Research Article

Hypertension in Kerala: A study of prevalence, control, and knowledge among adults

Sebastian NM, Jesha MM, Sheela P Haveri, Arya S Nath

Department of Community Medicine, MES Medical College, Perinthalmanna. Kerala, India.
Correspondence to: Sebastian NM, E-mail: nmsebastian@gmail.com

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Abstract

Background: Hypertension a silent killer as it is symptomless and remains undiagnosed, and not controlled if diagnosed. Hypertension is on the increase and affects more than 20% of adult population. Prevalence estimates are required to design control measures for hypertension, cardiovascular diseases, and stroke.

Objective: This study aims to reveal the prevalence, proportion of hypertension cases treated and controlled, and the knowledge and practice among hypertensives.

Materials and Methods: A cross-sectional community-based study was conducted among adults above 30 in the municipal town of Perinthalmanna, Kerala, India. The blood pressures (BPs) of 1154 adults were recorded at their homes along with their personal details, history of earlier diagnosis, treatment, and dietary and lifestyle modification. Data were entered in Microsoft Excel and analyzed using Epi-info.

Result: The prevalence of hypertension was 32.3%. Among them 55% were already diagnosed and 45% newly diagnosed during the study. The prevalence increases with age. Prevalence of prehypertension was 43.7%. Among those treated, only 33.9% had their BPs controlled. The percentage of those who were aware of dietary restriction was 79.4% and 76% were practicing. The percentage of subjects aware of a need for regular BP check was 83.6% but 69% were doing so. Only 42.6% were aware of a need for other lifestyle changes and 34.4% were practicing. Age, family history, and sedentary lifestyle were identified as correlates of hypertension.

Conclusion: The prevalence of hypertension and prehypertension is high and the control of hypertension among those treated is low.

KEY WORDS: Hypertension, prevalence, control, correlates, awareness and practice

Introduction

A disorder that has no apparent symptoms but later results in serious health problems can pose great threat to the health of people. Hypertension is such a major noncommunicable disease (NCD) and affects about 20% of the population in most communities. Hypertension has a major hand in causation of coronary artery diseases, stroke and various other vascular complications, and renal disorders.[1] It accounts for 7.5 million deaths and 57 million DALYS worldwide. It is one of the major risk factor for cardiovascular mortality, which accounts for 20%–50% of all deaths, making it a silent killer.

Although blood pressure (BP) is easily measurable, most patients, as they do not have symptoms, do not consult a facility for checking BP, and even if they are diagnosed, may not take adequate treatment for controlling BP. According to the "Rule Of Halves" stated in 1970s; 'only about half of the hypertensive subjects in the general population are aware of their condition, only about half those aware are being treated and only half of those being treated are adequately treated to keep it under control. This leaves the vast majority of hypertension cases not controlled and being at risk of developing complications.

Globally, the overall prevalence of hypertension in adults aged 25 years and above was 40% in 2008.[2] The prevalence

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in India as per the study by Indian Council of Medical Research (ICMR) was 25% among urban population and 29% among rural population when systolic BP of 140 and above and/or diastolic BP of 90 or above were considered as hypertension.[3] According to NCD risk factor survey conducted by Integrated Disease Surveillance Project (IDSP), during 2007–2008, the prevalence of hypertension in India varied between 17% and 20%, and 23%–24% in Kerala state where this study was conducted.[4]

The prevalence of hypertension is increasing over the years globally. In India, this increase is evident in urban and rural areas over the years from trend studies. Compiled study reports from 1949 to 1999 shows gradual increase in prevalence in both urban and rural areas in India.[5]

In recent years, the Central Health Ministry in India has launched a National Program for control of NCDs. To plan for interventions, it is important to know the extent of the problem of hypertension in the community and also whether the patients diagnosed as having hypertension are correctly managed and BP kept at normal levels. The present study attempts to bring out the prevalence of hypertension among adults and also the proportion of them adequately treated and got their BP under control.

