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Prevalence of hypertension and its associated risk factors among adults residing in urban slum: a population-based door-to-door study

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ABSTRACT

Background: High blood pressure (HBP) is the single most common risk factor for disease burden all over world. In India, HBP has now emerged as a leading risk factor for morbidity and mortality. This study was carried out to find out prevalence of hypertension and its association with major risk factors among adults residing in urban slum.

Methods: A population based door to door study was carried out in urban slum coming under field practice area of urban health training centre, Department of Community Medicine People's College of Medical Sciences and Research Centre, Bhopal, Madhya Pradesh.

Results: The mean systolic BP was 121.4 mmHg whereas mean diastolic BP was 79.4 mmHg. Overall, 64.6% respondents were normotensive, 15.4% were in the category of pre-hypertension, and 5% in stage 1 hypertension (HTN) and 15% were in stage 2 HTN, giving the overall prevalence of high blood pressure 20.07%.

Conclusions: It can be concluded from present study that the prevalence of hypertension is quite high. Hence it is necessary to increase the public awareness about hypertension.

Keywords: Hypertension, Prevalence, Risk factors, Urban slum

INTRODUCTION

High blood pressure (HBP) is the single most common risk factor for disease burden all over world. Raised blood pressure is one of the major risk factors for global mortality and is estimated to have caused 9.4 million deaths and 7% of disease burden as measured in DALYs in 2010.1

In India, HBP has now emerged as a leading risk factor for morbidity and mortality. Several studies over the years have shown increasing prevalence of hypertension (HTN) in India. Burden of HTN in India is expected to almost double from 118 million in 2000 to 213.5 million

by 2025.² In analysis of worldwide data for the global burden of HTN, 21 per cent of Indian men and women were found to suffer from HTN.² The global prevalence of raised blood pressure (defined as systolic and/or diastolic blood pressure ≥140/90 mmHg) in adults aged 18 years and over was around 22% in 2014. Because of population growth and ageing, the number of people with uncontrolled HTN has risen over the years.³

HTN is a major public health challenge in the phase of socio demographic and epidemiological transition leading to various complications causing high morbidity and mortality. Prevalence of HTN has been found to be increasing in epidemic proportions in Indian population.⁴

High blood pressure is a major cardiovascular risk factor. If left uncontrolled, HTN causes stroke, myocardial infarction, cardiac failure, dementia, renal failure and blindness, causing human suffering in term of both physical and mental. It is also imposing severe economic and service burdens on health systems.^{5,6}

In the majority of cases of HTN, the exact cause is unknown, but the presence of several factors like smoking, alcohol intake, physical inactivity, inadequate diet, excess salt intake, stress, increase the risk of developing the condition. Most of these factors are modifiable. Rapidly growing burden of HTN is also driven by the negative effect of urbanization. Another important element in the HTN control is early diagnosis. In the light of the above, this community based study was conducted to determine prevalence of HTN and its associated risk factors among adults residing in urban slum.

METHODS

It was a community based cross-sectional descriptive study carried out in urban slum coming under field practice area of urban health training centre (UHTC), Department of Community Medicine People's College of Medical Sciences and Research Centre, Bhopal from November 2012 to April 2014 after Institutional Ethics Committee's approval. Study population was constituted by all people above 25 years of age.

Sample size

The sample size for present study was calculated after conducting a pilot study among 100 individual of urban slum of the study area. This pilot study revealed proportion of various risk factors in study area. Alcohol consumption was the least occurring risk factor in study area which was 24% among study population. Then final sample size was estimated by taking the prevalence of least occurring modifiable risk factor for non-communicable diseases which was 24% for alcohol consumption (last 12 months).

Sample size was calculated by using the formula

 $n = 4pq/L^2$

The sample size of 1266 came out to be maximum. Thus for this study, a sample of 1270 adults was studied.

Sampling technique

The urban field practice area of PCMS and RC divided into four sectors namely Satnami Nagar, Labour colony, Ram Nagar and Sixty Quaters. The required sample size is equally drawn from these four sectors and study population were selected by systematic random sampling method. The family folders of all households are available in the UHTC. Numbers were allotted to every family folder in each sector. This became the sampling

frame. The sampling unit was a household, which was randomly selected from these family folders, thereafter starting from that residence, every nth household was selected. All people aged 25 years and above residing in the selected household for 6 months or more and willing to participate were included in the study. If there was no eligible participant in the selected household, or if the house was closed for three consecutive visits, that sampling unit was replaced by a contiguous household without disturbing the allocation of next unit. Data collection was done, after obtaining informed written consent.

