### **Research Article**

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# The study of social-demographic and other determinants of hypertension in a rural population of North India, Delhi, India

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#### **ABSTRACT**

**Background:** Hypertension is emerging as a major public health problem in India and also increasing in rural population.

**Methods:** The Community based Cross-sectional study was carried out during the year 2014 in rural area of Delhi, with the objectives to estimate the prevalence of Hypertension and to identify associated socio-demographic and other determinants

**Results:** Prevalence of Hypertension in rural population was found to be 21.2%; in men was 23.1% and in women it was 19.2% in the population age 20 years and above. Age, BMI, high salt-Intake, alcohol consumption, family history of hypertension was found to be significantly associated with hypertension.

**Conclusions:** Based on high prevalence, it is recommended that a basic protocol for screening of hypertension should be made for rural population which can be used for prevention, early diagnosis, and for prevention of complications.

Keywords: Hypertension, Prevalence, Socio demographic factors, Rural, Delhi

#### INTRODUCTION

The rapid economic growth in India is accompanied by demographic, lifestyle and cultural changes affecting the health profile of its citizens. There is a strong correlation between changing lifestyle factors and increase in hypertension in India. The overall prevalence is lower in rural India 3.4% in men and 6.8% in women. Hypertension is a controllable disease and it has been reported that decrease in people with hypertension are expected to produce large reductions in the burden of cardiovascular disease.

By making World Health Day, 2013 theme about Hypertension World Health Organization (WHO) aims to make people to aware of the need to know their blood pressure to take high blood pressure seriously and then to take control.<sup>5</sup> Accurate estimation of hypertension are therefore necessary to plan effective control measures.

So, it becomes imperative to detect hypertension at the earliest, so as to prevent its complications. With this backdrop it was planned to find out the prevalence of hypertension and associated socio-demographic and other determinants.

#### **METHODS**

A community based cross-sectional study carried out between January to December 2014 in the village Barwala of North West Delhi. This area was selected as it is a rural field training center (RFTC) catered by the Department of Community Medicine, Maulana Azad Medical College (MAMC). Taking into consideration the prevalence of hypertension in earlier study which was 17% and taking relative error as 20%.

The sample size required for study was 488. To get the estimated sample size a systematic random sampling was

done and every third house was selected; and from each selected house all eligible individuals aged 20 years and above were included in the study. Overall, a total of 580 subjects were included in this study. The purpose of this study was explained to each subject in the local language (Hindi) before conducting the study. A written and informed consent was taken.

Questionnaire was designed & validity of the questionnaire was assessed using the opinion of experts from our institute. A pilot study was carried out on 50 participant's s to test the reliability of the questionnaire. Unclear responses were modified to be easily understood by respondents with the help of inputs of experts from our institute.

Then subjects were interviewed using a predesigned, pretested, semi structured questionnaire; containing items on: a) Identification data i.e. age, gender, educational status, socio- economic status of the person b) Risk factors for hypertension i.e. body mass index, obesity, occupation, smoking, alcohol, family history, dietary habits etc. Physical examination of the patient included measurement of blood pressure, anthropometric measurements like height and weight. For all these measurements, standard procedures were followed.<sup>7</sup>

Blood pressure of the person to detect hypertension was measured by digital sphygmomanometer after 5 min of complete physical rest. Two readings were taken, 5 min apart sitting in chair. Elevated blood pressure was confirmed by measuring in contra lateral arm. JNC VII recommendations were used for the measurement of blood pressure.

Modified B.J. Prasad classification was used for rural area socio economic class. Smokers were defined as a person who was currently smoking at least once in a day or one who had left smoking less than one year back. 9

Alcohol user was defined as currently consuming alcohol at least three times in a week or one who had left alcohol less than one year back. The salt intake was calculated by asking for the average monthly consumption of salt by whole family and dividing it by the number of persons in the family and then further dividing it by number of days in month to calculate the average daily intake in g/person/day.

The collected data was entered and analysed using SPSS-17 version. Qualitative data was expressed by the percentages and difference between the proportions was observed by chi square test or Fischer exact test. The study was approved by the ethical committee of institution.

#### **RESULTS**

A Community based Cross-sectional study was conducted in rural area of Delhi. A total 580 rural persons aged 20 years and above were included. Out of which 279 (48.1%) were men and 301 (51.9%) were women.

Out of 580 study subjects, overall prevalence of hypertension was found to be 22.4% (130) and pre hypertension was 17.1%. Among 130 diagnosed hypertensive only 33 (25.3%) were aware of their hypertension status. The remaining newly diagnosed and hidden cases 74.7% (97) were unaware of their status (Table 1).

Table 1: Prevalence of hypertension among study subjects.

