Research Article

Prevalence and determinants of systemic hypertension among 15-year and older respondents in a rural area of Kancheepuram district, Tamil Nadu—a cross-sectional study

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Abstract

Background: Noncommunicable disease (NCD) is the leading cause of death worldwide, and mortality owing to NCD is higher in low- and middle-income countries. Worldwide, hypertension-related mortality accounts for 9.4 million in the form of cardiovascular diseases and stroke. In India, there has been an alarming increase in the prevalence of NCD over the past two decades so much so that accounts for 24% of all deaths among adults aged 25–69 years.

Objective: To study the prevalence and determinants of systemic hypertension among 15-year and older respondents in a rural area of Kancheepuram district, Tamil Nadu.

Materials and Methods: A community-based, cross-sectional study was carried out among 3,681 15-year and older respondents in Chunampet panchayat, a rural area in Kancheepuram district. JNC 7 guidelines were used for diagnosis of hypertension. Data entry was done in MS Excel 2013, and SPSS version 21 was used for analysis. The 95% confidence interval for proportions was calculated using EpiInfo software.

Result: The overall prevalence of hypertension in our study population was 10.8%, which included the participants who are known hypertensive on treatment and/or whose blood pressure was more than 140/90 mm Hg in sitting position for adult and adolescence more than 95 percentile. The prevalence of isolated systolic hypertension was 2.9% (n = 104), 2.7% among male and 2.9% among female subjects. The prevalence of hypertension increased proportionately with increasing age. Hypertension was more prevalent among those who had the habit of smoking tobacco (18.2%), alcohol consumption (17.4%), and those who were obese (14.2%).

Conclusion: Prevalence of hypertension increases as the age advances. Smoking tobacco, consuming alcohol, and obesity were found to be significant risk factors for hypertension. Interventions aimed toward alleviating these risk factors can help in reducing the risk of developing hypertension.

KEY WORDS: Prevalence, hypertension, rural India, prehypertension

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Introduction

Noncommunicable disease (NCD) is the leading cause of death worldwide, and mortality owing to NCD is higher in low- and middle-income countries.[1] Worldwide, hypertension-related mortality accounts for 9.4 million in the form of cardiovascular diseases and stroke. In India, there has been an alarming increase in the prevalence of NCD over the past

two decades so much so that accounts for 24% of all deaths among adults aged 25–69 years.[2] Asian Indians have been found to develop NCD at a younger age than other populations.[3] The probable reasons for the rise in the NCD rates comprise lifestyle changes related to urbanization and the epidemiologic and nutritional changeovers that accompany economic development.[4]

The four main types of NCDs are cardiovascular diseases (such as heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma), and diabetes. According to the WHO, nearly 80% of NCD deaths—29 million—occur in low- and middle-income countries.[1] NCDs are the most common cause of death in the Southeast Asia region, estimated about 7.9 million annually (55% of the total deaths in the region).[2] One-third of these deaths are premature and occur before the age of 60 years, thus affecting economically productive individuals.[3] Globally, around 25 million or one half of all deaths are from NCDs, and this proportion keeps rising. The WHO estimated that, in 2000, NCDs and mental disorders caused 59% of deaths and 46% of the global burden of disease (WHO, 2002). On the basis of available trends, by 2020, NCDs are predicted to account for 73% of deaths and 60% of disease burden worldwide (Murray, 1996).[4] Cardiovascular diseases account for most NCD deaths, around 17.3 million people annually, followed by cancers (7.6 million), respiratory diseases (4.2 million), and diabetes (1.3 million). These four groups of diseases account for around 80% of all NCD deaths. The most common risk factors include tobacco use, the harmful use of alcohol, unhealthy diets, and physical inactivity.[5]

Materials and Methods

Study Setting

This community-based, cross-sectional study was carried out in Chunambed panchayat, a rural area in Kancheepuram district, Tamil Nadu, South India, which is also the field practice area of Rural Health Training Center, Pondicherry Institute of Medical Sciences. The study subjects were all the adults and adolescents in the study area aged 15 years and older, residing in the area for more than 1 year and who are consenting to participate in the study.

Sample Size

With the prevalence of hypertension taken as 26% from ICMR-INIDAB study,[6] the minimum required sample size was calculated to be 3,420 with 5% alpha error and absolute precision of 1.5%.

