

ORIGINAL ARTICLE

Prevalence of hypertension and its association with stress, Indian diabetes risk score and obesity in rural population of Meerut

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Abstract

Background: The prevalence pattern of hypertension in developing countries is different from that in the developed countries. In India, community surveys have documented that between three and six decades, prevalence of hypertension has increased by about 30 times among urban dwellers and by about 10 times among the rural inhabitants. Many studies on hypertension are available from urban areas but there are less studies among the rural population. **Aim & objectives:** To determine the prevalence & correlates of hypertension among the adults in rural population of Meerut. **Settings and Design:** community based cross-sectional study conducted in rural Meerut. **Materials and Methods:** 150 participants were selected by systematic random sampling. Data was collected using a pre designed, structured schedule, including blood pressure and anthropometric measurement of participants. **Results:** The prevalence of hypertension came out to be 33.3%. In rural population high Indian Diabetes Risk Score (IDRS), higher Body Mass Index (BMI), increased Waist Hip Ratio (WHR), Truncal obesity and disturbed sleep were significantly associated with hypertension, **Conclusions:** a high prevalence of hypertension was seen in this rural area which requires intervention at primary health care level for its prevention.

Keywords

Hypertension; Rural; BMI; Truncal obesity

Introduction

WHO defines hypertension as 'a condition in which the blood vessels have persistently raised pressure, putting them under increased stress. (1) An epidemiological shift in the prevalence of hypertension in developing countries as compared to the developed countries has been observed. (2,3) Studies from India and Bangladesh have shown upward trend in the prevalence of hypertension.(4)

As hypertension is a direct risk factor for many cardiovascular diseases so it is important to know about its prevalence and risk factors in a community. India in particular has seen an increasing trend of hypertension since last few decades and this increase has been evident

in urban as well as rural populations of India. Community survey in India have documented that between 3-6 decades, prevalence of hypertension has increased by almost 30 times among urban dwellers and by about 10 times among rural inhabitants (5). Although hypertension prevalence is generally lower in rural Indian population in comparison to urban but there has been steady increase of hypertension overtime in the rural population as well (6)

Various factors might have contributed to this rising trend like changing life style, environment, diet, stress, industrialization and urbanization etc. The prevalence rate of hypertension also varies widely in rural India because of different social, economical and cultural background.

Aims & Objectives

1. To assess the prevalence of hypertension
2. To find out correlates of hypertension among the adults in rural population of Meerut

Material & Methods

Study Type & study area: It was a community based cross-sectional study. This study was conducted at village Khajuri in Kila Parikshitgarh block, Meerut.

Study Population: All the adults aged ≥ 18 years residing in the study area.

sample size Sample size was calculated by taking pooled prevalence in rural areas of north India as 14.5% (7) at 95% level of confidence and 6% absolute allowable error. It came out as 138 & final sample size worked out was 150.

Data collection: Data was collected, after taking informed written consent from the participants, using a pre-designed pre-tested structured schedule. For gathering the data a personal door to door visit was made to each household, selected using systematic random sampling technique. Sampling unit was a house hold and one individual ≥ 18 years of age from each household was selected randomly by lottery method. If no adult aged ≥ 18 years was found in a family or the selected house was found locked at the time of interview then adjacent house was visited.

Inclusion Criteria: Individuals who had completed 18 years of age at the time of data collection from the selected households

Exclusion Criteria: Subjects <18 years of age, who didn't give the consent, who were not found well oriented, residing in the area for <6 months, pregnant females, severely ill and bed ridden persons were excluded from the study.

Working Definition: Overweight and Obesity was defined as body mass index (BMI) $\geq 23\text{kg}/\text{m}^2$ and BMI $\geq 27.5\text{kg}/\text{m}^2$ respectively (8). Waist Hip Ratio of >0.95 for males and >0.85 for females was considered to indicate abdominal obesity.(9) Waist circumference of ≥ 100 cm for males and ≥ 90 cm for females was considered as truncal obesity.(9) Two consecutive readings was made for each site to the nearest 0.5cm using a non-stretchable fiber measuring tape on a horizontal plane without compression of skin. Participants with IDRS value of <30 were categorized as low risk, those with values between 30 and 50 as medium risk and those with score ≥ 60 as high risk for diabetes (10)

For hypertension JNC-VII criteria was used. A person was considered hypertensive if Systolic BP $\geq 140\text{mmHg}$ and/or diastolic BP $\geq 90\text{mmHg}$ or subject was currently taking anti-hypertensive treatment. Average of two BP readings taken at an interval of 5 minutes was calculated and finally recorded. All the subjects detected as hypertensive were referred to rural health and training center, Khajuri for further workup.

