Research Article

A study of prevalence and certain lifestyle risk factors of essential hypertension in a rural area in Telangana, India

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Abstract

Background: Hypertension with all its complications has emerged as one of the most important noncommunicable diseases in urban as well as rural areas of India. Effective surveillance of the disease involves collection of accurate data on its prevalence and its risk factors. In rural India, there is a dearth of data on the prevalence and risk factors of Hypertension, especially of the lifestyle-related risk factors. This information is essential to plan prevention strategies.

Objective: To assess the prevalence of Hypertension in rural population of the field practice area of Cherlapally among adults above the age group of 30 years and to determine the lifestyle risk factors for Hypertension in the abovementioned study population.

Materials and Methods: A cross-sectional study was undertaken in a rural area of Nalgonda District, Telangana, India, to determine the prevalence of the disease and certain lifestyle risk factors using the World Health Organization STEP wise approach to surveillance methodology. A total of 1,500 persons from six villages drawn by multistage systematic random sampling were studied.

Result: The prevalence of Hypertension was 24.5% in men, 20.7% in women, and 22.5% in total. The prevalence of prehypertension, stage I Hypertension, and stage II Hypertension were 26.9%, 7.5%, and 3.0%, respectively, the prevalence of Hypertension was seen to increase with age in both the genders. Association of Hypertension with tobacco use, high body mass index, abdominal obesity, high salt intake, and physical inactivity during work, transport, and leisure of study subjects was statistically highly significant.

Conclusion: The need to have targeted programs to modify and reduce the impact of lifestyle risk factors has been identified as an important strategy for rural areas.

KEY WORDS: NCD, hypertension, prevalence, lifestyle risk factors, WHO STEPS

Introduction

India is undergoing a rapid epidemiological transition with the increase in the incidence of noncommunicable diseases (NCD), such as cardiovascular diseases (CVD), cancer, chronic obstructive pulmonary disease, stroke, chronic kidney disease (CKD), and blindness, some of which are often referred to as lifestyle diseases. Among them, systemic hypertension is a very important disorder by itself and is also a strong risk factor for CVD, stroke, and CKD. Prehypertension is also associated with an increased risk of major cardiovascular events, independent of other cardiovascular risk factors.

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Recent studies showed that for every known person with Hypertension, there are two persons with either undiagnosed Hypertension or prehypertension.[1] Various community-based studies have recorded prevalence of Hypertension in India to be ranging from 30%–40% in urban and 10–20% in rural areas.[2–5] It is directly responsible for 57% of all stroke deaths and for 24% of cases of coronary heart diseases in India.[3] Only scant data are available on the prevalence of risk factors in different geographical areas in India.[6–13]

There is an urgent need to check the increasing burden of Hypertension. There are no data in rural areas on prevalence and its risk factors especially those related to lifestyles. This study was undertaken to know the actual burden of

Hypertension and its risk factors in rural areas to facilitate the planning of strategies for prevention and control and to facilitate the surveillance of risk factors.

Materials and Methods

A community-based cross-sectional study was conducted in the village of Cherlapally and villages around it, which constitute the field practice area of Rural Health Training Centre of Department of Community Medicine, Kamineni Institute of Medical Sciences, Narketpally, Nalgonda District, Telangana, India, from October 2010 to September 2012. The total population of the field practice area was 30,600. Taking the prevalence of Hypertension in rural India as 20% as a guideline, with an acceptable error of 10% at 95% confidence level, the required sample size was estimated as 1,500 for this study.

Multistage systematic random sampling method was used to select the study subjects. The 1,500 subjects were drawn from six villages based on the size of the population in each village. Six villages were selected randomly out of 11 villages in the study area in the first stage. In the second stage, the households in each village were selected by systematic sampling method. The sampling fraction for selection of households in each village varied from village to village as the number of households in each village is different. In the final stage, all persons aged 30 years and above in the selected households were included in the sample. Known cases of secondary Hypertension, pregnant women, and women on oral contraceptive pills were excluded. Ethical clearance for this study was accorded by the Institutional Ethical Committee of Kamineni Institute of Medical Sciences, Narketpally. Informed verbal consent was obtained before interview and the purpose of the interview was explained in detail to each individual.