Classification of Subjects	Males (N= 279) n (%)	Females (N= 301) n (%)	Total (N= 580) n (%)
Normal	175 (62.7)	176 (58.4)	351 (60.5)
Pre hypertension	39 (14.0)	60 (20)	99 (17.1)
Hypertension (Stage 1)	39 ( 14.0 )	43 (14.3)	82 (14.1)
Hypertension (Stage 2)	9 (3.2)	6 (2)	15 (2.6)
Known hypertensive#	17 (6.1)	16 (5.3)	33 (5.7)

<sup>#</sup> already diagnosed hypertensive and on treatment.

The prevalence of hypertension in males and females was 23.3% (65) and 21.6% (65) respectively. The age-wise distribution of study subjects along with prevalence in each group is shown in Table 2.

The prevalence of hypertension increased significantly with increasing age. The distribution of hypertension

among study subjects was different among different education status. Prevalence of hypertension was high among subjects who had studied up to primary 28.8%, and low in graduated subjects, and the difference between education groups was statistically significant.

According to occupation status the prevalence of hypertension was more among semi-skilled workers 26.9% and lower among skilled workers 19% and the difference between groups were statistically significant.

The difference was found statistically insignificant with regard to gender, marital status, type of family, socioeconomic status (p>0.05) as shown in (Table 2).

A significant higher prevalence of hypertension was found in those who were having positive family history of hypertension 32.4%, alcohol users 35.4%, non-

vegetarian 28.9% and in those who are consuming increased salt intake >8gm was 43.7%. There was tendency of increase in Blood Pressure with increasing BMI.

The association between prevalence of hypertension and BMI was statistically significant. Similarly, Prevalence of hypertension was significantly higher in sedentary/light workers 25.8% compared to moderate / vigorous workers 18.9%. The difference was found statistically insignificant with regard to smoking (p>0.05) as shown in (Table 3).

Table 2: Distribution of hypertension among study subjects according to demographic factors.

Variables	Hypertensive N= 130 n (%)	Non hypertensive N= 450 n (%)	Total N= 580 n (%)	p value
Gender				
Male	65 (23.3)	214 (47.6)	279 (48.1)	0.65
Female	65 (21.6)	236 (52.4)	301 (51.9)	
Age group (yrs)				
20 – 29	14 (11.2)	111 (88.8)	125 (21.6)	0.01*
30- 39	29 (18.5)	128 (81.5)	157 (27.1)	
40-49	27 (19.9)	109 (80.1)	136 (23.4)	
50-59	31 (35.6)	56 (64.4)	87 (15)	
60 and above	29 (38.6)	46 (61.4)	75 (12.9)	
Marital status				
Married	120 (23.6)	389 (76.4)	509 (87.8)	0.10
Others #	10 (14.1)	61 (85.9)	71 (12.2)	
Type of family				
Joint	73 (21.7)	264 (78.3)	337 (58.1)	0.60
Nuclear	57 (23.5)	186 (76.5)	243 (41.9)	
Educational status				
Illiterate	26 (26.2)	73 (73.8)	99 (17.1)	0.04*
Primary	30 (28.8)	74 (71.2)	104 (17.9)	
Middle school	25 (20.2)	99 (79.8)	124 (21.3)	
High school	32 (21.6)	116 (78.4)	148 (25.6)	
Diploma	9 (17.6)	42 (82.4)	51 (8.8)	
Graduate	4 (10.2)	35 (89.8)	39 (6.7)	
Professional	4 (26.7)	11 (73.3)	15(2.6)	
Occupation				
Unemployed	22 (21.6)	80 (78.4)	102 (17.6)	0.01*
Unskilled	16 (26.2)	45 (73.8)	61 (10.5)	
Semi-skilled	36 (26.9)	98 (73.1)	134 (23.1)	
Skilled worker	24 (19)	102 (81)	126 (21.7)	
Others \$	32 (20.4)	125 (79.6)	157 ( 27.1)	
Socioeconomic status @				
High	55 (16)	290 (84)	345 (59.5)	0.82
Low	75 (32)	160 (68)	235 (40.5)	

<sup>#-</sup> others includes Unmarried/ single/ widow/ divorcee; P values were calculated by applying the  $\chi 2$  test; \*p value <0.05; \$- others clerical/ shop owner/ farmer, semi profession, Profession; @- According to Modified B. J. Prasad classification. Class I, II and III, are grouped as High class, IV, and V were grouped as low class.

Table 3: Distribution of hypertension among study subjects according to risk factors.