Ethical Approval: Ethical approval was taken from institutional ethical committee of Subharti Medical College, Meerut.

Statistical analysis: Data was analyzed using SPSS version 19. Categorical variables were expressed in frequency and percentages. Association between the variables were analyzed by applying chi-square & fisher exact test

Results

(Table 1) In present study, the prevalence of hypertension came out to be 33.3% among the study subjects. Majority of participants had either no or mild stress while only 18.7% participants were having high stress. 26.7% participants were having very high IDRS and very few were having low IDRS. According to BMI, 24.7% participants were overweight and 22.0% were obese. Truncal obesity was present only in 27.3% of participants but 42.7% participants were having deranged WHR.

Table 2 shows socio demographic characteristics of non-hypertensive and hypertensive groups. The association of hypertension status was found to be statistically significant with increasing age, gender and education. There was no significant association found between hypertension and marital status, occupation, type of family and Socio Economic Status of the participants.

According to (Table 3), there was increase in the prevalence of hypertension with increase in stress level, but this association between stress level and hypertension status was not found to be significant. Increasing trend of hypertension was also seen with disturbed sleep and this association was found to be significant. Participants with low/moderate IDRS had less hypertension when compared with participants with high IDRS. There was a significant association seen between hypertension status and IDRS. Similarly, participants having normal BMI were less hypertensive as compared to participants who were overweight or obese. There was a significant association seen between BMI and hypertension status. Participants with normal WHR had less hypertension when compared with participants with deranged WHR, there was a significant association seen between hypertension status and WHR. Association between truncal obesity and hypertension status was also found to be significant.

Discussion

The prevalence of hypertension in our study came out to be 33.3%. In a systematic review on hypertension, in India overall prevalence of hypertension came out to be 29.8% while prevalence for hypertension in rural parts was 27.6%. Regional estimates for prevalence of hypertension in rural north-India was 14.4%. (7) Clearly prevalence in our study was closer to overall prevalence of hypertension in India rather than to rural north. This difference could be due to the fact that in Meerut villages are more developed when compared to other rural areas of north India.

Association of hypertension status was found to be statistically significant with age and gender. Other studies also showed significant association of prevalence of hypertension with age and gender. (6,7,11) It is clear that with increasing age progressive rise of blood pressure is seen.

There was a clear-cut increase in a prevalence of hypertension with increase in stress level, but this association between stress level and hypertension status was not found to be significant. There are not many studies regarding association of subjective stress with hypertension in India but some indirect links can be found. A review article by R. Gupta also states that psychosocial stress is an important environmental factor in hypertension. (6) Increasing trend of hypertension was also seen with disturbed sleep and this association between disturbed sleep and hypertension status was found to be significant. Participants with low/moderate IDRS had less hypertension when compared with participants with high IDRS. There was a significant association seen between hypertension status and IDRS. Studies by M Singh(12) and by S. Yadav et al(13) also show that subjects with glucose intolerance have greater risk of hypertension.

In our study there was a significant association seen between BMI and hypertension status. Participants with normal WHR had less hypertension when compared with participants with deranged WHR, there was a significant association seen between hypertension status and WHR. Association between truncal obesity and hypertension status was also found to be significant. This was in accordance with study by M Singh (12), by S Das et al (11), by S. Yadav et al (13), and by J Kishore et al (14)

Conclusion

In the present study prevalence of hypertension came out to be 33.3%. Association of hypertension status came out to be highly significant with age and gender. Association between disturbed sleep, IDRS, BMI, WHR and truncal obesity was also found to be statistically significant with hypertension status.

Recommendation

The observed prevalence of hypertension in this study (and other studies as well) suggest strong need of nationwide policies towards prevention and control of hypertension in India. These policies could include health education, life style changes, stress management and control of insulin resistance etc.

Limitation of the study

This study was conducted in smaller sample size so study with larger sample is needed to generalize the results and

any causal association cannot be derived from the present cross-sectional study design. Participants were labelled as hypertensive by single day blood pressure reading only.

Relevance of the study

This study highlights the need of awareness generation about hypertension, life style changes and stress management.

Authors Contribution

MG: Contributed in all the process of study. RB & MG: Involved in all the process of study. CKG: Involved in data analysis, manuscript editing.

