INTERNATIONAL JOURNAL OF MEDICAL AND APPLIED SCIENCES
E-ISSN:2320-3137

Research Article

PREVALENCE AND DETERMINANTS OF HYPERTENSION AMONG ADULTS IN A RURAL AREA IN THIRVANANTHAPURAM, KERALA-A CROSS SECTIONAL STUDY

S. Anil Bindhu, Nazeemabeevi, Thankam.K, V.Girija, Jeesha C Haran

Department of Community Medicine, Sree Gokulam Medical College &Research Foundation,Trivandrum, Kerala, India

Corresponding author:
Dr. S. Anil Bindhu, Department of Community Medicine, Sree Gokulam Medical College &Research Foundation,Trivandrum, Kerala, India

Received on 9 Jan 2014, Published on 31 Jan 2014

ABSTRACT

Hypertension is a major public health problem in Kerala.1. To determine the prevalence of hypertension among adults in Nellanad Panchayath, a rural area in Thiruvananthapuram. 2. To determine the association of selected factors with hypertension among adults in the rural area. Cross-sectional study was conducted among 300 adults (>/=18 years) in Nellanadu Panchayth, a rural area in Trivandrum, Kerala, S.India. Data collected by a house-to-house survey with the help of a pretested proforma after taking informed consent. Subjects with systolic blood pressure >/= 140 mmHg and or diastolic blood pressure >/= 90 mm of Hg and or subjects on anti- hypertensive medication, were classified as having hypertension. Study variables were age, gender, BMI, waist circumference (WC) , waist hip ratio(WHR), alcohol consumption, and smoking. The SPSS 20.0 was used for statistical analyses. The level $P < 0.05$ was considered as the cut-off value for significance. The mean age of the study population is 47.58.The prevalence of hypertension among adults was 36.0% (95% CI : 30.7-41.3%)and pre-hypertension was 49.3%.The mean systolic BP among males was significantly high (p=0.04, t test) compared to females. ANOVA test showed that there is significant difference in systolic BP between different age group (p=0.001). Waist circumference and WHR had a positive correlation ($p<0.05$) with systolic blood pressure. In Multivariate analysis, high waist circumference (OR:3.57 , 95% CI: 1.9-6.7) and high WHR were associated with hypertension (OR: 1.99, 95% CI 1.1-3.6).The prevalence of hypertension and pre-hypertension is high in the rural area. Waist circumference and WHR are important predictors of hypertension.

Key words: hypertension, prevalence, Kerala, rural

INTRODUCTION

Hypertension is a factor contributing to many other diseases including myocardial infarction, stroke, heart failure, renal failure, and retinopathy, and is a leading cause of death. Hypertension is the commonest cardiovascular disease, posing a major public health challenge to the population undergoing socio-economic and epidemiological transition. According to JNC 7 guidelines, there are 4 categories of blood pressure.

Normal blood pressure is SBP <120 mm Hg and diastolic blood pressure (DBP) <80 mm Hg. Pre-hypertension is defined as a SBP of 120-139 mm Hg or a DBP of 80-89 mm Hg, Stage I

hypertension: SBP 140-159 mm Hg or DBP 90-99 mm Hg, Stage II hypertension: SBP ≥160 mm Hg or DBP≥100 mm Hg.[1] A systematic review on Worldwide prevalence of hypertension reported that the prevalence of hypertension varied around the world, with the lowest prevalence in rural India (3.4% in men and 6.8% in women) and the highest prevalence in Poland (68.9% in men and 72.5% in women).[2]

Objectives:

- 1. To determine the prevalence of hypertension among adults in Nellanad Panchayath, a rural area in Thiruvananthapuram, Kerala
- 2. To determine the association of selected factors with hypertension among adults in the rural area**.**

Definitions and diagnostic criteria:

- Individuals with systolic blood pressure(SBP) >/=140 mmHg and /or diastolic blood pressure(DBP)>/= 90 mmHg and or participants with current therapy with antihypertensive medication are categorized as having hypertension.