Survey instrument

The survey protocol for this study was based on the STEPS approach of WHO. A predesigned, pretested, semi-structured questionnaire was used to assess sociodemographic profile and behavioral risk factors that is, tobacco use, alcohol use. Clinical measurements such as weight, height, and blood pressure were obtained using standardized protocols and instruments. Body mass index (BMI) was calculated using the formula, weight (kg)/height² (m²). BMI values are age independent and the same for both sexes.

Blood pressure measurement

BP was measured twice in sitting position; first measurement of BP was conducted at start of interview. The second measurement was after completion of interview, with an approximate time of more than 20 minutes between both the measurements. The individuals were classified into following categories of HTN as per JNC guideline:⁹

Table 1: HTN classification.

Systolic BP or Diastolic BP	Classification
≤119 and ≤79	Normal
120-139 or 80-89	Pre HTN
140-159 or 90-99	Stage 1 HTN
≥160 or ≥100	Stage 2 HTN

As a dichotomous variable, HTN was considered to be present if the individual fell into the category of Stage 1 or Stage 2 HTN. Normal and pre hypertensive individuals were labelled as no HTN.

Data analysis

The collected data was entered in excel sheet. All statistical analysis was carried out using SPSS version20 and Appropriate Statistical tools were applied wherever required like Chi-square test etc.

RESULTS

Total number of individuals studied was 1270. Among them, 646 were females and 624 were males. Distribution

of study participants as per age, marital status, highest education level achieved, type of occupation and socioeconomic class is depicted in Table 2.

Presence of HTN was determined by asking the respondents about history of being diagnosed or put on

medication. This was labelled as self-reported HTN. An individual was labelled hypertensive based on the reading taken during the study or on the self-reporting of HTN or both. All participants were asked about their interaction with health care staff regarding measuring or diagnosis of HTN.

Table 2: Socio-demographic profile of the study population.

Casia damagnankia factana	Male (n=624)	Female (n=646)	Total (n=1270)
Socio-demographic factors	N (%)	N (%)	N (%)
Age (year)			
25-35	169(27.1)	161 (24.9)	330 (26.0)
36-45	185 (29.6)	143 (22.1)	328 (25.8)
46-55	110 (17.6%)	86 (13.3)	196 (15.4)
56-65	77 (12.3)	78 (12.1)	155 (12.2)
>65	83(13.4)	178 (27.6)	261 (20.6)
Marital status			
Single	46 (7.4)	03 (0.5)	49 (3.9)
Married	488 (78.2)	435 (67.3)	923 (72.7)
Divorced	05 (0.8)	06 (0.9)	11 (0.9)
Widow	80 (12.8)	153 (23.7)	233 (18.3)
Separated	05 (0.8)	49 (7.6)	54 (4.3)
Education			
Professional	0	0	0
Graduate/postgraduate	30 (4.7)	01 (0.2)	31 (2.4)
Intermediate	25 (4.0)	13 (2)	38 (3.0)
High school	91 (14.6)	54 (8.4)	145 (11.4)
Middle school	157 (25.2)	140 (21.7)	297 (23.4)
Primary school	202 (32.4)	195 (30.2)	397 (31.3)
Illiterate	119	243 (37.6)	362 (28.5)
Occupation			
Professional	0	0	0
Semi-professional	0	0	0
Clerical/Shop/Farm owner	90 (14.4)	06 (0.9)	96 (7.6)
Skilled worker	99 (15.9)	26 (4.0)	125 (9.8)
Semiskilled worker	77 (12.3)	36 (5.6)	113 (8.9)
Unskilled worker	268 (42.9)	147 (22.8)	415 (32.7)
Unemployed	90 (14.4)	14 (2.2)	102 (8.0)
Homemakers	0	417 (64.6)	419 (33.0)
Socioeconomic status			
Lower	103 (16.5)	150 (23.2)	253 (19.9)
Upper lower	368 (59.0)	417 (64.6)	785 (61.8)
Lower middle	150 (24.0)	77 (11.9)	227 (17.9)
Upper middle	03 (0.5)	02 (0.3)	05 (0.4)
Upper	0	0	0

Table 3: Details of blood pressure measurement and treatment.

