

Prevalence, Awareness and Treatment of Hypertension in adults aged 25-69 years in Mumbai

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Abstract

Background: Hypertension has become a very common feature in the urban areas, with at least one member in the family being affected with the diseases. Diagnosis of hypertension maybe delayed for several years due to lack of screening. Once diagnosed as hypertensive, and initiated on treatment, patient's usually fail to go for regular health seeking behaviour or have poor compliance to medical advice resulting in uncontrolled blood pressure levels. **Aims:** The aim of the present study is to assess the prevalence of Hypertension, Pre-Hypertension, Awareness of Hypertension, Treatment of Hypertension and Controlled Hypertension. Settings and Design: Cross-sectional Study design conducted in an urban area of Mumbai. **Methods and Material:** One stage cluster sampling was used to select requisite sample size. Men and women aged 25-69 years underwent Blood Pressure measurements according to standard guidelines. Statistical analysis used: Chi-square, Age standardised prevalence rates, 95% confidence intervals were calculated. **Results:** Amongst the 446 men and women screened, 151(33.9%) were found to have hypertension and 108 were pre-hypertensive. One-third of the individuals were not aware of their condition. Amongst the hypertensive cases taking treatment, almost two-thirds had uncontrolled BP. **Conclusions:** It is important not only to conduct screening programmes in the community but also develop programmes to ensure that the diagnosed patients achieve their target BP level and delay the onset of complications thereby improving quality of life.

Key words:

Prevalence, Awareness, Treatment, Hypertension, Mumbai.

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Introduction

Raised Blood Pressure (RBP), one of the eight modifiable risk factors of Non-Communicable Diseases stated in WHO-STEPS is an important and easily measurable indicator. Over the years an increasing trend of Hypertension (HT) has been observed. Initially thought of as a disease of affluent society, HT is now seen across all sections of the society due to the changing life style. According to the World Health Organization the prevalence of RBP is 21.1% in India with almost an equal distribution amongst males and females.¹ Prevalence of HT is reported to have increased in the last six decades from 2% to 25% among urban residents.² The age standardized prevalence of HT is reported to be 26.3% in India and 28.1% in Maharashtra.³ A study in the Parsi Community of Mumbai revealed a HT prevalence of 36.4%.⁴ Another study in Mumbai showed the prevalence in Males as 47.5% and 48.4% in females.⁵ Hypertension has become so common in the society that it is not unusual to find atleast one person in the family having the disease. As a result people tend to easily accept the disease status and do not generally hide the disease status. Once diagnosed as hypertensive, they usually seek treatment. However the compliance to drugs, life style modifications, and regularity of visits to the physician is questionable. A systematic review and meta-analysis has reported prevalence of hypertension treatment as 37.6% and controlled BP as 20.2%.⁶ Several studies across India show a wide variation in prevalence of HT and therefore it is imperative for the researchers to have baseline data of their own area prior to

starting an interventional project. The present study reports findings of our baseline survey. The specific objectives of the study are to assess the Prevalence of Hypertension, Pre-Hypertension, Awareness, Treatment and Controlled Hypertension in the urban community of Mumbai.

Materials and Methods

Study Area: The study was conducted in urban field practice area of the department of Community Medicine, of a Medical College situated in Mumbai. The population, belongs to low and middle socio-economic class living either in buildings or in shanties. Health care services are provided by the government dispensary, Urban Health Training Centre and Private Practitioners.

Study Design A Cross-Sectional Study design was adopted with House-to-House survey by trained Out-Reach Workers to identify and screen eligible beneficiaries for Hypertension.

Sampling Method A one stage cluster sampling method was employed. The study area is demarcated into 6 clusters, with an estimated total population of 6000. Three clusters were randomly selected from these six clusters. Within each selected cluster all the households were visited to identify eligible beneficiaries.

Sample Size Based on the Hypertension prevalence rate of 28%; 95% confidence interval and a design effect of 1.5 the sample size calculated using Open epi info software was 442.^{3,7} In the present study we enrolled 446 participants.

Study Period The survey was conducted over a period of six months from January to June 2014.

Study Population The study population included all men and women between 25-69 years of age residing in the selected area.

Selection Criteria All the individuals between 25-69 years of age available at the time of survey and consenting to participate in the research study.

Study Tools Demographic profile (Age, Sex, Religion, Marital Status, whether living in own or rental house) of the household members was recorded. Data on income and education was obtained from our previous records. Blood Pressure readings; previous diagnosis of HT ; and whether taking treatment was recorded in a separate form.