A pro forma was designed and used after pretesting by conducting a pilot study among 50 individuals. Risk factors were measured by using the World Health Organization (WHO) STEP wise approach to surveillance of NCD.[14]

Blood pressure (BP) was measured in sitting posture on the left arm with a calibrated mercurial sphygmomanometer. Three measurements taken after 3 min rest between each measurement were recorded for each subject. The mean of the second and third readings was used to diagnose Hypertension.[14] Subjects with systolic blood pressure (SBP) ≥140 mm Hg and/or diastolic blood pressure (DBP) ≥90 mm Hg, known cases of essential Hypertension, and subjects on antihypertensive medication were considered as hypertensive.

Height was recorded by stadiometer to the nearest 0.5 cm. Weight was measured with calibrated spring weighing machine to the nearest 0.5 kg. Body mass index (BMI) was calculated using the formula: weight (kg)/height (m^2). Waist was measured at midway of the inferior margin of last rib and iliac crest in a horizontal plane at the end of a normal expiration. Hip circumference was taken around the pelvis at the point of maximal protrusion of buttocks to the nearest 0.1 cm.[14]

All the lifestyle risk factors were measured as per the guidelines of WHO STEP wise approach to the surveillance of NCD.[14]

Current tobacco chewers/smokers are those who chew tobacco regularly or smoke regularly and chewed/smoked at least once on an average during the previous 30 days from the time of the study.

Current alcohol drinkers are those who consume alcohol at present or have consumed within the past 1 year.

Consumption of one cup of raw green leafy vegetables or half cup of other vegetables (cooked or chopped raw) or half cup of vegetable juice is taken as one serving. One serving of fruit was considered to be one medium size apple or banana or orange or half cup of chopped, cooked, canned fruit or half cup of fruit juice, not artificially flavored.

Physical inactivity is defined as less than 10 min of activity at a stretch, during work, transport, or leisure, and was estimated as METs (metabolic equivalents) for each subject using WHO Global Physical Activity Questionnaire Analysis Guide.[15] MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate.

Generalized obesity was defined as having BMI ≥30 kg/m^2 and abdominal obesity as waist circumference ≥90 cm for men and ≥80 cm for women as per WHO guidelines.[16]

Average daily intake of salt in grams per person per day was calculated from the total monthly consumption of salt by the family divided by the family size and then by 30. JNC (Joint National Committee) has recommended a daily intake of salt as 6 g/day.[2]

SPSS (Statistical package for the social sciences) 19.0 version was used for the analysis of data. Distribution of Hypertension prevalence by age and gender was calculated. The data were further subjected to univariate as well as multivariate analysis to determine the relationship of Hypertension and various risk factors.

Result

Age–sex distribution of the total 1,500 study subjects is shown in Table 1. There were 700 (46.7%) men and 800 (53.3%) women. The prevalence of Hypertension increased significantly with age ($p < 0.001$) is shown in Table 2. The prevalence of Hypertension was 24.5% in men, 20.7% in women, and 22.5% in total is shown in Table 3. By the grade of Hypertension, the prevalence of prehypertension, stage I Hypertension, and stage II Hypertension were 26.9%, 7.5%, and 3.0%, respectively, as shown in Table 4. Univariate analysis of risk factors for high BP shows age, tobacco use, high BMI, abdominal obesity, high salt intake, and physical inactivity as statistically highly significant, which is shown in Table 5. Multivariate analysis identified age, tobacco use, fruit and vegetables consumption, high BMI, abdominal obesity, high salt intake, and physical inactivity as independent risk factors of Hypertension, which is shown in Table 6.

Table 1: Distribution of study subjects according to age and gender (n = 1,500)

Age group	Males	Females	Total
	No. (%)	No. (%)	No. (%)
30–39	181 (25.8)	239 (29.8)	420 (28.0)
40–49	186 (26.6)	196 (24.5)	382 (25.5)
50–59	130 (18.6)	153 (19.1)	283 (18.8)
60–69	134 (19.1)	158 (19.8)	292 (19.5)
70+	69 (9.9)	54 (6.8)	123 (8.2)
Total	700 (100.0)	800 (100.0)	1,500 (100.0)

Table 2: Prevalence of hypertension by age (n = 338)

Age group (years)	No. examined	No. with hypertension	Prevalence (%)
30–39	420	27	6.4
40–49	382	65	17.0
50–59	283	90	31.8
60–69	292	105	35.9
70+	123	51	41.4
Total	1,500	338	22.5

Chi-square for linear trend: (extended Mantel-Haenszel χ^2) 131.9.
$p < 0.0001$.