Kerala is a state in southern India where, though many health indices are more comparable with developed countries than northern states in India, the dual burden of NCD and communicable disease such as vector-borne diseases are present. This study is conducted in the municipal town of Perinthalmanna in Kerala. Perinthalmanna is known as the "Hospital town" of Malappuram district in Kerala, where there are many hospitals including a government district hospital that provides curative services. In this urban area, Primary Health Centers that implements preventive and promotive health care practically do not exist. It may be interesting to see how far the curative services succeed in detecting and controlling hypertension. The results of the study will also be useful for planning interventions for control of hypertension in the community.

The study was conducted with the objectives to find out the prevalence of hypertension among adults aged 30 years and above, to know the proportion of hypertensives that are currently being treated for this condition and the proportion of them adequately treated to control BP, and to assess knowledge and practice regarding diet and lifestyle modifications among hypertensive subjects.

Materials and Methods

The town of Perinthalmanna in northern Kerala, India, has a population of around 50,000 (49,723 in 2011 census). This population resides in 34 wards. A cross-sectional descriptive study design was adopted. The study was conducted among adults aged 30 years and above (study population). Those who were below 30 years and pregnant ladies were excluded from the study. The study was completed in 3 months from February 2015. To obtain prevalence, sample size was calculated using prevalence estimate of 20% as was seen in NCD risk factor survey conducted by IDSP during 2007–2008 and allowing for a difference of 15%. The estimated sample size was 711. Allowing for design effect on sample size of 1070 adults was to be studied. Each of the 34 wards was taken as a cluster and from each cluster 32 subjects were included in the study. From each ward, first house was identified randomly and houses were covered serially until proportionate number of adults was obtained. From the identified houses all adults 30 years and above were included in the study. Two interns and one social worker formed a team and visited the homes and collected data. The interns were given a short training on recording the BP correctly using sphygmomanometer and recording the other details in a semistructured format**.** Informed consent was taken from the participants. Details regarding age, gender, educational status, and occupation were recorded. Details of any other illness, family history of hypertension, and whether BP had been checked before were also recorded.

BP of all adults was measured using sphygmomanometer twice at an interval of 5 min and the lower reading was recorded. Though ideally BP has to be measured on second occasion before labeling as hypertension this could not be done because of feasibility problems. For calculation of prevalence the definition of hypertension included subjects with systolic BP $\geq$ 140 mmHg and or diastolic BP $\geq$ 90 mmHg. and those who are already diagnosed and being treated for hypertension regardless of their BP reading now. Sociodemographic details, family history of hypertension, and other existing health problems were collected. From those who were previously diagnosed as having hypertension, details of treatment, BP checking, dietary changes, and lifestyle modification were collected to know their awareness and practice. After data collection, those who are detected with hypertension were given a health education on the importance of controlling BP including the proper treatment and diet modification.

There were no ethical problems in this study, but ethical clearance was obtained from Institutional Ethical Committee. Individual verbal consent was taken from each patient. No interventions were planned as part of the study. Those who were detected to have hypertension were given appropriate education and management.

Statistical Analysis

Data were entered in Microsoft Excel and analyzed using statistical program Epi-info. Prevalence of hypertension was calculated as percentage of all people newly diagnosed plus those who were previously diagnosed and on treatment, to the total people studied. Persons studied were grouped into controlled hypertension, normal BP, prehypertension Grade 1, and Grade 2 hypertensions, according to the new classification of BP (JNC 7). Percentage of people on regular treatment and percentage with controlled BP were calculated taking those people with previously diagnosed BP as denominator. The pattern of treatment, knowledge, and practice were also

analyzed among these people. Logistic regression analysis was carried out to identify correlates of hypertension.

Result

Data were obtained from a total of 1154 persons above the age of 30 years. Out of them, 765 were females (66%) and 389 were males (34%). This difference should be due to the fact that many of the males were out of the house for work during the day time. Majority of the subjects (93%) were between ages 30 and 70 years and 7% above the age of 70 years. The demographic characteristics of the study population are depicted in Table 1. Out of the 1154 individuals studied, 373 were identified as having hypertension giving a prevalence of 32.3% (CI =29.5–35.1) among people 30 years and above in the study area. The prevalence increases with age, 11.5% was among youngest age group of 30–39 and 62.1% people were above 80 as shown in Table 2**.** The prevalence of prehypertension was 43.7%. Figure 1 shows the comparative prevalence of prehypertension and hypertension among various age groups. Bivariate cross-tabulation analysis showed significant higher prevalence among women compared to men ($p = 0.014$), which on logistic regression analysis with other predictive variables turned to be not significant.