Methodology Two Outreach Workers (ORWs) were trained over a period of three days by the research investigators. Training included details about the risk factors, prevention and treatment of HT; measurement of Blood Pressure (BP) using digital sphygmomanometer (OMRON) as specified in WHO-STEPS; interpreting the BP reading and providing appropriate guidance to the individual.⁷ ORWs were also trained on how to record the data. The ORWs practiced on volunteers and patients attending the Urban Health Training Centre. After they gained adequate experience and felt confident of taking BP measurements, they started the field survey. During the initial few days the ORWs were supervised by the research investigators and subsequently by the Medical Social Worker and other faculties trained on the research protocol including measurement of BP. The ORWs visited each household in the selected study area and explained the purpose of the study. Demographic profile of the household members was recorded in the household form. If a household refused

to participate or was locked, it was mentioned accordingly on the household form. This process of recording demographic profile, helped the ORWS to identify the eligible population between 25-69 years of age. The eligible individual's willingness to participate was assessed and informed written consent was taken after explaining the purpose of the study. Almost all those present at the time of the survey consented to participate. Participants were asked if they were suffering from hypertension and whether they were taking treatment for the same. Three BP readings were recorded at intervals of five minutes in a sitting position with digital BP measuring instrument (OMRON) . The average of second and third BP readings were taken to classify the individual as Raised Blood Pressure.⁷ All the individuals with either a Systolic Blood Pressure (SBP) of ≥ 140 mm Hg or a Diastolic Blood Pressure (DBP) of ≥ 90 mm Hg were referred to the physician. All those previously diagnosed as hypertension and not taking treatment were also referred. The forms were scrutinized daily by the Medical Social Worker and weekly by the Research Investigators to check for completeness and accuracy of the recorded information.

Definitions of Raised Blood Pressure; Hypertension; and Control of Hypertension According to WHO STEPS, Raised BP⁷ is defined when SBP of ≥ 140 mm Hg or DBP of ≥ 90 mm Hg is recorded.⁷ Using JNC-VII criteria a SBP of ≥ 140 mm Hg or DBP of ≥ 90 mm Hg is defined as Hypertension amongst those not previously diagnosed as HT; a SBP between 120-139 mm Hg or DBP between 80-89 mm Hg is called as Pre-Hypertension in absence

of previous diagnosis and treatment of HT; and SBP <120 mm Hg and DBP is <80 mm Hg is defined as Normal/Optimal in absence of previous diagnosis of HT.⁸ According to JNC-VIII, a BP of <140 mm Hg and <90 mm Hg is said to be controlled HT amongst the individuals with Hypertension on treatment.⁹

Data Analysis Data was entered into excel and analysed using the function commands in excel and open epi software. Mean Systolic and Diastolic BP for men and women in different age groups; Prevalence of Hypertension, Awareness, Treatment and Control with 95% CI is reported here. Chi-Square is also calculated to study the statistical difference in the prevalence rates between different age and sex groups. Age standardization for the Prevalence Rates was calculated using WHO World standard population.¹⁰ Reporting of the data on Prevalence of Hypertension, Awareness, Treatment and Control is being done as per the standard guidelines on reporting of HT survey.¹¹

Ethics Committee Approval Ethics Committee Approval from the Institutions Ethics Committee Board was taken.

Results

Profile of Study area Of the 865 households present, 464 (53.64%) households participated in the study. Proportion of the household refusing participation is 13.64% and locked is 32.72%.

Profile of Population in Study Area Amongst the 464 households, 953 (48.67%) males and 1005 females were living. The average family size is 4.2. Majority of the population (97.91%) were followers of

Hinduism. All the community members understand and speak Hindi/Marathi. Amongst the total population 82.69% lived in their own house. The proportion of population living in rental houses in the buildings was only 7.75% as compared to 38.83% living in the shanties. It was observed that that 59.35% (1162) of the population was between 25-69 years of age and 4.44% (87) were above 70 years of age. Proportion of population <25 years of age was 43.6% in shanties as compared to buildings (33.1%).

Participation of Eligible Population Of the 1162 eligible individuals in the surveyed houses, 555 (47.76%) were males and 607 (52.24%) were females. Only 446 individuals were available and consented to participate in the study. The proportion of eligible males participating in the survey was 19.46% (108) as compared to 55.68% (338) in females. Participation rate in the different age groups was 28.57% (25-29 years); 35.96% (30-49 years); and 48.06% (50-69 years).