MATERIALS AND METHODS

- Design: community based Cross-sectional study.
- Study population: all adults≥18 years in Nellanadu Panchayath, a rural area in Trivandrum, Kerala, S.India.
- Exclusion criteria: pregnant women
- Sample size: 288 (with α error = 5%, relative precision =20 %, anticipated prevalence of hypertension 25%)
- Sampling: Three wards are randomly selected and 100 participants from Consecutive Houses were included in the study.
- Study variables: age, sex, BMI, waist circumference (WC), waist hip ratio (WHR), alcohol intake, smoking..
- Subjects were screened for hypertension by a house-to-house survey with the help of a pretested proforma after informed consent. Blood pressure was measured in the right arm by using the regular mercury sphygmomanometer. The participants were requested to take rest for five minutes. Blood pressure was measured in the sitting posture with an appropriate-sized cuff encircling the arm, with instrument at the level of heart. Two separate readings were taken at an interval of minimum ten minutes. The average of the two readings was taken**.** Anthropometric measurements like weight, height, waist circumference and hip circumference were taken from all participants. The weighing machine was checked with known weights every day before starting the survey. The height was measured on a vertical scale with heels, buttocks, and occiput against the wall. Weight was measured. Waist circumference is measured with subject standing with feet 25-30 cm apart. Measurement is taken midway between inferior margin of the last rib and the crest of ilium in horizontal plane to nearest 0.1cm. The hip circumference is measured around pelvis at the point of maximal protrusion of the buttocks. For men Waist circumference >/=90 cm and for women >/=80 cm, were considered as cut off points for defining abdominal obesity**.** WHR >0.9 in men and >0.8 in women are taken as high**.** All newly detected hypertensives were referred to local hospitals for further management. All persons

with Pre-hypertension were educated regarding lifestyle modifications and motivated to follow up.

STATISTICAL ANALYSIS

- The Statistical Package for the Social Sciences software Version 20.0 was used for statistical analyses.
- Proportions, Chi-square test & logistic regression are used for categorical outcome variables.
- Mean, T test & ANOVA were used for quantitative outcome variables.
- The level $P < 0.05$ was considered as the cut-off value for significance

Results

The community based cross sectional study in Nellanadu Panchayath among 300 adults gave the following results. Mean age of the study population: 47.58 (95% CI:45.84-49.32) with SD=15.32. In the study population, 35% men and 0.5% women consumed alcohol. Also 41.7% of men and 2% of women were smokers. Only 30% of adults are involved in at least moderate physical activity. Among the participants 50.7% gave family history of hypertension.

Table no.1

AGE- SEX DISTRIBUTION OF THE STUDY POPULATION

Age group of the study population		SEX		Total
		MALE	FEMALE	
18-30 years		16 15.5%	28 14.2%	44 14.7%
30-40 years		22 21.4%	41 20.8%	63 21.0%
40-50 years		20 19.4%	46 23.4%	66 22.0%
50-60 years		19 18.4%	48 24.4%	67 22.3%
60-70 years		20 19.4%	21 10.7%	41 13.7%
70-80 years		5 4.9%	9 4.6%	14 4.7%
80-90 years		1 1.0%	4 2.0%	5 1.7%
Total		103	197	300
	% within SEX	100.0%	100.0%	100.0%

Table no.2Mean blood pressure in the study population

Blood Pressure	GENDER	MEAN	SD	SE	95% CI MEAN		P
					LOWER	UPPER	
SBP	MALE	131.10	15.717	1.50	128.25	134.15	0.04
	FEMALE	127.06	16.826	1.23	124.67	129.47	
DBP	MALE	86.50	10.498	1.00	84.56	88.45	0.078
	FEMALE	84.32	9.988	.73	82.89	85.77	

The overall prevalence of hypertension in the study population is 36.0%(95%CI : 30.7-41.3%). Among males 37.9% (95% CI, 28.2-47.6%) among Females 35% (95% CI: 28.4-41.1 %*)* are found to be having hypertension. The prevalence of Pre-hypertension is 49.3 % (148). Only 14.7% (44) had Normal blood pressure. Among the study participants, 7% (21) had stage 2 hypertension at the time of study (2%among newly detected, 5% among those on treatment). Among those participants with hypertension, 77 (71.3%) knew that they had hypertension. Among those who were aware of their hypertension 62 patients (80.5%) were taking treatment. Among the subjects who were on treatment, only 31 (50%) had adequately controlled blood pressure at the time of study.