Table 3: Prevalence of hypertension by sex (n = 1,500)

Sex	Total population screened	No. with hypertension	Prevalence of hypertension
Males	700	172	24.5
Females	800	166	20.7
Total	1,500	338	22.5

Table 4: Distribution of study subjects according to severity of blood pressure levels

Grade of hypertension[a]	SBP		DBP	Frequency	Percentage (%)
	(mm Hg)		(mm Hg)		
Normal	<120	And	<80	759	50.6
Prehypertension	120–139	Or	80–89	403	26.9
Hypertension stage I	140–159	Or	90–99	113	7.5
Hypertension stage II	≥160	Or	≥100	45	3.0
Hypertensives on treatment	Any value		Any value	180	12.0
Total				1,500	100.0

SBP, systolic blood pressure; DBP, diastolic blood pressure.
[a]As per Joint National Commission on Hypertension 7th Report criteria.

Discussion

In this study, prevalence of Hypertension (overall: 22.5%; men: 24.5%; women: 20.7%) is comparable with the studies by other authors.[5,17–25] To cite a few, Kokiwar and Gupta[17] observed the overall prevalence of Hypertension as 19.04%, 23.4% among women and 14.4% among men. In a study by Rajasekar et al.,[18] noted overall prevalence was 19.1%, 19.6% in men and 18.5% in women. Kannan and Satyamoorthy[19] observed overall prevalence as 25.2%, 22.6% in men and 27.4% in women. Madhukumar et al.[20] reported overall prevalence as 8.06%. Yuvraj et al.[21] showed that the overall prevalence was 18.3% (men: 19.1%, females: 17.5%). Kadu et al.[22] reported that the overall prevalence of Hypertension was 12.75% with 13.10% in men and 12.52% in women. Deshmukh et al.[23] showed the prevalence to be 21.8% among men and 19.8% among women. The variations with some studies that showed lower prevalence could be explained by the differences in the age distribution of the study subjects and sampling variations between studies.

Age-dependent increase in the prevalence of Hypertension in both men and women reported in majority of studies

Table 5: Univariate analysis of lifestyle risk factors of hypertension (n = 1,500)

Variable	Hypertensives	χ^2	*p*-Value	Unadjusted odds ratio	95% confidence interval	
	N (%)				Lower	Upper
Age						
30–39	27 (6.4)			1		
40–49	65 (17.0)	22.080	0.000*	2.988	1.86	4.78
50–59	90 (31.8)	78.464	0.000*	6.788	4.21	10.78
60–69	105 (35.8)	99.460	0.000*	8.173	5.17	12.91
Above 70	51 (41.1)	94.931	0.000*	10.31	6.07	17.51
Tobacco use						
No	191 (18.7)			1		
Yes	147 (30.5)	26.142	0.000*	1.908	1.486	2.449
Alcohol use						
No	166 (22.2)			1		
Yes	172 (22.8)	0.083	0.774	1.036	0.813	1.320
Fruits and vegetables serving						
<5	324 (22.2)			1		
>5	14 (32.6)	2.549	0.110	0.592	0.309	1.134
BMI						
≤24.9	208 (20.2)			1		
25–29.9	92 (24.4)	2.974	0.085	1.279	0.967	1.692
≥30	38 (41.8)	22.814	0.000*	2.840	1.843	4.426
Waist circumference						
Nonobese	256 (19.6)			1		
Obese	82 (42.3)	43.713	0.000*	3.003	2.189	4.119
Salt intake						
<6 g	54 (16.2)			1		
>6 g	284 (24.3)	9.597	0.002*	1.654	1.200	2.279
Physical activity						
>600 MET	181 (17.1)			1		
<600 MET	157 (35.2)	58.900	0.000*	2.632	2.046	3.386

BMI, body mass index; MET, metabolic equivalent.
*p value < 0.05.