Out of the 373 hypertensive subjects, 169 (45%) were undiagnosed at the time of the study and the remaining 204 (55%) were diagnosed by the time. The prevalence of undetected hypertension was 17.8% (n = 950). Figure 2 depicts the prevalence of undetected hypertension according to age group.

Sixty-five percent of the 204 previously diagnosed patients were taking only a single drug, 18% two drugs, and 2% of them three drugs. Fifteen percent were advised diet modification and exercises. Eighty-six percent of the patients put on medicines informed that they regularly take medicines; the remaining told they used to miss doses. Among those on treatment, only 33.9% had BP at controlled levels (systolic < 140 mm and diastolic < 90 mm of mercury) as shown in Table 3.

79.4% of those on treatment were aware that they should have dietary restriction of salt and 76% reported that they were actually restricting salt in diet. Only 42.6% were aware that lifestyle changes like regular exercise are required and 34.4% said that they were practicing that. 83.6% were aware of the need for regular BP checking but only 69.1% were checking BP at least once a month. These results are depicted in Figure 3.

Logistic regression analysis was carried out to identify correlates of hypertension by including predictive variables such as gender, age group, income, educational status, employment, family history of hypertension and comorbidities, diabetes, and hypercholesteremia (self-reported). The adjusted odds ratio showed significant odds for higher age group and also presence of family history of hypertension. Patients who reported having no work and house wives showed adjusted odds ratio of 1.5, which is marginally significant at 95% level. Female gender, low income, and low educational status that showed significantly higher prevalence on bivariate analysis showed no significance in step-wise model in logistic regression analysis (Table 4).

Discussion

The prevalence of hypertension and prehypertension obtained in our study are high and agrees with other prevalence studies in the region to attract concern. Another important observation was that in spite of treatment, 66.1% of patients with hypertension have BP above controlled level, showing inadequate treatment. Sedentary life without any work appears as a risk factor when compared to working people. No correlation was observed in our study between presence of diabetes and hypertension.

Recent review articles on prevalence of hypertension reports a prevalence of 33.1% in urban and 28.3% in urban and rural south India.[6] This observation is similar to the finding of our study. A study from Chennai has reported a prevalence of 22.1% of which 37.3% were known hypertensives and among them only 50% were taking treatment and among them only 41% had controlled hypertension.[7] Our results differ that more than half (54.7%) are already diagnosed with hypertension and among them large majority were taking treatment (86.7%) but when it comes to control only one third of those treated (33.9%) were under control. This means that more than half of prevalent cases in our study are diagnosed, and most of them put on treatment but insufficiently. Rule of halves is slightly changed but ultimately the outcome is same. Another Indian review article incorporating 88 studies published in 2014 gives the prevalence in Kerala to be high ranging from 36.1 to 47 in different studies and is comparable with our results.[8] IDSP survey in Kerala reports 10% of urban and 9% of rural adult population reporting that they are already diagnosed with hypertension, but this result cannot be compared with our results as it is reported figure and age group is not given. The IDSP report also shows that, among diagnosed cases, 62% were on drugs, and others were advised dietary modification. Our results show comparatively higher proportion on drug treatment. Measurement of BP as part of the IDSP survey shows 34% of respondents were recorded in the normal group and 48% were in prehypertension group, about 18% in stage 1 or stage 2.[9] This also is a high prevalence like our result. Laxmaiah et al.[10] in a multiple tribal-area study has shown high prevalence of hypertension among tribal population all over India, the prevalence in Kerala being 45% among men and 36.7% among tribal women. Most studies we referred from Kerala as well as south India observe high proportion of people with prehypertension similar to our observation. The IDSP survey observed 48%, Anil Bindhu and others from Trivandrum report 49% and Thankappan et al reports 44.3% prehypertension from Kumarakom. [9,11,12] Another study from Karnataka reports prehypertension as 40.4% and hypertension 36.6%.[13] Shukla et al.[14] report from western Indian population that the