Prevalence of Hypertension An individual was labeled as Hypertension, if the participant was a known case of HT taking anti-hypertensive medications or an individual with either SBP \geq 140 mm Hg or DBP \geq 90 mm Hg in absence of previous diagnosis.¹¹ Referring to Table 1, the overall crude prevalence of HT was 33.86% (95% CI - 29.62-38.37%) and the age-standardized prevalence rate using WHO World Standard 2000-2025 was 31.83% (95% CI - 31.71-31.96). The difference observed in prevalence of HT in males (40.74%) and females (31.66%) was statistically significant as seen in Table 3. Age standardized rates for males is 36.81%

Table1: Prevalence of Hypertension, Awareness of Hypertension, Treatment and Controlled Hypertension

	Prevalence			Awareness			Treatment			Controlled Hypertension		
	No.	%age	95% CI	No.	%age	95% CI	No.	%age	95% CI	No.	%age	95% CI
Total												
Crude Rate	151/446	33.86	29.62-38.37	104/151	68.87	61.10-75.71	102/151	67.55	59.73-74.50	61/151	40.40	32.90-48.37
25-29 years	4/48	8.33	3.29-19.55	2/4	50.00	15.00-85.00	2/4	50.00	15.00-85.00	2/4	50.00	15.00-85.00
30-49 years	57/237	24.05	19.05-29.88	35/57	61.40	48.43-72.94	34/57	59.65	46.70-71.38	22/57	38.60	27.06-51.57
50-69 years	90/161	55.90	48.18-63.34	67/90	74.44	64.56-82.32	66/90	73.33	63.80-81.38	37/90	41.11	31.51-51.44
Male												
Crude Rate	44/108	40.74	31.95-50.17	27/44	61.36	46.62-74.28	27/44	61.36	46.62-74.28	17/44	38.64	25.72-53.38
25-29 years	2/10	20.00	5.67-50.98	0/2	0	0-65.76	0/2	0	0-65.76	0/2	0	0-65.76
30-49 years	15/48	31.25	19.95-45.33	9/15	60.00	35.75-80.17	9/15	60	33.75-80.17	6/15	40	19.83-64.25
50-69 years	27/50	54.00	40.40-67.03	18/27	66.67	47.83-81.36	18/27	66.67	47.83-81.36	11/27	40.74	24.52-59.27
Female												
Crude Rate	107/338	31.66	26.93-36.8	77/107	71.96	62.81-79.60	75/107	70.09	60.85-77.95	44/107	41.12	32.26-50.59
25-29 years	2/38	5.26	1.46-17.28	2/2	100	34.24-100.00	2/2	100	34.24-100.00	2/2	100	34.24-100.00
30-49 years	42/189	22.22	16.88-28.67	26/42	61.90	46.81-75.00	25/42	59.52	44.50-72.96	16/42	38.10	25.00-53.19
50-69 years	63/111	56.76	47.47-65.59	49/63	77.78	66.09-86.27	48/63	76.19	64.37-85.01	26/63	41.27	29.96-53.58

Table 2: Mean, Median and Standard Deviation of Systolic and Diastolic Blood Pressure in Males and Females aged 25-69 years

	Total population					Male population					Female population				
	No.	Mean	SD	Median	Q1, Q3	No.	Mean	SD	Median	Q1, Q3	No.	Mean	SD	Median	Q1, Q3
Mean SBP	446	123.52	19.33	121	109,133	108	131	19.28	127.50	117.75,138	338	121.13	18.76	117.50	107,131
25-29 years	48	109.69	12.90	107	102.75,114	10	122.10	16.30	118	112,130.75	38	106.42	9.71	107	101.25,113
30-49 years	237	120.01	16.68	118	107,129	48	128.48	18.93	125.50	116.75,133.50	189	117.86	15.39	115	106,127
50-69 years	161	132.81	20.44	131	119,144	50	135.20	19.47	133.50	124,142.25	111	131.74	20.85	130	117,144.5
	No.	Mean	SD	Median	Q1, Q3	No.	Mean	SD	Median	Q1, Q3	No.	Mean	SD	Median	Q1, Q3
Mean DBP	446	76.28	10.90	75	69,83	108	80.14	11.43	79	72,86.25	338	70.05	10.45	74	67.25, 81
25-29 years	48	68.77	8.44	69	62.75,75	10	74.40	8.63	74	72,76.75	38	67.29	7.84	65	61.25,73
30-49 years	237	76.01	10.62	75	68,83	48	80.96	11.80	81	72,87.25	189	74.76	9.95	74	68, 80
50-69 years	161	78.91	10.92	79	72,85	50	80.50	11.42	79	74.5,86.75	111	78.20	10.67	78	71, 84.5