Table no.3 Hypertension in relation to Sex and Age group

VARIABLES		HYPERTENSION		Chi-Square value	DF	P	OR	95%CI:	
		YES	NO					Upper	Lower
SEX	Male	39 37.9%	64 62.1%	0 .237	1	0.627	1.13	0.69-	1.83
	Female	69 35%	128 65%						
AGE GROUP	<40 years	11 10.3%	96 89.7%						
	40-60 Yrs	57 42.9%	76 57.1%						
	60 yrs or more	40 66.7%	20 33.3%	57.926	2	<0.001			

TABLE NO.4. RESULTS OF BIVARIATE ANALYSIS OF VARIABLES

VARIABLES		HYPERTENSION		CHI	DF	P	OR	95%CI
		YES	NO					
BMI (Kg/m^2)	<25	67 32.1%	142 67.9%	4.65	1	0.03	1.738	1.049-2.879
	25 OR MORE	41 45.1%	50 54.9%					
WHR	NORMAL	54 29.8%	127 70.2%	7.529	1	0.006	1.954	1.21-3.16
	HIGH	54 45.4%	65 54.6%					
WC	NORMAL	56 26.9%	152 73.1%	24.25		0.001	3.529	2.11-5.897
	HIGH	52 56.5%	40 43.5%					

Table No.5 RESULTS OF MULTIVARIATE ANALYSIS OF VARIABLES

VARIABLES	ODDS RATIO	95% C.I. for OR		SIGNIFI-CANCE
		LOWER	UPPER	
WC	3.574	1.902	6.715	0.001
WHR	1.994	1.101	3.611	0.023
BMI ≥25	0.854	0.458	1.593	0.620
AGE GROUP <40 YEARS Vs ≥60 YRS	0.044	0.018	0.106	0.001
AGE GROUP 40 -60 YEARS Vs ≥60 YEARS	0.315	0.159	0.626	0.001

Logistic regression analysis showed that odds of hypertension 3.5 times in subjects with high Waist Circumference compared to those with normal WC. Also there is 1.99 times more risk of hypertension among subjects with high WHR compared to those with normal waist- hip ratio. Among subjects with BMI < 25(Kg/m^2), only 32.1% had hypertension, but among those with BMI 25(Kg/m^2) or more, 45.1% had hypertension. The risk of hypertension is 73.8% more in people with high BMI (>/=25(Kg/m^2) compared to those who have BMI<25(Kg/m^2). But logistic regression analysis did not give any statistically significant association between BMI and hypertension, when adjusted for age, waist hip ratio, waist circumference. ANOVA test showed that there is statistically significant difference in systolic BP between different age groups (p=0.001) and in Diastolic BP between different age group (p=0.001). Post hoc test showed significant difference in systolic BP between the three age groups group. ANOVA test showed significant difference in Diastolic BP between different age group(p=0.001). Post Hoc Test showed significant difference in diastolic BP for age group <40 Years with 40-60 years age group and >/+60 years age group. Diastolic BP of (40-60year) Age group is significantly different from (<40 years) age group. Diastolic BP of Age group >60 years is also significantly different from age group(<40 years). But no statistically significant difference is found in diastolic BP of 40-60 years group and >/=60 years group . Bivariate analysis showed that risk of hypertension was not significantly associated with gender (p=0.6), smoking (p=0.5),, and alcohol consumption(p=0.8). Both systolic BP (r=0 .173 ,p=0.003) and Diastolic BP (r=0.189,P=0.001) had significant positive correlation with waist circumference. Systolic blood pressure has a significant positive correlation with WHR also (r = 0.134, P=0.02). DBP had significant correlation with BMI(R=0.129, P=0.025)

DISCUSSION:

The prevalence of hypertension and pre-hypertension is high in the study population. The overall prevalence of hypertension was 36.0% among adults in this rural area. No statistically significant difference is found in the prevalence of hypertension according to gender. This prevalence is comparable to a study reported by Thankappan et al.2006;[4] prevalence of hypertension was 36.7% (95% CI:35.5-38.0; men: 36.0% and women 37.2%) in Kumarakom, Kerala. In a recent study among tribal population in Kerala by Meshram et al:2012;[5] among adults >20 years gave prevalence of 40%. Zachariah et al. reported that prevalence of hypertension among middle aged(40-60 years) subjects in urban Trivandrum city was 54.5% (men 56.3%, women 52.3%).[6] The prevalence of hypertension is high compared to prevalence in other South Indian states, CURES study in Chennai[7],[20% prevalence men:23.2% vs. women:17.1%] and a study among adults >18 years in rural areas of Davanagere[8] (18.3%.). The prevalence of hypertension was only 13% and 10% among rural men and women respectively as per the study conducted by ICMR in 1994.[9] The prevalence among rural men and women now in Kerala has increased very much in the present study. The awareness about the hypertension status is more in this rural population, nearly 71%. Among those who were aware of their hypertension 62 patients (80.5%) were taking treatment. Among the subjects who were on treatment, 31 (50%) had adequately controlled blood pressure at the time of study. In an earlier study conducted in Thiruvananthapuram city in 2003, only 39% of hypertensives were aware of the condition, while 29% were treated with blood pressure-lowering medications and adequate control of elevated blood pressure was achieved in only 30.6% of treated hypertensives.[6] Waist circumference and WHR are found to be a strong predictor of higher prevalence of

