

## Research Article

# Prevalence of hypertension in an area of urban Varanasi, India and its association with selected demographic factors

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### ABSTRACT

**Background:** Non communicable diseases (NCDs) are the leading cause of death in WHO South East Asian Region and the rising trend is attributed to a variety of factors viz smoking, sedentary life style etc. Hypertension is considered as the principle risk factor for heart attack and stroke. The main objective was to assess the prevalence and spectrum of hypertension and its association with selected demographic factors in an area of urban Varanasi.

**Methods:** This cross-sectional community based study was undertaken in a selected area of urban Varanasi. The study sample comprised of subjects 25 years and above. After obtaining ethical clearance and taking consent from study subjects, they were specifically interviewed for selected demographic characteristics using pre designed and pre tested proforma. Their blood pressure was measured using electronic BP machine following standard technique. The data was entered in personal computer and analyzed with SPSS.

**Results:** Out of 611 subjects, 314 (51.4%) subjects were male and 297 (48.6%) were female. 51.7% and 20.0% subjects were categorized as normal and pre hypertensive respectively. As much as 19.6% and 8.7% subjects were in stage 1 and stage 2 hypertension. Presence of hypertension increased significantly ( $p < 0.001$ ) with advancing age.

**Conclusions:** Hypertension is a significant problem in study subjects. Nearly one fifth of the subjects were in pre hypertensive stage. Preventive strategies should be directed to them for positive impact.

**Keywords:** Demographic factors, Hypertension, Pre hypertension, Spectrum

### INTRODUCTION

Hypertension, also known as high or raised blood pressure, is a global public health issue. It contributes to the burden of heart disease, stroke and kidney failure and premature mortality and disability. It disproportionately affects populations in low and middle-income countries where health systems are weak. Hypertension rarely causes symptoms in the early stages and many people go undiagnosed. Those who are diagnosed may not have access to treatment and may not be able to successfully control their illness over the long term.<sup>1</sup> Globally cardiovascular disease accounts for approximately 17 million deaths a year, nearly one third of the total deaths. Of these, complications of hypertension account for 9.4

million deaths worldwide every year.<sup>2</sup> Hypertension is responsible for at least 45% of deaths due to heart disease (total ischemic heart disease), and 51% of deaths due to stroke. In 2008, worldwide, approximately 40% of adults aged 25 years and above had been diagnosed with hypertension; the number of people with the condition rose from 600 million in 1980 to 1 billion in 2008.<sup>3</sup>

The prevalence of hypertension is highest in the African Region at 46% of adults aged 25 and above, while the lowest prevalence at 35% is found in the Americas. Overall, high-income countries have a lower prevalence of hypertension (35%) than other groups at 40%. Chronic non-communicable diseases (NCDs), particularly cardiovascular diseases (CVD) and its principal risk

factor high blood pressure is increasing in the South East Asia Region (SEAR). In 2008, of the 7.9 million NCD related deaths in SEAR, 3.6 million were attributable to CVD alone. This is projected to increase to 12.5 million by 2030. Notably, unlike in developed countries, most of the deaths occur at younger ages with consequent adverse health, economic and social implications.<sup>1</sup>

The increasing prevalence of hypertension is attributed to population growth, ageing and behavioural risk factors, such as unhealthy diet, harmful use of alcohol, lack of physical activity, excess weight and exposure to persistent stress. The adverse health consequences of hypertension are compounded because many people affected also have other health risk factors that increase the odds of heart attack, stroke and kidney failure. These risk factors include tobacco use, obesity, high cholesterol and diabetes mellitus. Industrialization, socio-economic development, urbanization, changing age structure, changing lifestyles have placed India at a position where it is facing a growing burden of NCDs.

In India, NCDs accounted for 40% of all hospital stays and 35% of all outpatient visits in 2004.<sup>4</sup> Also, chronic diseases are estimated to account for 53% of all deaths and 44% of disability-adjusted life-years (DALYs) lost in 2005.<sup>5</sup> As of 2005, India experienced the “highest loss in potentially productive years of life” worldwide.<sup>6</sup> Hypertension exerts a substantial public health burden on cardiovascular health status and healthcare systems in India.<sup>6,7</sup>

Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India. In an analysis of worldwide data for the global burden of hypertension, 20.6% of Indian men and 20.9% of Indian women were hypertensive in 2005. The rates for hypertension in percentage are projected to go up to 22.9 and 23.6 for Indian men and women, respectively by 2025.<sup>8</sup>

Rapid unplanned urbanization also tends to promote the development of hypertension as a result of unhealthy environments that encourage consumption of fast food, sedentary behaviour, tobacco use and the harmful use of alcohol. Epidemiological evidence reveals that population demographic changes in India have increased risk factors of hypertension.