(95% CI - 36.67 – 36.94) and for females is 30.67% (95% CI - 30.55-30.80) From Table 1, it can be seen that the prevalence of HT increases with age as expected and the difference observed between the different age groups is statistically significant (Table 4). The prevalence of HT in the age group of 25-29 years is higher amongst males as compared to females. Overall mean SBP is 123.52 mm Hg (SD=19.33) and DBP is 76.28 mm Hg (SD=10.90). Both SBP and DBP is higher amongst males than females (Table 2)

Table 3: Sex Distribution of Individuals with Hypertension and without hypertension

Sex	Hypertension	No Hypertension	Total
Male	44	64	108
Female	107	231	338
Total	151	295	446
$X^2=3.009, df=1;p=0.04$			

Prevalence of Pre-Hypertension Of the 446 participants, 24.22% (108) were having SBP between 120-139 mm Hg or DBP between 80-89 mm Hg in absence of diagnosis of HT. Only 19.82% females had Pre-HT as compared to 37.96% in males. Prevalence of Pre-HT amongst different age groups was 14.58%; 24.47% and 26.71% in the age groups 25-29 years; 30-49 years and 50-69 years respectively. (Refer Table 5 and 6)

Table 4: Age Distribution of Individuals with Hypertension and without hypertension

Age (years)	Hypertension	No Hypertension	Total
25-29	4	44	48
30-49	57	180	237
50-69	90	71	161
Total	151	295	446
$X^2=59.08, df=2;p<0.001$			

Prevalence of Optimal Blood Pressure

The percentage of participants with Optimal BP was 77.08% (25-29 years), 51.48% (30-49 years) and 17.39% (50-69 years) respectively. Only 21.30% males had an Optimal BP reading as compared to 48.52% females.

Table 5: Sex Distribution of Individuals with Hypertension, Pre-Hypertension and Optimal Blood Pressure

Sex	Hyper-tension	Pre-Hyper-tension	Optimal Blood Pressure	Total
Male	44	41	23	108
Female	107	67	164	338
Total	151	108	187	446
$X^2=27.59, df=2;p<0.001$				

Prevalence of Awareness of Hypertension

Awareness of HT is defined as the number of participants labelled as HT who were aware about their disease status.¹¹ Only 68.87% hypertensive patients detected in the present survey were aware of their condition. Males were less likely to be

aware of their condition as compared to female, though significant difference was not found. There was no difference in the awareness levels between different age groups.

Table 6: Age Distribution of Individuals Screened for Hypertension

Age (years)	Hyper tension	Pre-Hyper tension	Optimal Blood Pressure	Total
25-29	4	7	37	48
30-49	57	58	122	237
50-69	90	43	28	161
Total	151	108	187	446
X ² =83.75, df=4;p<0.001				

Figure 1: Flow Chart showing the prevalence of Hypertension, Awareness, Treatment and Controlled Hypertension in Men and Women aged 25-69 years

	Men	Women	Total
	↓	↓	↓
Total Population	993	1005	1998
	↓	↓	↓
No. of Eligible Population	595	607	1162
	↓	↓	↓
No. of Study Population	108	338	446
	↓	↓	↓
No. diagnosed Hypertension(HT)	44	107	151
	↓	↓	↓
No. Aware of having HT	27	77	104
	↓	↓	↓
No. Taking Treatment for HT	26	76	102
	↓	↓	↓
No. with Controlled HT	17	44	61

Prevalence of Treatment Of the 151 cases detected as hypertension, only 102 (67.55%) were currently taking treatment (61.36% - males and 70.09%-females). There was no statistically significant difference observed regarding treatment status with reference to sex or age groups.

Prevalence of Controlled Hypertension Controlled HT is defined as SBP <140 mm Hg and DBP <90 mm Hg amongst individuals with Hypertension.¹¹ The prevalence of controlled HT was 40.40% overall; 38.64% in males and 41.12% in females. Amongst the 102 previously diagnosed cases taking treatment, only 59.80% (61) had BP reading of <140/90 mm of Hg.

Discussion

Prevalence of Hypertension In Mumbai an increasing prevalence of hypertension has been observed over the years due to life style changes. In the present study conducted in Mumbai, the overall crude prevalence of hypertension was 33.86% and age standardized prevalence was 31.83%. A systematic review and meta analysis has reported the overall prevalence of hypertension in urban India as 33% which are similar to our findings.⁶ Studies conducted in Mumbai showed the prevalence to be 36.4% in Parsi community.⁴ A study by ICMR showed an overall age-standardized prevalence of 28.1% in Urban Maharashtra.³ A wide variation in the prevalence of hypertension between different urban areas is observed in several studies. One study conducted in several locations in India showed prevalence of HT as high as 43.5%.¹² Lucknow reported HT prevalence of 32% whereas Chennai

reported 21%.^{13,14,15,16} The variation observed could be due to different socio-cultural settings, life-styles and varied study design. Prevalence of hypertension in male population was higher as compared to female in the present study similar to the findings of other studies.^{3,14,17,18,19,20} Prevalence of hypertension was observed to be increasing with age similar to several other studies.^{3,5,13,14,16,20-22} In a study conducted in elderly aged 60 and above, the overall prevalence of Hypertension was found to be 72%.¹² Men are also more likely to develop hypertension at younger age as compared to females.

