of hypertension was higher in non-vegetarians (43.7%) than vegetarians (34.7%) with a statistically significant difference. ($P < 0.05$).

Type of Fat Consumed	Study Population		Hypertension	
	No.	%	No.	Prevalence (%)
Saturated	318	18.9	154	48.4
Unsaturated	64	3.8	25	39.1
Both	1298	77.3	423	32.6
Total	1680	100.0	602	35.8

Table 4. Fat intake and Hypertension

$\chi^2 = 28.17$, $df = 2$, $P < 0.001$.

The prevalence of hypertension was found to be higher in persons consuming saturated fats (48.4%). While prevalence of hypertension was 39.1% in those consuming unsaturated fats and minimum (32.6%) in both type of fat consumers. This difference was found to be statistically significant ($p < 0.001$).

Body Mass Index (kg/m ²)	Study Population		Hypertension	
	No.	%	No.	Prevalence (%)
Underweight	583	34.7	110	18.9
Normal	744	44.3	174	23.4
Overweight	182	12.0	162	89.0
Obese	171	8.9	156	91.2
Total	1680	100.0	602	35.8

Table 5. Body Mass Index and Hypertension

$\chi^2 = 575.15$, $df = 3$, $p\text{-value} < 0.001$.

The prevalence of hypertension was found to be maximum in obese (91.2%). While the distribution was lower in normal and underweight (23.4% and 18.9% respectively). This difference of prevalence of hypertension with BMI was found to be statistically significant ($p < 0.001$).

Type of Physical Activity	Study Population		Hypertension	
	No.	%	No.	Prevalence (%)
Light	1267	75.4	480	37.9
Moderate	378	22.5	112	29.6
Heavy	35	2.1	10	28.6
Total	1680	100.0	602	35.8

Table 6. Physical Activity and Hypertension

$\chi^2=9.45$, $df=2$, $P<0.05$.

The prevalence of hypertension was higher in those engaged in light physical activity (37.9%) while it was found to be lower in those with moderate (29.6%) and heavy (28.6%) physical activity. This difference was found to be statistically significant. ($P<0.05$).

Level of Mental Stress	Study Population		Hypertension	
	No.	%	No.	Prevalence (%)
No stress	1180	70.2	389	33.0
Occasional	230	13.7	88	38.3
Frequent	218	12.9	87	40.0
Constant	52	3.1	38	73.1
Total	1680	100.0	602	35.8

Table 7. Mental Stress and Hypertension

$\chi^2=22.5$, $df=3$, $P<0.001$.

The prevalence of hypertension was higher in occasional (38.3%), frequent (40.0%), and constant (73.1%) groups as compared to no mental stress (33.0%) and this difference in prevalence of hypertension in relation to mental stress was statistically significant ($P<0.001$).

DISCUSSION

In this study also prevalence of hypertension was 35.8 % which was gradually increasing with age and maximum in 60+ age group. The result can be compared with study conducted by Gupta R. and Thankappan KR.¹²

Males have shown lower prevalence of HTN (34.7%) compared to females (37.0 %). Finding of our study can be compared by studies done by Malhotra P.¹⁷ in North India and Joseph A.¹⁸ in Trivandrum showed the prevalence in females to be higher than males.

In this study also the prevalence of hypertension was found to be significantly higher in persons with high salt intake. The finding can be compared by study done by Hazarika NC.⁵ in tea garden workers of Assam.

Our study showed a significant association between diet and hypertension. This finding was consistent with findings of Rouse IL.⁶ which also showed low prevalence of hypertension among vegetarians.

In this study this was found that higher intakes of cholesterol and saturated fat are associated with increased prevalence of hypertension. Similar to this study, a study done by Kodali V.⁷ also showed a significant association between dietary pattern and hypertension.

The present study showed BMI as strong predictor of blood pressure, the finding similar to study done by Kumanyika et al¹⁹

Our study showed that physical inactivity is significantly associated with hypertension. Studies done by Brook RD.⁹ and Chobanian AV showed the similar association between physical activity and hypertension.

Our study has shown a significant association between hypertension and stress. In a study conducted by Yadlapalli

S Kusuma in 2009 on Perceptions on hypertension among migrants in Delhi, City life has been perceived as a major predisposing factor for developing hypertension. City life has been corroborated with pollution and adulteration of food, high fat diet along with physical inactivity and stress.²⁰

CONCLUSION

There is association between various dietary and personal factors and prevalence of hypertension. There was a significant association between age, sex, salt intake, fat consumption, diet and prevalence of hypertension. Personal factors i.e. Body mass Index, Low physical activity and high stress were also associated with high prevalence of hypertension. There is need of creating awareness regarding personal and dietary factors associated with hypertension. Practice of art through mental relaxation through our traditional teachings like yoga and meditation has to be promoted. This might help in bringing down the stress in our daily lives.

Strength

The strength of the study was that it was a population based cross-sectional study to find the prevalence and risk factors related to hypertension among population above 20 years of age in rural area. The sample size was large and bias was taken care of by random sampling. In the present study an attempt was made to increase the knowledge and awareness level regarding personal and dietary factors associated with hypertension.

Limitations

In spite of the best efforts to convince all the study subjects to participate in the study, 306 (15.40%) study subjects did not cooperate. There was difficult to convince some of the subjects to cooperate in the study and also at time members were not present at their houses so alternative persons had to be put in place which required more time.

Recommendations

Non communicable disease like hypertension has gained rapid momentum in both rural and urban population. It was against this background that the present study was undertaken with aim to study the prevalence of hypertension and its associated risk factors. Salt consumption should be curtailed in the diet as it strongly influences the blood pressure and for it proper education should be provided to people. Proper precautions should be taken to check the excess growth of body weight. It is advisable to control it before it grows uncontrolled. People should be encouraged to undertake regular physical exercise and should avoid sedentary lifestyle. Mental stress should be controlled by either change in lifestyle or by undertaking yoga or meditation exercise.

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