Table 1: Demographic characteristics of population studied (N=1154)

Characteristics		Frequency	Percent
Age group	30–39	375	32.5
	40–49	300	26.0
	50–59	197	17.1
	60–69	175	15.2
	70–79	78	6.8
	>80	29	2.5
Gender	female	765	66.3
	Male	389	33.7
Educational status	Illiterate	73	6.3
	Lower school	504	43.7
	Upper school	476	41.2
	Graduate and above	101	8.7
Income	<20,000/month	882	77.0
	>20,000/month	264	22.9
Occupation	House wife	658	57.0
	Business	96	8.3
	Driver	34	2.9
	Farmer	53	4.6
	Salesman	32	2.8
	Laborer	73	6.3
	Employee	65	5.6
Family history of hypertension	No	710	61.5
	Yes	444	38.5

Table 2: Distribution of Blood pressure in the population

	Female (%)	Male (%)	Total (%)
Normal BP*	**192** (16.6)	**85** (7.4)	**277** (24.0)
Prehypertension**	**307** (26.6)	**197** (17.1)	**504** (43.7)
Controlled BP***	**50** (4.3)	**26** (2.3)	**76** (6.6)
Grade 1 hypertension****	**155** (13.4)	**58** (5.0)	**213** (18.5)
Grade 2 hypertension*****	**61** (5.3)	**23** (2.0)	**84** (7.3)
Total	**765** (66.3)	**389** (33.7)	**1154** (100.0)

*SBP < 120 mmHg and DBP < 80 mmHg;
**SBP: 120–139 mmHg and DBP: 80–89 mmHg;
***SBP < 140 mmHg and DBP < 90 mmHg and on treatment for hypertension;
****SBP: 140–159 mmHg or DBP: 90–99 mmHg;
*****SBP > 160 mmHg or DBP > 100 mmHg.

Table 3: Proportion of hypertensives already diagnosed, newly diagnosed, proportion being treated, and BP controlled

	Number	Percentage	
Newly diagnosed during study	169	14.6	N = 1154
Previously diagnosed and on treatment	204	17.7	
Treated without medicines	**31**	**15**	N = 204
Taking **regular** medicines	**149**	**86**	N = 173
Irregular medicines	24	14	
Among treated BP **controlled**	**69**	**33.9**	N = 204
Among treated BP not controlled	135	66.1	

Table 4: Result of logistic regression analysis showing significant correlates of hypertension (N = 1154)

Category		Wald statistic	Significance (*p* value)	Adjusted odds ratio	95% CI	
					Lower	Upper
Age group	30–39 (Reference)	136.6	0.000			
	40–49	41.9	0.000	**3.85**	2.56	5.80
	50–59	56.8	0.000	**5.48**	3.52	8.54
	60–69	115.1	0.000	**12.13**	7.69	19.15
	70–79	64.1	0.000	**10.91**	6.08	19.58
	>80	36.6	0.000	**13.51**	5.81	31.41
Family history of hypertension		16.5	0.000	**1.78**	1.34	2.34
Occupation = Housewife		3.6	0.059	**1.51**	.984	2.30
Idle individuals without work		3.8	0.051	**1.59**	.997	2.55
Constant		174.7	0.000	.052		

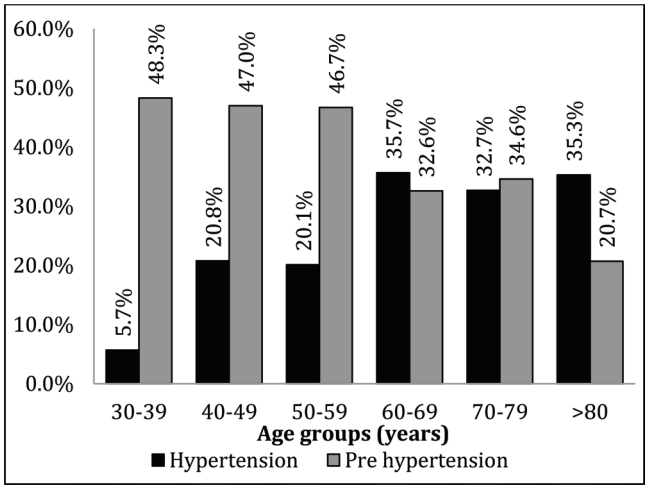

Figure 1: Prevalence of hypertension and prehypertension according to age group.