Prevalence of Pre-Hypertension One-fourth of the population screened had pre-hypertension, with two-fifth of the male population having pre-hypertension. as compared to one-fifth of the females screened. Thus it is necessary that screening programmes not only focus on the easy to reach female population but also the male population. The prevalence of pre-HT found in our present study is much lower than that reported in Karnataka and Lucknow.^{13,20}

Prevalence of Awareness Awareness of Hypertension was 69% amongst the population with women being more likely to be aware as compared to men. These findings are similar to the findings of other researchers who have reported 54-57% awareness levels.^{21,23,24} A systematic review and meta analysis has estimated prevalence of awareness in urban India as 42%.⁶ The study in Pune found that the awareness of hypertension amongst the elderly was 44.3%.¹² Other researchers have reported a low awareness level of 25.3% and 32.8%.^{25,16} The higher awareness levels in present study could be due to better accessibility to

health care services. An ICMR study found that 20.8% of the total cases detected were newly detected HT, which is lower than that reported in present study (33%).³ Such a high proportion of newly detected cases, justifies the need for screening programmes in the community.

Prevalence of Treatment The prevalence of treatment was 68% in the present study as compared to 22.5% - 43.7% reported in other studies.^{6,12,23,24,25} The study in Chennai reported a figure similar to the present study.¹⁶ Once diagnosed as Hypertension, they are more likely to follow the treatment prescribed. In the present study of the 108 previously diagnosed cases only 6 cases were not taking treatment of whom 2 had optimal blood pressure.

Prevalence of Controlled HT The prevalence of controlled hypertension in the community is 40% in the present study as compared to 20% in the estimates derived by meta analysis.⁶ The study also showed that despite taking treatment, an alarmingly high proportion (40%) had uncontrolled BP levels. Other studies have also reported a higher prevalence of uncontrolled hypertension - 73.5% (Pune)¹² and 69.4% (Kerala).²³ Majority of the participants are taking treatment from the private sector, where it is difficult to ensure standardized treatment and lack of mechanism to retrieve patients who fail to follow up. The patient usually feels that since he/she is taking medication, there is no need for regular visits to the physician. Private Practitioners usually spend very little time in explaining to the patient about the disease and life style modifications. Thus poor motivation of patients to regularly visit the doctor in absence of any symptoms; poor knowledge

about the effects of uncontrolled blood pressure; and half hearted attempts of lifestyle modifications results in patients having uncontrolled BP despite treatment. If such a large proportion of hypertensive patients are having uncontrolled BP, only diagnosis and initiation of treatment is not sufficient. It means some action needs to be taken to ensure BP is under control.

Participation Rate A large proportion of the houses were locked at the time of survey, indicating that in order to increase participation, the availability of the population should be considered before planning such studies. Finding a time that is convenient to the community and the researchers is the most challenging task. The age distribution of the population between buildings and shanties shows high proportion of population above 25 years in buildings as compared to shanties. Also the proportion living in rental houses in buildings is much lower as compared to shanties. Though migration and shifting of house is common in urban areas making it difficult to establishing cohort, one can select the buildings rather than shanties to conduct cohort study. Proportion of participation amongst eligible population was only around 38%, which is much lower than that quoted in a study conducted in Lucknow.¹³ The proportion of eligible male population participating in the present survey was also much lower as compared to females. This is due to the fact that most of the population in urban areas is working, and the survey was carried out during office working hours. With high prevalence of hypertension and pre-hypertensive it becomes imperative for national programmes and other agencies working on

Non-communicable Diseases to develop innovative approaches to reach the male population and working population in urban settings.

Conclusions

Screening for hypertension is a very simple approach that can be taken up on a wider scale by appointing and training Out-Reach Workers who can work on the odd days i.e. Sundays and holidays to maximize the coverage of both male and female population. It can also be undertaken in the common public places like railway stations and bus depots. Regular screening at work place may offer better coverage for opportunistic screening. Only screening and identifying individuals with HT is not sufficient, but a concerted efforts should be made to ensure that the BP is controlled by developing educational and counseling services in the community to complement the curative services provided by the Private Practitioners.

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