is comparable with this study.[17–22] The higher prevalence of Hypertension in men (24.5%) than in women (20.7%) seen in this study is comparable with other studies.[5,8–25]

The prevalence of prehypertension, stage I Hypertension, and stage II Hypertension as per JNC VII criteria were 26.9%, 7.5%, and 3.0%, respectively, in this study. Kokiwar and Gupta[17] observed these rates as 18.8%, 10.1%, and 6.7%, respectively. Yuvraj et al.[21] noted the prevalence of optimal BP as 11.7%, high BP as 15.7%, grade 1 as 11.6%, grade 2 as 5.6%, and grade 3 as 1.2%. The differences between this study and other studies could be explained by the differences in the age groups of the study subjects and the differences in the method of classification of the disease.

Multiple logistic regression analysis in this study showed that age, tobacco use, high BMI, abdominal obesity, extra salt intake, and physical inactivity were independent risk factors of Hypertension. Prevalence increased with each decade of increase in age to 7.45 times at the age of 70 or above. In this study, tobacco users were 1.44 times more at risk of having Hypertension as compared with nontobacco users and also tobacco use was significantly associated with Hypertension, which is comparable with other studies.[17–20,26] In this study, study subjects with BMI >30 kg/m^2 were 1.952 times at risk of having Hypertension as compared with subjects with BMI <30 kg/m^2. The association of Hypertension with obesity as per BMI found to be statistically significant in this study was also comparable to other studies.[17–20,23] Study subjects with abdominal obesity were 2.36 times at risk of having Hypertension as compared with subjects without abdominal obesity. The association of Hypertension with abdominal obesity found to be statistically significant in this study was also comparable to other studies.[18,23] Study subjects consuming high salt

Table 6: Multiple logistic regression analysis of risk factors of hypertension (*n* = 1,500)

Variable	Adjusted odds ratio	95% Confidence interval		df	Significance
		Lower	Upper		
Age					
30–39	1				
40–49	1.253	0.795	1.973	1	0.331
50–59	1.369	0.848	2.209	1	0.199
60–69	2.558	1.536	4.260	1	0.000*
Above 70	7.452	4.106	13.527	1	0.000*
Tobacco use					
No	1				
Yes	1.440	1.073	1.933	1	0.01*
Alcohol use					
No	1				
Yes	0.761	0.570	1.015	1	0.06
Fruits and vegetables serving					
>5	1				
<5	0.422	0.210	0.848	1	0.01*
BMI					
<30	1				
>30	1.952	1.183	3.221	1	0.01*
Waist circumference					
Nonobese	1				
Obese	2.363	1.663	3.358	1	0.000*
High salt intake					
<6 g	1				
>6 g	1.946	1.369	2.767	1	0.000*
Physical activity					
>600 MET	1				
<600 MET	1.477	1.086	2.008	1	0.01*

BMI, body mass index; df, degree of freedom; MET, metabolic equivalent.
*p value < 0.05.

intake were at 1.94 times higher risk of having Hypertension as compared with subjects not consuming high salt and this is comparable to some other studies.[20,27] Fruit and vegetable intake was not statistically significant with Hypertension in this study. Agarwal et al.[28] reported similar findings. In this study, the prevalence of Hypertension decreased with increased physical activity, which is comparable with other studies.[17,19,28]

This study can contribute in finding the reason for the drastic increase in the BP of the rural population and also to formulate appropriate Hypertension control programs as very few research studies of risk factors have been conducted in the rural areas of Telangana. Limitations of the study were that normal-sized cuff was used for the study irrespective of subject's arm circumference, this would have introduced a systematic bias in the measurement of BP; accurate assessment of salt intake and vegetable and fruit servings was not done because of logistic problems; and family history of Hypertension was not taken into consideration as majority of the subjects were not aware of their family history.

Conclusion

This study brought to our notice that Hypertension in the study area was a significant problem. It also revealed that lifestyle risk factors were highly prevalent and significantly associated with the disease. There is plenty of scope for early detection and control of risk factors and motivation/education for risk factor modification/prevention of establishment of risk factors. There was also a need for the early detection of prehypertension and established Hypertension and for the treatment of the affected individuals through appropriate community-based screening and treatment strategies. This study provided useful data for planning and implementing Hypertension prevention programs in the community.

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