There is increasing life expectancy, urbanization, development and affluence in India.<sup>9</sup> In 1901, only 11% of the population was living in an urban area; this proportion was 17.6% in 1951, 18.3% in 1961, 20.2% in 1971, 23.7% in 1981 and 26.1% in 1991. There is a strong correlation between urbanization and increase in hypertension prevalence.

An alarming rise in hypertension projected by Global Burden of Hypertension 2005 study, the GBD 2010 study and non-communicable disease India specific data

portray a grim picture for the 17.8% of the world's population who reside in India.<sup>2,8</sup> With this background this study was undertaken in an urban area of Varanasi.

The specific objectives of the study were; (a) to assess the prevalence and spectrum of hypertension and (b) to find out its association with selected demographic factors in an area of urban Varanasi, India.

## METHODS

This community based cross sectional study was carried out in Sunderpur, which is urban field practice area of Department of Community Medicine, Institute of Medical Sciences, Banaras Hindu University. The consent of participants was obtained before the start of the study.

It is a community based cross sectional study. Individuals of age of 25 years and above constituted subjects of the study. The required sample size was computed based on the assumption that prevalence of hypertension in adults aged 25 years and above was 40% as per WHO 2008<sup>3</sup> using the formula  $N = Z \times P \times Q / L^2$  where P= Prevalence Q= 1- P and Z= constant= $\alpha^2 = (1.96)^2$ .

Taking permissible level of error as 10% the computed sample size came out to be 576. However, keeping allowance for non-response a total of 611 subjects ( $\geq 25$  years) were considered for the study. For their selection, two sectors were selected by lottery method from the five sectors of Sunderpur. In the selected sectors subjects  $\geq 25$  years of age were selected by total enumeration. A pre designed and pre tested proforma and an electronic blood pressure monitor served as tools for this study.

### Techniques of study

In order to assess the prevalence of hypertension total enumeration of the study subjects ( $\geq 25$  years of age) was done by interviewing head or any responsible member of the family. Age recording of the study subjects was done by life events using staircase approach. Besides age and sex, information pertaining to religion, caste, type of family were also noted on the proforma.

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) of each study subject was recorded adopting criteria as given below.

- Blood pressure was measured by an electronic blood pressure monitor with a cuff of proper size to encircle 80% of the arm circumference.
- The blood pressure was taken in the right arm with the subject relaxed and comfortable.
- The blood pressure reading was taken after ensuring a gap of 30 minutes in the event of smoking or coffee ingestion and after the subjects had emptied their bladder.

- Subjects were seated with their back supported and with their legs resting on the ground and in uncrossed position for 5 minutes.
- Two readings were taken 2 minutes apart and averages of two readings were recorded.

Based on JNC-7 criteria subjects were categorized into normal (SBP<120 and DBP<80 mm of Hg), Pre-hypertensive (SBP=120-139 and DBP=80-89 mm of Hg), Hypertension stage 1 (SBP=140-159 and DBP=90-99 mm of Hg) and Hypertension stage 2 (SBP≥160 and DBP≥100 mm of Hg).<sup>9</sup> As per JNC-7 criteria, subjects in stage 1 and stage 2 hypertension are considered as hypertensive.

### Analysis of data

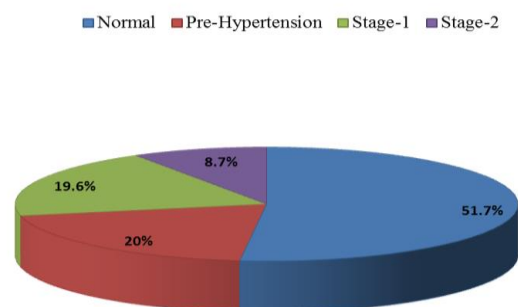
Data thus generated was analyzed with the help of Microsoft excel 2007 and SPSS version 16<sup>th</sup> software. Appropriate tables were generated and statistics were applied for statistical association and inference. Chi-square test was used for testing statistical significance and p<0.05 was considered as significant.

### RESULTS

Out of 611 subjects ≥25 years, 48.4% subjects belonged to the age group 25-39 years; 51.4% subjects were male and 48.6% were female. Majority (99.5%) of them were Hindu. As much as 39.6%, 40.6% and 19.8% subjects belonged to SC/ST, OBC and other caste category, respectively. Three hundred ninety three (64.3%) subjects were from joint family; remaining 35.7% subjects were from nuclear family. In case of 53.2% subjects, family size was ≤6 whereas 17.0% subjects have family size was greater than or equal to 10 (Table 1).