hypertension in this study. In a study conducted among Chinese population also, WC is the best predictor of metabolic risk factors including hypertension.[10] The Obesity in Asia Collaboration(OAC) also reported that measures of central obesity particularly WC are better discriminators in hypertension and diabetes in Asian and Caucasians, compared to BMI.[11] In the present study there was a significant positive correlation of WC and WHR with SBP. In another study also there was a significant positive correlation for SBP and the correlation coefficient was, 0.23 with waist circumference, 0.11 with WHR.[12]

We used measurement of blood pressure only at one visit, to find out the hypertension status of the participants, due to limited resources. This is a major limitation as single visit measurement, even when averaged, may overestimate the prevalence of hypertension.

CONCLUSION &RECOMMNDATION:

Hypertension is found to be a major public health problem. More than one third of the adults (36%) in the rural area in Trivandrum had hypertension. Central obesity rather than BMI is found to be a strong predictor of higher prevalence of hypertension.

There is an urgent need to give high priority for prevention, early detection, and control of hypertension.

REFERENCES:

1. Chobanian AV, Bakris GL, Black HR, Cushmann WC, Green LA, Izzo JL., Jr Seventh report of joint national committee on prevention, detection, evaluation and treatment of high blood pressure. Hypertension. 2003;42:1206–52.

2. Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. Worldwide prevalence of hypertension: a systematic review. J Hypertens. 2004 Jan;22(1):11-9

3. World Health Organization, International Association for the Study of Obesity, International Obesity Task Force. The Asia-Pacific Perspective: Redefining obesity and its treatment. Sydney: Health Communications, 2000

4.Thankappan KR, Sivasankaran S, Sarma PS, Mini G, Khader SA, Padmanabhan P.et al. Prevalence-correlates-awareness-treatment and control of hypertension in kumarakom, kerala: baseline results of a community-based intervention program. Indian Heart J. 2006;58:28-33.

5. Meshram I I, Arlappa N, Balkrishna N, Rao K M, Laxmaiah A, Brahmam G. Prevalence of hypertension, its correlates and awareness among adult tribal population of Kerala state, India. J Postgrad Med 2012;58:255-61

6.Zachariah MG, Thankappan KR, Alex SC, Sarma PS, Vasan RS. Prevalence, correlates, awareness, treatment, and control of hypertension in a middle-aged urban population in Kerala. Indian Heart J. 2003;55(3):245-51

7.Mohan V, Deepa M, Farooq S, Datta M, Deepa R. Prevalence, Awareness and Control of Hypertension in Chennai – the Chennai Urban Rural Epidemiology Study (CURES-52). *J Assoc Physicians Ind* 2007;55:326-32.

8. Yuvaraj BY, Nagendra Gowda MR, Umakantha AG Prevalence, Awareness, Treatment, and Control of Hypertension in Rural Areas of Davanagere. Indian J Community Med. 2010; 35: 138–141.

9. ICMR Task force project on Collaborative study of coronary Heart Study.

10. Jin-wen Wang , Da-yi Hu , Yi-hong Sun , Jia-hong Wang, Gui-lian Wang, Jiang Xie et al. Obesity criteria for identifying metabolic risks. *Asia Pac J Clin Nutr 2009;18: 105-113* 105

11. Huxley R, Barzi F, Stolk R, Caterson I, Gill T, Lam TH et al.Ethnic comparisons of obesity in the Asia-Pacific region: protocol for a collaborative overview of cross-sectional studies. Obes Rev. 2005 ;6:193-8.

12. Deshmukh PR, Gupta SS, Dongre AR, Bharambe MS, Maliye C, Kaur S, Garg BS.Relationship of anthropometric indicators with blood pressure levels in rural Wardha. Indian J Med Res. 2006;123:657-64.