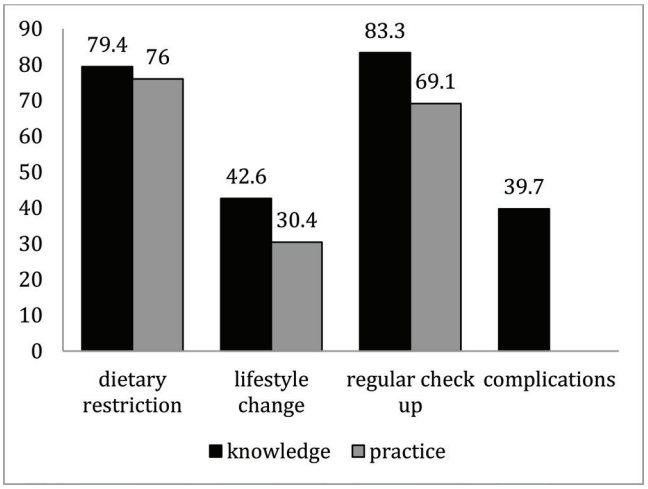

Figure 3: Proportion of hypertension patients with knowledge and proportion practicing the same.

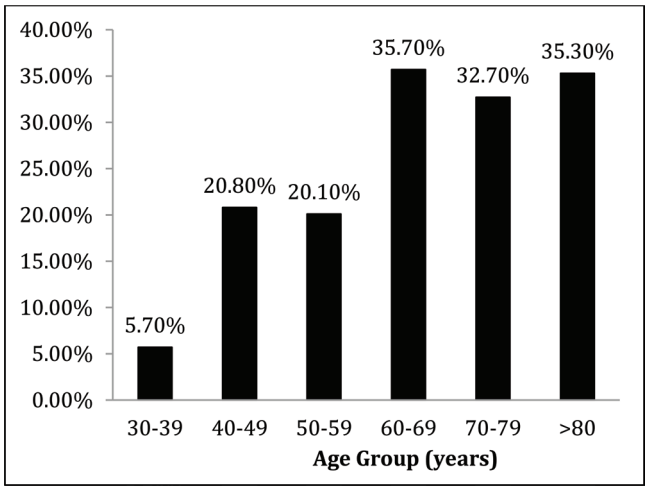

Figure 2: Prevalence of undiagnosed hypertension according to age group (n = 950).

prevalence of prehypertension is similar in young and older populations (39 and 42), whereas hypertension had different prevalence and was 11% and 40%, respectively, for younger and older age groups. Our study shows that toward older age the prehypertension prevalence is less compared to younger age meaning that the prehypertension is a predictor of hypertension and prehypertension seen at younger age becomes established as hypertension as explained by tracking of BP. Most cases, by the time they get older, are diagnosed and put on treatment but most of them insufficiently treated and not controlled. Sedentary lifestyle appears to be predictor of hypertension.

Our study has the strength that it is a community-based study and a representative sample of the whole population was included in the study. The study has the limitation that to establish hypertension BP has to be ideally measured on two occasions one week apart. Because of feasibility problems our study could measure only once, but many other studies referred are also done similarly.

Conclusion

The study concludes that prevalence of hypertension and prehypertension is high and comparable to that reported by other studies and surveys in India. The observation that high proportions of individuals have prehypertension raises concern. Another important fact is that in spite of diagnosing more than half of the prevalent cases and put under treatment, only one-third of the patients treated have controlled BP. This means that the NCD control program should focus on correct treatment and control of hypertension along with health education for lifestyle changes, diet restrictions, and frequent BP checkup for individuals with prehypertension to prevent and delay hypertension. Our study results also points to the need for hospitals and doctors to focus more on keeping BP controlled with adequate treatment rather than simply giving medicines.

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