**Table 1: General characteristics of study subjects (N=611).**

Variables	No.	%	
Age (in years)	25-39	296	48.4
	40-49	117	19.1
	50-59	118	19.3
	≥60	80	13.1
Sex	Male	314	51.4
	Female	297	48.6
Religion	Hindu	608	99.5
	Muslim	02	0.3
	Others	01	0.2
Caste	SC/ST	242	39.6
	OBC	248	40.6
	Others	121	19.8
Type of family	Joint	393	64.3
	Nuclear	218	35.7
Family size	≤6	325	53.2
	7-9	182	29.8
	≥10	104	17.0



**Figure 1: Distribution of study subjects according to their blood pressure category.**

Out of 611 subjects, 51.7% and 20.0% subjects were categorized as normal and pre hypertensive, respectively. As much as 19.6% and 8.7% subjects were in stage 1 and stage 2 hypertension (Figure 1). Presence of hypertension increased significantly (p<0.001) with advancing age. This was 7.8% in 25-39, 23.9% in 40-49, 54.2% in 50-59 and 72.5% in more than or equal to 60 year age group, respectively. As much as 51.3% males and 52.2% female subjects were normotensive. Out of 314 male subjects 27.7% subjects were hypertensive; male subjects with stage 1 and stage 2 hypertension were 18.5% and 9.2%, respectively. Of 297 female subjects, 20.9% and 8.1% subjects were in stage 1 and stage 2 hypertension, respectively. In all 29.0% female subjects were hypertensive (Table 2).

Of 608 Hindu subjects, 315 (51.8%) subjects were normotensive. 173 (28.5%) Hindu subjects were hypertensive; subjects in stage 1 and stage 2 were 19.7% and 8.7%, respectively. There existed no significant difference (p>0.05) in religion wise prevalence of hypertension in study subjects (Table 2).

Sixty one (25.25%) SC/ST subjects were hypertensive; subjects with stage 1 and stage 2 hypertension were 17.4% and 7.9%, respectively.

As much as 18.5% and 9.3% OBC subjects were in stage 1 and stage 2 hypertension; in all 27.8% subjects were hypertensive. One third of the subjects belonging to other caste category were hypertensive; subjects in stage 1 and stage 2 hypertension were 26.4% and 9.1%, respectively. There existed no significant difference (p>0.05) in the occurrence of hypertension in subjects in different caste categories (Table 2).

Out of 393 subjects belonging to joint family, 31.04% subjects were hypertensive; subjects in stage 1 and stage 2 hypertension were 22.6% and 8.4% respectively. Out of 218 subjects from nuclear family, 23.4% subjects were hypertensive; subjects in stage 1 and stage 2 hypertension were 14.2% and 9.2%, respectively. There existed no significant difference (p>0.05) between types of family of

study subjects and blood pressure categories (Table 2). Out of 325 subjects having family size  $\leq 6$ , 84(25.8%) subjects were hypertensive; subjects from this category with stage 1 an stage 2 hypertension were 18.5% and 7.4% respectively. As much as 30.8% and 31.7% subjects

having family size 7-9 and  $\geq 10$  were hypertensive. There existed no significant difference ( $p > 0.05$ ) between family size and blood pressure categories of study subjects (Table 2).

**Table 2: Distribution of study subjects according to their demographic profile and blood pressure category.**

Characteristic	No.	Blood Pressure Category								Test of significance
		Normal		Pre-hypertension		Stage- 1		Stage- 2		
		No.	%	No.	%	No.	%	No.	%	
<b>Age (in years)</b>										
25-39	296	214	72.3	59	19.9	22	07.4	01	0.3	$\chi^2=271.5$ df=9 P <0.05
40-49	117	64	54.7	25	21.4	23	19.7	05	4.3	
50-59	118	33	28.0	21	17.8	52	44.1	12	10.2	
$\geq 60$	80	05	6.2	17	21.2	23	28.8	35	43.8	
<b>Sex</b>										
Male	314	161	51.3	66	21.0	58	18.5	29	9.2	$\chi^2=1.066$ df=1 P =0.785
Female	297	155	52.2	56	18.9	62	20.9	24	8.1	
<b>Religion</b>										
Hindu	608	315	51.8	120	19.7	120	19.7	53	8.7	$\chi^2=5.500$ df=6 P =0.481
Muslim	02	01	50.0	01	50.0	0	0.0	0	0.0	
Others	01	00	0.0	01	100.0	0	0.0	0	0.0	
<b>Caste</b>										
SC/ST	242	122	50.4	59	24.4	42	17.4	19	7.9	$\chi^2=9.493$ df=6 P =0.148
OBC	248	138	55.6	41	16.5	46	18.5	23	9.3	
Others	121	56	46.3	22	18.2	32	26.4	11	9.1	
<b>Type of Family</b>										
Joint	393	197	50.1	74	18.8	89	22.6	33	8.4	$\chi^2=6.420$ df= 3 P =0.093
Nuclear	218	119	54.6	48	22.0	31	14.2	20	9.2	
<b>Total No. of Family Members</b>										
$\leq 6$	325	174	53.5	67	20.6	60	18.5	24	7.4	$\chi^2=8.058$ df= 6 P =0.234
7-9	182	94	51.6	32	17.6	42	23.1	14	7.7	
$\geq 10$	104	48	46.2	23	22.1	18	17.3	15	14.4	