Risk factors	Hypertensive N= 130 ( % )	Non-Hypertensive N= 450 (%)	Total N= 580( % )	p value			
Family history of hypertension							
Present	24 (32.4)	50 (67.6)	74 (12.8)	0.01*			
Absent	106 (20.9)	400 (79.1)	506 (87.2)				
BMI ( Body Mass Index)							
Underweight (< 18.49)	10 (15.7)	54 (84.3)	64 (12.7)	0.02*			
Normal (18.5-24.99)	54 (16)	284 (84)	338 (56.6)				
Pre obese/ Overweight (≥25- 29.99)	25 (26.6)	69 (73.4)	94(16.2)				
Obese (≥30)	29 (34.5)	55 (65.5)	84 (14.5)				
Smoking							
Yes	34 (24.6)	104 (75.4)	138 (23.8)	0.47			
No	96 (21.7)	346 (78.3)	442 (76.2)				
Consuming Alcohol							
Yes	35 (35.4)	64 (64.6)	99 (17.1)	0.002*			
No	95 (19.7)	386 (80.3)	481 (82.9)				
Physical activity							
Sedentary/ light work	76 (25.8)	218 (74.2)	294 (50.8)	0.01*			
Moderate / vigorous	54 (18.9)	232 (81.1)	286 (49.2)				
Dietary habits							
Vegetarian	93 (20.6)	359 (79.4)	452 (78.3)	0.004*			
Non vegetarian	37 (28.9)	91 (71.1)	128 (21.7)				
Daily Salt intake per person							
<6gm	50 (20.3)	359 (79.4)	246 (42.4)	0.002*			
6-8 gm	59 (20.6)	91 (71.1)	286 (49.3)				
>8 gm	21 (43.7)	359 (79.4)	48 (8.3)				

P values were calculated by applying the  $\chi$ 2 test; \*p value <0.05.

### **DISCUSSION**

The present study was conducted among adults to find out the prevalence of hypertension and associated socio demographic factors.

The overall prevalence of hypertension was 22.4%. The prevalence of hypertension was observed to be similar to the previous studies conducted in the rural population; among adults (≥ 30 years) in Central India (22.1%), among adults ( $\geq 20$  years) in Maharashtra (23%), and by Sathish et al among (15-64 years) in a rural area of Tamil Nadu in 2011 (23.6%). 10-12 The prevalence of hypertension in the previous studies conducted in the rural population by Todkar et al among adults in Maharashtra in 2009 observed a low prevalence 7.24%, Kokiwar in age group above 30 years in central India 19.4%. 13,14 Difference in prevalence of various studies observed may be because of variation in age group, geographical differences and lifestyle practices in the community. The higher prevalence of hypertension could be due to urbanization, sedentary lifestyle, physical inactivity and addictions like tobacco use and alcohol consumption.

In the present study, higher prevalence 38.6% was observed in 60 yrs and above age group. The association between higher age and hypertension had been reported by Shanthirani et al in south India. The present study showed a higher prevalence of hypertension in males 23.3% than females 21.6%, which was also similar to findings observed in the other studies like Meshram et al among adults (> 20 years) in Maharashtra in 2014, Kaur P et al in rural population of south India. The reasons for increased prevalence in males may be due their sedentary lifestyle, physical inactivity and addictions like tobacco use and alcohol consumption.

Prevalence of hypertension was significantly higher in subjects with family history of hypertension 32.4%. This is consistent with the findings from studies done by Rajashekar et al among adults (> 30 years) in Tamil Nadu, Todkar et al in Maharastra, Kaur P et al in a rural population of south India. 13,16,17 It is observed in the present study that prevalence of hypertension was significantly higher in obese persons 34.5% and overweight 26.6%. This positive association between obesity and hypertension was observed in other studies. 11,16-18

Present study showed that prevalence of hypertension was significantly higher in adults who led a sedentary lifestyle 25.8%. The positive association of physical activity and hypertension was similar to other studies. <sup>17-19</sup> Present study showed that prevalence of hypertension was higher among smokers 24.6% as compared to non smokers 21.7%. A study conducted by Pooja et al among adults also observed a similar positive association. <sup>18</sup>

The present study showed that the prevalence of hypertension was significantly higher among subjects consuming alcohol 35.3% compared to non alcoholics. Similar positive association was observed in a study conducted in Uttharkhand district by Saxena et al. <sup>19</sup>

Prevalence of hypertension was significantly higher in subjects consuming more than 8 gm/day of salt 43.7%. The findings were similar to study done by Saxena et al, Gosh et al in Bihar among adult population and Todkar et al among adults in Maharashtra<sup>15</sup> also found positive association between salt intake and hypertension. <sup>15,19,20</sup>

#### **CONCLUSION**

Overall prevalence of hypertension was 22.4%. Out of 130 detected hypertensive, only 25.3% were aware of their hypertension status. The remaining 74.7% were unaware of their status. Thus our study indicates the 'iceberg phenomenon' of hypertension amongst the study population. It is important for our health care delivery system to be proactive in using every opportunity to screen people for hypertension and counsel them about lifestyle modification and risk reduction. Healthy lifestyle changes like change in food habits in terms of reduction of salty and fatty food, promotion of balanced diet complemented by regular physical activity, and maintaining appropriate weight for age etc. should be promoted through behaviour change communications to reduce the prevalence of hypertension. Information education and counselling can help young people to avoid health risks.