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Tables

TABLE 1 DISTRIBUTION OF HYPERTENSION STATUS, STRESS LEVEL, INDIAN DIABETES RISK SCORE AND OBESITY AMONG THE PARTICIPANTS

Variable	Group	Frequency	Percentage(%)
Hypertension Status	Non-Hypertensive	100	66.7%
	Hypertensive	50	33.3%
Stress Level	Normal	21	14%
	Mildly Stressed	101	67.3%
	Highly Stressed	28	18.7%
IDRS (Indian Diabetes Risk Score)	Low Risk	9	6.0%
	Moderate Risk	101	67.3%
	Very High Risk	40	26.7%
BMI Cut- Off	Underweight	24	16%
	Normal Weight	56	37.3%
	Overweight	37	24.7%
	Obese	33	22%
Truncal Obesity	Absent	109	72.7%
	Present	41	27.3%
Waist Hip Ratio	Normal	86	57.3%
	Deranged	64	42.7%
Total		150	100%

TABLE 2 ASSOCIATION OF HYPERTENSION WITH SOCIODEMOGRAPHIC CHARACTERISTICS

Variable	Group	Hypertensive status						P value
		Non-Hypertensive		Hypertensive		Total		
		No.	%	No.	%	No.	%	
Age	<40 years	70	84.3%	13	15.7%	83	100%	<0.001
	41-50 years	9	56.3%	7	43.8%	16	100%	
	51-60 years	18	60.0%	12	40.0%	30	100%	
	>60 years	3	14.3%	18	85.7%	21	100%	
Gender	Male	51	75.0%	17	25.0%	68	100%	0.049
	Female	49	59.8%	33	40.2%	82	100%	
Religion	Hindu	24	61.5%	15	38.5%	39	100%	0.430
	Muslim	76	68.5%	35	31.5%	111	100%	
Marital status	Married	82	67.2%	40	32.8%	122	100%	0.767
	Unmarried/widow	18	64.3%	10	35.7%	28	100%	
Education	Illiterate / just literate	27	46.6%	31	53.4%	58	100%	<0.001
	Primary/middle school	23	76.7%	7	23.3%	30	100%	
	High school or above	50	80.6	12	19.4%	62	100%	
Occupation	Unemployed	6	42.9%	8	57.1%	14	100%	0.117
	Farmer/agriculture	31	73.8%	11	26.2%	42	100%	
	Service /business	12	80.0%	3	20.0%	15	100%	
	Housewife/student	51	64.6%	28	35.4%	79	100%	
Type of family	Nuclear family	21	70.0%	9	30.0%	30	100%	0.665
	Joint family	79	65.8%	41	34.2%	120	100%	
Socio economic status	SES class I/II	35	59.3%	24	40.7%	59	100%	0.229
	SES class III	31	75.6%	10	24.4%	41	100%	
	SES class IV/V	34	68.0%	16	32.0%	50	100%	
Total		100	66.7%	50	33.3%	150	100%	

TABLE 3 ASSOCIATION OF HYPERTENSION WITH STRESS LEVEL, DISTURBED SLEEP, INDIAN DIABETES RISK SCORE AND OBESITY

Variable	Group	Hypertensive status						p value
		Non-Hypertensive		Hypertensive		Total		
		No.	%	No.	%	No.	%	
Stress Level	Normal	16	76.2%	5	23.8%	21	100%	0.208
	Stressed	69	68.3%	32	31.7%	101	100%	
	Highly Stressed	15	53.6%	13	46.4%	28	100%	
Disturbed sleep	Never	59	74.7%	20	25.3%	79	100%	0.030
	Sometimes	31	63.3%	18	36.7%	49	100%	
	Often/ always	10	45.5%	12	54.5%	22	100%	
IDRS	Low Risk / Moderate Risk	83	75.5%	27	24.5%	110	100%	<0.001
	Very high risk	17	42.5%	23	57.5%	40	100%	
BMI Cut- Off	Normal Weight	58	72.5%	22	27.5%	80	100%	0.034
	Overweight	24	64.9%	13	35.1%	37	100%	
	Obese	18	54.5%	15	45.5%	33	100%	
Waist Hip Ratio	Normal	66	76.7%	20-	23.3%	86	100%	0.002
	Deranged	34	53.1%	30	46.9%	64	100%	
Truncal Obesity	Absent	83	76.1%	26	23.9%	109	100%	<0.001
	Present	17	41.5%	24	58.5%	41	100%	
Total		100	66.7%	50	33.3%	150	100%	