Sampling

The overall population of the 10 villages in the institute's field practice area was 16,005. Probability proportional to size sampling was done in selection of villages (8 of 10). Systematic random sampling was done in recruiting the desired number of participants from each village.

Procedure

Trained interviewers visited all the households in the villages for data collection. Written informed consent was obtained from all the participants of the household who met the inclusion criteria, after which, data collection was done using a structured, pretested, questionnaire by the interviewers. The questionnaire contained the details regarding the socio-demographic details, education, occupation, monthly income of the family, smoking status, alcohol consumption, physical activity, diet, history of medical illnesses, height (measured), and weight (measured). Blood pressure was measured twice at 5 min interval using automated blood pressure measuring apparatus (OMRAN). Average of the two blood pressure readings was considered for analysis.

Operational Definitions

Known case of systemic hypertension on treatment or adult whose blood pressure was more than 140/90 mm Hg during the time of examination were considered hypertensive for adolescents whomever blood pressure was more than 95 percentile. JNC 7 guidelines were used for diagnosing hypertension among adults, and European Society of Hypertension for adolescence and children were used. Participants who used any form of tobacco smoking or alcohol consumption for a period of more than 1 year were considered smokers and alcohol consumers, respectively. Participants with body mass index (BMI) > 30 kg/m^2 were classified as obese.

Exclusion Criteria

All those who were critically ill and not available in the household even after three repeated visits were excluded from the study.

Statistical Analysis

Data entry was done in MS Excel 2013, and SPSS version 21 was used for analysis. The 95% confidence interval for proportions was calculated using EpiInfo software.

Result

The overall prevalence of hypertension in our study population was 10.8%. The prevalence of prehypertension and hypertension among our study population was 34.2% and 9.1%, respectively, based on the blood pressure measure during the examination. The prevalence of isolated systolic hypertension was 2.9% (n = 104), 2.7% among male and 2.9% among female subjects [Table 1].

Among all the hypertensive (including those who are on treatment) participants, majority (81.2%) of them showed increased blood pressure, and 44.4% of them were previously undiagnosed although they showed increased blood pressure. For nearly 66% of the hypertensive participants who were on treatment, blood pressure was still high [Figure 1].

The prevalence distribution of hypertension was almost similar between the various villages studied in the survey. The

lowest prevalence of hypertension among the villages was 5.7% and the highest prevalence 14.8% [Table 2].

The prevalence of hypertension increased proportionately with increasing age, with a peak prevalence of 23.5% and 24.4% in the age group of 58–67 years and >67 years, respectively. Similarly, 1.5% of the young population belonging to the age group of 15–27 years showed hypertension.

The sex distribution of the study population was almost equal, male subjects representing 46.2% and female subjects 53.8%. More male subjects (11.2%) showed hypertension when compared with females (10.8%), however, this difference was not statistically significant. About 37.3% of the study population were illiterates, and they showed a higher prevalence of hypertension (16%). Hypertension was uncommon among those who are professionals (3.8%), while the prevalence was much higher among unskilled workers (12.2%). Nearly half of our study subjects belonged to socioeconomic class IV, and the highest prevalence of hypertension was seen in the lower socioeconomic groups.

Hypertension was more prevalent among those who had the habit of smoking tobacco (18.2%), alcohol consumption (17.4%), and those who are obese (14.2%).

Nearly 90% of our study subjects were not involved in any form of physical activity. There were no hypertensive individuals in the study among those who practised jogging, cycling, outdoor games, working out in gym, and other forms of physical activity. Moreover, the prevalence was much lower in those subjects who were doing brisk walking regularly. There were very less number of individuals who followed a vegetarian diet, and the prevalence of hypertension was less among those [Table 3].