		Male (n=624)	Female (n=646)	Total (n=1270)
		N (%)	N (%)	N (%)
DD absolved even	Yes	347 (55.6)	473 (73.2)	820 (64.6)
BP checked ever	No	277 (44.4)	173 (26.8)	450 (35.4)
C 16 A TYPN	Yes	38 (6.1)	80 (12.4)	118 (9.3)
Self-reported HTN	No	586 (93.9)	566 (87.6)	1152 (90.7)
On HTN medication	Yes	18 (2.9)	49 (7.6)	67 (5.3)
	No	606 (97.1)	597 (92.4)	1203 (94.7)

As seen from Table 3, 55.6% males and 73.2% females gives history of blood pressure measurement in past. Out of which 9.3% respondents (6.1% among males and 12.4% among females) were self- reporting for HTN, but not all were on medication for the HTN.

Table 4: Sex wise distribution of systolic and diastolic blood pressure.

BP	Male	Female	Total
(mmHg)	Mean (SD)	Mean (SD)	Mean (SD)
Systolic	118.3 (16.28)	124.4 (21.3)	121.4 (19.3)
Diastolic	77.1 (10.3)	81.6 (14.8)	79.4 (13.02)

It is seen from Table 4 that the mean systolic BP was 121.4 mmHg (118.3 mmHg for male and 124.4 mmHg for females), whereas mean diastolic BP was 79.4 mmHg (77.1 mmHg for males and 81.6 mmHg for females).

After measuring the blood pressure, the individuals were classified into various categories like normal, pre hypertensive, stage 1 and 2 HTN. Figure 1 gives the percentage of respondents according to categories of measured blood pressure. Overall, 64.6% respondents were normotensive, 15.4% were in the category of pre-HTN, and 5% in stage 1 HTN and 15% were in stage 2 HTN, giving the overall prevalence of high blood pressure 20.07%.

Among males, 69.2% were normotensive, 19.4% were in the category of pre-HTN, 1.6% was in stage 1 HTN and 9.8% were in stage 2 HTN as compared to female having 60.1% normal blood pressure, 11.5% pre-HTN, 8.4% stage 1 HTN and 20.1% stage 2 HTN. Overall prevalence of HTN (stage 1 and stage 2) among males and females

was 11.4% and 28.5% respectively. The prevalence of HTN among female respondents was high compare with male as shown in Table 5.

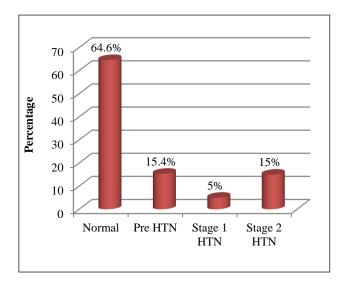


Figure 1: Categorization of measured blood pressure in the study population.

Table 5: Gender wise distribution of measured blood pressure.

Blood	Male	Female	Total
pressure	(n=624)	(n=646)	(n=1270)
categories	N (%)	N (%)	N (%)
Normal	432 (69.2)	388 (60.1)	820 (64.6)
Pre HTN	121 (19.4)	74 (11.5)	195 (15.4)
Stage 1 HTN	10 (1.6)	54 (8.4)	64 (5)
Stage 2 HTN	61 (9.8)	130 (20.1)	191 (15)

Table 6: Category of measured blood pressure according to age.

	Age (in year	rs)				
Blood pressure categories	25-35 (n=330)	36-45 (n=328)	46-55 (n=196)	56-65 (n=155)	>65 (n=261)	Total (n=1270)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Normal	267(80.9)	255(77.7)	162(82.6)	70(45.2)	66(25.3)	820 (64.6)
Pre HTN	55(16.7)	44(13.4)	26(13.3)	30(19.4)	40(15.3)	195 (15.4)
Stage 1 HTN	2(0.6)	6(1.8)	8(4.1)	20(12.9)	28(10.7)	64 (5)
Stage 2 HTN	6(1.8)	23(7.1)	0	35(22.6)	127(48.7)	191 (15)

It is seen from Table 6 that prevalence of HTN was found increasing with age. Prevalence of HTN was recorded highest in age group more than 65 years.