## DISCUSSION

Chronic diseases are on rise in India; these diseases are contributing significantly to productivity loss and contribute significantly for attributable burden of disease and load on health system.<sup>2,6,7,11,12</sup> Several studies and non-communicable diseases country profile, 2011 highlights alarming situation due to hypertension.<sup>2,8,13,14</sup>

Using JNC VII classification- half of the subjects were normotensive.<sup>10</sup> Nearly 3 out of 10 subjects were hypertensive; two third of them were in stage 1 hypertension. Similar findings have been reported by several workers.<sup>15-17</sup> Contrary to this several workers reported a higher prevalence of hypertension.<sup>17-23</sup> Lower prevalence of hypertension has been observed by some researchers.<sup>24-27</sup> The result of the present study shows an increase in prevalence of hypertension with an increase in age. This is in conformity with several Indian

studies.<sup>24,26,28,29</sup> Varying pattern of hypertension with socio-economic status has been reported in several studies.<sup>26,30,31</sup>

According to a study women had a lower prevalence of isolated diastolic blood pressure compared to men across all age groups.<sup>32</sup> Rate of age associated increase in blood pressure accelerates in women around fifth and sixth decade of life and eventually exceeds that of men. However, results remain controversial. In the present observation there has been no difference in the magnitude of hypertension in male and female subjects. It is alarming to note that one fifth of the study subjects were in the stage of pre hypertension. Although they were free from the disease as per JNC-7 criteria, they were at potential risk of the disease. Spectrum of hypertension has been similar in males and females. There existed no significant difference in sex wise prevalence of hypertension in the study subjects.

Urbanization is considered an important risk factor and determinant of hypertension. This disparity in the prevalence of hypertension in urban and rural areas can be attributed to the fact that different cut-off age and sample size for screening the population have been used. Different studies have also used different criteria for defining hypertension.

Although there has been no significant difference in religion wise prevalence of hypertension in study subjects. Much significance cannot be attached to the findings as there has been gross under representation of Muslim subjects. Caste has been used as a proxy indicator of socioeconomic status and it is expected that extent of hypertension may vary in different caste categories. However, in the present study, in Hindu subjects, caste was not significantly associated with the occurrence of hypertension. In the present study, type of family and family size have not exerted significant influence on the prevalence of disease.

Normal levels of both systolic and diastolic blood pressure are particularly important for the efficient functioning of vital organs such as the heart, brain and kidneys and for overall health and wellbeing. Hypertension is a significant problem in study subjects. Nearly one fifth of the subjects were in pre hypertensive stage.

According to JNC- 7 criteria they are free from disease but are at high risk of developing hypertension in near future. Although hypertension guidelines (2014) also known as JNC 8 is available, it has not changed classification of hypertension, but thresholds for pharmacologic treatment were defined.<sup>33</sup>

This is a serious warning signal and significant lifestyle interventions and dietary modifications are urgently needed. People need to know why raised blood pressure is dangerous, and how to take steps to control it. There are significant health and economic gains attached to early detection, adequate treatment and good control of hypertension.

Preventive strategies should be directed to them for positive impact. World Health Organization (WHO) has also emphasized the fact that addressing behavioural risk factors, e.g. unhealthy diet, harmful use of alcohol and physical inactivity, can prevent hypertension. Health promoting lifestyle modifications are recommended for individuals with pre-hypertension and as an adjunct to drug therapy in hypertensive individuals

## CONCLUSION

Hypertension is a significant problem in study subjects and calls for concerted efforts from all stakeholders. Nearly one fifth of the subjects were in pre hypertensive stage. Preventive strategies should be directed to them for positive impact.

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