Discussion

Chronic NCDs are assuming increasing importance among adult population in both developing and developed countries. The prevalence of NCDs is showing an upward trend in many countries, and this trend is likely to increase. In India, there is an epidemiologic transition that occurs, that is, there is an increase in number of NCDs from communicable diseases (WHO).[7] Among the NCDs, hypertension and diabetes mellitus were more common. The most important causative factor for this epidemiologic transition is lifestyle modifications.[8]

Our study, basically, relates the lifestyle modifications with that of prevalence of hypertension. Our study also seeks association of the sociodemographic factors and the socioeconomic factors associated with hypertension. NCDs usually come to light in the middle years of life and, thereafter, begins to rise in frequency. Various studies in India reported different levels of hypertension among different age groups. ICMR-INDIAB[6] study reported a higher prevalence of hypertension (26%) when compared with our study; however, the other study was conducted among participants aged 20 years and older. Das et al.,[9] in a study carried out in West Bengal among adults in an urban region, observed that the prevalence of systolic and diastolic hypertension was 40.9% and 29.3%, respectively. While CURES study[10] reported an overall prevalence of hypertension as 20%, Singh et al.[11] who conducted a study in five cities of India also reported a higher prevalence of prehypertension and hypertension in South India ranging from 20% to 35%. Other studies conducted in India also showed a similar varying prevalence of hypertension.[12,13]

Table 1: Prevalence of hypertension based on measured blood pressure of the participants at the time of interview* (*N* = 3681)

Classification of blood pressure	Systolic BP, *n* (%)	Diastolic BP, *n* (%)	Systolic BP and diastolic BP,*n* (%)
Normal	2,326 (63.2)	2,630 (71.4)	2,087 (56.7)
Prehypertension	961 (26.1)	927 (25.2)	1,260 (34.2)
Stage I hypertension	343 (9.3)	105 (2.9)	298 (8.1)
Stage II hypertension	51 (1.4)	19 (0.5)	36 (1)

*Also includes hypertensive participants those who are on treatment.

Table 2: Prevalence of hypertension based on the village of the study participants

Village	Number of study participants, *n* (%)	Prevalence of hypertension, *n* (%)	*p*
Agaram	340 (9.2)	29 (8.5)	0.001
Illedu	741 (20.1)	71 (9.6)	
Kayanaloor	234 (6.4)	27 (11.5)	
Manapakkam	534 (14.5)	50 (9.4)	
Pudupattu	316 (8.6)	18 (5.7)	
Puthirankottai	542 (14.7)	70 (12.9)	
Villipakam	542 (14.7)	70 (12.9)	
Vanniyanallure	432 (11.8)	64 (14.8)	
Total	3,681 (100.0)	399 (100.0)	

Table 3: Distribution of study participants based on various determinants

	n (%), (*N* = 3,681)	Prevalence of hypertension, *n* (%), *N* = 399	95% Confidence interval	Odds ratio	*p*
Age group (years)					
<27	867 (23.6)	13 (1.5)	1.11–1.89	1	0.000
28–37	842 (22.9)	42 (5.0)	4.3–5.7	3.45	
38–47	676 (18.4)	75 (11.1)	10.09–12.11	8.20	
48–57	529 (14.4)	86 (16.3)	15.11–17.49	12.75	
58–67	459 (12.5)	108 (23.5)	22.13–24.87	20.21	
>67	308 (8.4)	75 (24.4)	23.01–25.79	21.15	
Sex					
Male	1,701 (46.2)	190 (11.2)	10.18–12.22	1.06	0.542
Female	1,980 (53.8)	209 (10.8)	9.8–11.8		
Education					
Illiterate	1,374 (37.3)	220 (16)	14.82–17.18	2.27	0.000
Literate	2,307 (62.7)	179 (7.8)	6.93–8.67		
Occupation					
Unskilled	1,760 (47.8)	214 (12.2)	11.14–13.26	1	0.000
Skilled	749 (20.4)	58 (7.7)	6.84–8.56	0.61	
Professional	26 (0.7)	1 (3.8)	3.18–4.42	0.29	
Others	1,146 (31.1)	126 (11.0)	9.99–12.01	0.89	
Socioeconomic status (per capita income)					
I: > Rs. 17,964	115 (3.1)	12 (10.5)	9.51–11.49	1	0.000
II: Rs. 8,982–17,964	411 (11.2)	53 (12.9)	11.82–13.98	1.27	
III: Rs. 5,389–8,981	754 (28.5)	53 (7)	6.18–7.82	0.65	
IV: Rs. 2,695–5,388	1871 (50.8)	198 (10.6)	9.61–11.59	1.02	
V: < Rs. 2,695	530 (14.4)	83 (15.7)	14.52–16.88	1.59	
Smoking					
Yes	247 (6.7)	45 (18.2)	16.95–19.45	1.94	0.000
No	3,434 (93.3)	354 (10.3)	9.32–11.28		
Alcohol					
Yes	505 (13.7)	88 (17.4)	16.18–18.62	1.96	0.000
No	3,176 (86.3)	309 (10)	9.03–10.97		
Obesity					
BMI < 25 (kg/m^2)	2,275 (61.8)	200 (8.8)	7.88–9.72	1.71	0.000
BMI > 25 (kg/m^2)	1,406 (38.2)	199 (14.2)	13.07–15.33		
Physical activity					
Brisk walking	294 (8.0)	22 (7.5)	6.65–8.35	1	0.033
Jogging	12 (0.2)	0			
Cycling	38 (1)	0			
Games	25 (0.7)	0			
Gym	10 (0.3)	0			
Others	1 (0.1)	0			
None	3,301 (89.7)	377 (10.8)	9.8–11.8	1.59	
Diet					
Vegetarian	15 (0.4)	1 (6.7)	5.89–7.51	0.59	0.774
Nonvegetarian	3666 (99.6)	398 (10.8)	9.8–11.8		
Total	3681 (100)	399 (10.8)	9.8–11.8		