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#### Authors' note

The study was conceptualized and its design formulated by MKV, GSM, RK, MKD and GKI. Literature search and data collection were done by MKV. Analysis and interpretation of data were done by MKV, GSM, and RK. Drafting of the article was done by MKV and RK. The manuscript was critically reviewed by GKI and MKD. All the authors approved of the final manuscript draft. MKV takes the responsibility for the integrity of the work as a whole from inception to publishing of the article and may be designated as "guarantor" or key person for the study.

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#### REFERENCES

- Chockalingam A, Campbell NR, Fodor JG. Worldwide epidemic of hypertension. Can J Cardiol. 2006;22(7):553-5.
- Pereria M, Lunet N, Azevedo A, Barros H. Differences in prevalence, awareness, treatment and control of hypertension between developing and developed countries. J Hypertens. 2009;27(5):963-75.
- 3. Gupta R. Trends in hypertension epidemiology in India. J Hum Hypertens. 2004;18:73-8.
- 4. Rodgers A, Lawes C, MacMahon S. Reducing the global burden of blood pressure-related cardiovascular disease. J Hypertens Suppl. 2000;18:S3-6.
- 5. World Health Organization. A Global Brief of Hypertension. Geneva: WHO. 2013:40.
- Sanjeet P, Chaturvedi S, Saini NK, Rajnish A, Syed S, Abhishek S. Current Status of the 'rule of halves' of hypertension. A survey among the residents of Slum Resettlement colony from east Delhi. Healthline pISSN. 2013;4(2):6970.
- 7. Physical status: The use and interpretation of anthropometry. Technical report series. Geneva: World Health Organization. 1995. Report No. 854.
- Shankar RD, Arlappa N. Updated Prasad SES Classification. Int J Res Dev Health. 2013;1(2):26-8.
- Midha T, Idris MZ, Saran RK, Srivastava AK, Singh SK. A study on the association between hypertensive status and Anthropometric correlates in the Adult Population of Lucknow District, India. Indian J Prev. Soc. Med. 2009;40(1):49-54.
- Jonas JB, Nangia V, Matin A, Joshi PP, Ughade SN. Prevalence, awareness, control and awareness of arterial hypertension in a rural Central Indian population: the Central India Eye and Medical Study. Am J Hypertens. 2010;23(4):347-50.
- 11. Meshram I, Laxmaiah A, Mallikharjun RK, Arlappa N, Balkrishna N, Reddy CG. Prevalence of hypertension and its correlates among Adult Tribal Population (≥ 20 years) of Maharashtra state, India. Int J Health Sci Res. 2014;4(1):130-9.
- 12. Satish T, Kannan S, Sarma PS, Razum O, Thankappan KR. Incidence of hypertension and its risk factors in rural Kerala, India: a community base cohort study. Public Health. 2012;126(1):25-32.
- 13. Todkar SS, Gujarathi VV, Tapare VS. Period prevalence and socio-demographic factors of hypertension in rural Maharashtra: A cross-sectional study. Indian J Community Med. 2009;34:183-7.
- 14. Kokiwar PR, Gupta SS. Prevalence of Hypertension in a rural community of Central India. Int J Biomed Res. 2011;2:950-3.

- Shantirani CS, Pradeepa R, Deepa R, Premlata G, Saroja R, Mohan V. Prevalence and risk factors of hypertension in a selected South Indian Population. The Chennai Urban Population Study. J Assoc Physicians India. 2003;51:20-7.
- Kaur P, Rao SR, Radhakrishnan E, Rajasekar D, Gupte MD. Prevalence, awareness, treatment, control and risk factors for hypertension in a rural population in South India. Int J Public Health. 2012;57(1):87-94.
- 17. Rajasekar VD, Krishnagopal L, Mittal A, Singh Z, Purty AJ, Binu VS. Prevalence and risk factors for hypertension in a rural area of Tamil Nadu, South India. Indian J Med Spec. 2012;3:12-7.
- 18. Kannan L, Satyamoorthy TS. An epidemiological study of hypertension in a rural household community. Sri Ramachandra J Med. 2009;29-33.

- 19. Pooja MY. Prevalence of hypertension among rural population of Doiwala Block, Dehradun, Uttarakhand, India. Recent Research in Science and Technology. 2013;5(1):21-4.
- 20. Saxena K, Vartika S, Yogesh S. Bio-social factors associated with hypertension in hilly population of Tehri. Indian J Community Health. 2011;23(2).
- 21. Ghosh A, Sarkar D, Mukherji B, Pal R. Prevalence and risk correlates of hypertension among adult rural population of Bihar. Asian J Biomed Pharm Sci. 2013;6:71-5.

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