Taking various risk factors as exposure variable and HTN as outcome, significant association was found between HTN and risk factors as depicted in Table 7.

There was significant association between inadequate diet i.e., low consumption of fruits and vegetables and high blood pressure as depicted in Table 8.

It can be seen from Table 9 there was significant association between obesity and HTN. About 81.3% grade 2 overweight study participants suffering from stage 2 HTN.

Table 7: Association between HTN and various risk factors.

		Blood press	sure category				
Risk factor		Normal (n=820)	Pre-HTN (n=195)	HTN stage-1 (n=64)	HTN stage- 2 (n=191)	χ^2 df=3	P value
		N (%)	N (%)	N (%)	N (%)		
Con alvin a	Yes	273	84	10	38	22.42	< 0.0001
Smoking	No	547	111	54	153	32.42	<0.0001
Constraines takana	Yes	443	107	43	158	56.02	< 0.0001
Smokeless tobacco	No	377	88	21	33		
Alcohol	Yes	185	68	04	30	31.75 <0.00	-0.0001
Alconol	No	635	127	64	161		<0.0001
Low physical	Yes	550	102	11	21	222.6	-0.0001
activity	No	270	93	53	170	233.6	< 0.0001
High salt intake	Yes	157	61	25	68	27.62	-0.0001
(>5gm/day)	No	603	134	39	123	37.63	< 0.0001

Percentages are column wise.

Table 8: Association of diet with measured blood pressure.

	Diet	
Blood pressure categories	Adequate (n=188)	Inadequate (n=1082)
	N (%)	N (%)
Normal	126 (67.1)	694 (64.1)
Pre HTN	39 (20.7)	156 (14.5)
Stage 1 HTN	04 (2.1)	60 (5.5)
Stage 1 HTN	19 (10.1)	172 (15.9)
Total	188 (100)	1082 (100)

Percentages are column wise, $\chi^2=11.66$, df=3, p=0.009.

Table 9: Association between BMI and measured blood pressure.

Dland magazina	BMI categories					
_	Blood pressure Underweight		Grade 1 overweight	Grade 2 overweight	Grade 3 overweight	
categories	N (%)	N (%)	N (%)	N (%)	N (%)	
Normal	70 (92.1)	730 (71.8)	20 (20.2)	0	0	
Pre HTN	6 (7.9)	155 (15.2)	25 (25.3)	9 (12)	0	
Stage 1 HTN	0	53 (5.2)	6 (6.1)	5 (6.7)	0	
Stage 2 HTN	0	80 (7.8)	48 (48.4)	61 (81.3)	2 (100)	
Total	76	1018	99	75	2	

Percentages are column wise, $\chi^2=460.12$, df=12, p-value ≤ 0.0001 .

DISCUSSION

Overall prevalence of high blood pressure turned out to be 20.07% with 11.4% males and 28.5% females in our study. Mean systolic and diastolic blood pressure of study participants was 121.4 mmHg and 79.4 mmHg respectively. According to IDSP NCDs risk factor survey in Madhya Pradesh the mean systolic and diastolic blood pressure was 126.1mmHg and 78.1mmHg respectively among survey population of Madhya Pradesh. ¹⁰ In this survey overall prevalence of HTN was 24%. This is slightly higher than present study.

A study done by Bhadoria et al in Jabalpur district of central India revealed the prevalence of normotensive, pre-HTN, stage-I and stage-II HTN was 62.5%, 20.5%, 10.9%, and 6.1%, respectively and overall prevalence of HTN turned out to be 17.1%. Results are almost similar to present study.

Present study showed that the prevalence of HTN was increases with increasing age. Many studies have reported similar observations. ^{11,12} This clearly depicts that, as more of the population enters older age groups, the burden of HTN, will further increase.

In this study there was significant association between obesity and HTN. About 81.3% grade 2 overweight study participants suffering from stage 2 HTN. Another study

conducted in Chennai also showed that persons with abdominal obesity are 2.17 times at risk of having HTN.¹³

CONCLUSION

The prevalence of HTN was high in the study area and it was also associated with various risk factors like smoking, alcohol intake, dietary habits, low physical activity and obesity. Hence it is necessary to increase the public awareness about HTN detection and about risk factors and hypertensive complications through various approaches.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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