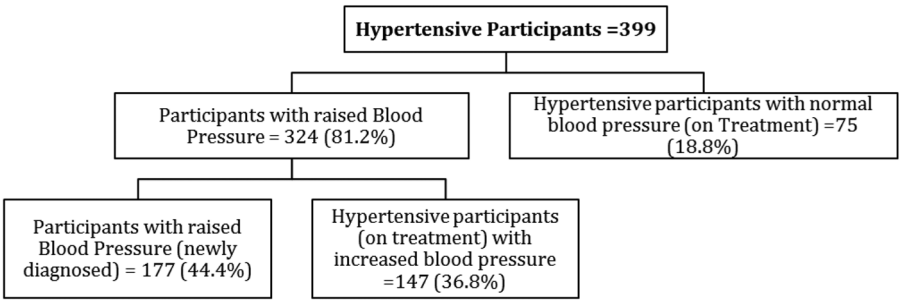

Figure 1: Schematic representation of hypertensive participants based on blood pressure and treatment status.

High blood pressure among the hypertensive participants on treatment could be possibly due to noncompliance with treatment or inadequate treatment.

In this study, the prevalence of hypertension was found to be highest in the age group of 58 –67 years or older. Study by Yadav et al.[14] also reported that prevalence of hypertension was highest in the age group of 60–69 years. It was also observed in the study that prevalence increases with each passing decade of life, which further confirms the positive relationship with increasing age. Similar association was also seen in study carried out by Das et al.[9] A wide survey was done in Surat,[15] and the prevalence of hypertension was significantly higher among male employees 32.5% when compared with female employees 23.1%, ($p < 0.01$). Similar type of observation was found in our study also. However, there was a very minimal difference in the prevalence of hypertension between the two genders, and this difference was not statistically significant. This can be attributable to the fact that this study was conducted in a rural area where both the male and female subjects are equally involved in physical labor. Prevalence of both hypertension was high among those who used to smoke tobacco, consume alcohol, and among those who are obese in this study. Similar results were also observed by other researchers in India.[11,15–19] Similarly, physical inactivity was also observed to be a risk factor for hypertension, which was the result of various other studies as well.[15,20–22] Moreover, many studies have stated the effectiveness of treating hypertension by modifications of lifestyle factors, which are considered a risk factor for the development of hypertension.[23–26] Our study adds an additional evidence that increasing age, physical inactivity, smoking tobacco, and obesity are risk factors of hypertension in our study population. Prevention of hypertension may be aimed at reducing the prevalence of abovementioned risk factors. The strengths of our study are community-based; appropriate sampling technique; and standard equipment used. The inability to study all the possible determinants adequately could be a limitation of our study. All the participants with high blood pressure during examination were referred to the nearby health center for further evaluation and management.

Conclusion

Prevalence of hypertension was 10.8%, and it increases as the age advances; smoking tobacco, consuming alcohol, and obesity are found to be significant risk factors for hypertension. Interventions and mass screening are required to catch up undiagnosed patients, and proactive measures to improve blood pressure control among diagnosed hypertensive patients.

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