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ORIGINAL ARTICLE

An Epidemiological Study of Hypertension and Its Risk Factors in Rural Population of Bangalore Rural District

Suwarna Madhukumar*, Vaishali Gaikwad and Sudeepa D

Department of Community Medicine, MVJ Medical College & RH , Dandupalya, Kolathur Post, Hoskote, Bangalore Rural-562114 Karnataka, India

Abstract: *Background:* In developing countries like India the prevalence of non communicable diseases is slowly assuming an alarming proportions and Hypertension is the commonest NCD and it accounts for a large proportion of cardiovascular deaths. *Objectives:* To estimate the prevalence of Hypertension in rural areas of Bangalore. To assess the risk factors and its strength of association with Hypertension. To study the treatment seeking behavior in hypertensives. *Study period:* June 2008 to June 2009. *Materials and Methods:* A house to house survey was conducted and 1501 study subjects 15 years of age and above were screened in a village using a pre tested questionnaire. Two independent BP readings were taken in sitting position by visiting each participant at their home. Hypertension was defined using JNC7 criteria. It defines hypertension as blood pressure more than 140/90 mmHg. *Statistical tests:* Percentiles, chi square test. *Results:* Prevalence of Hypertension was 8.06%. There were various risk factors significantly associated with hypertension like age, sex, BMI, smoking, alcohol, salt intake etc. *Conclusion:* The overall prevalence was 8.06%. Of the 121 hypertension patients 104 (85.95%) were aware of their disease and only 68 (65.38%) were taking regular treatment.
Keywords: Hypertension, prevalence, risk factors, treatment

Introduction

Hypertension is the most common cardiovascular disease and is assuming epidemic proportions in developing countries as well [1].It affects nearly 26% of the population worldwide[2].Hypertension exhibits a iceberg phenomenon where unknown morbidity exceeds the known morbidity. The prevalence of hypertension is rapidly increasing in developing countries and is said to be one of the leading causes of death and disability among the elderly [3].

Prevalence of hypertension in India, for the last three decades has increased by about 30 times among urban residents and by about 10 times among rural residents [4]. Pooled epidemiological studies have shown the average prevalence of hypertension in India is 25% in urban areas to 10% in rural areas [1, 5]. Several risk factors have been implicated in the etiology of hypertension. This includes geographic considerations, genetic socio-economic, socio-cultural and dietary, nutritional status etc. While the risk factors and their impact on hypertension is documented by well designed studies in the Western countries, systematically conducted studies using rigorous epidemiological techniques are lacking in India.

Epidemiological studies to assess the prevalence of Hypertension are urgently needed in developing countries like India to determine the baseline against which future trends in risk factor levels can be assessed and preventive strategies planned to promote health. Morever most of these studies are conducted on the urban population and do not report about risk factors in rural population since the life style differs vastly in the two groups. Hence studies are needed in rural areas to have a base line data about the prevalence of hypertension and its association with the risk factors. Preventive strategies have to be planned for the rural areas. Simple life style modifications in the rural areas will change the epidemic scenario. Thus with the intention of getting the prevalence of hypertension and plausible risk factors in rural areas the faculty from the Department of Community Medicine did a cross-sectional survey in Kumbalahalli village, Hoskote taluk of Bangalore Rural district.

Material and Methods

Hoskote talukha of Bangalore rural district has around 300 villages. The population of these villages ranges from around 200 to 2000 .Kumbalahalli, a village located in the north eastern belt in Bangalore rural district was selected by a simple random sampling by lottery method from among the villages listed within 10 Kilometers radius of Hoskote town where the MVJ medical College of the authors is located.

Calculation of sample size: Based on a pilot study conducted in the area, an 8% prevalence for hypertension reported for rural areas was used to calculate the sample size. Using the formula for sample size calculation for cross sectional surveys, a sample size of 1150 adults (aged 15 years and above) was arrived at.

Sample size = $4pq/l^2$ p=8% l =20%

N= 1150

A well designed, pre- tested questionnaire was used and a house to house survey was conducted and all the people above the age of 15 years were interviewed and examined. Since the population of the village selected was around 1600 the whole village was screened. Informed written consent was obtained. Data was collected on age, sex, educational status, occupation, family history, literacy status, marital status, personal habits in addition to dietary salt intake was collected. A detailed history was taken and also general physical examination including weight and height, and two Blood Pressure (BP) readings within a gap of 15 minutes was done. BP was measured using a mercury sphygmomanometer by palpation and auscultation method in right arm in sitting position. Two readings were taken 15 min apart and the average of both the reading was taken for analysis.

Hypertension was diagnosed using the JNC 7 criteria

Optimal Blood Pressure	: <115/80
Normal Blood Pressure	: <120/80
Pre-Hypertension	: 120-139/80-89
Stage 1 Hypertension	: 140-159/90-99
Stage 2 Hypertension	: >160/100

So hypertension in this study was defined as systolic BP more than 140 and diastolic BP more than 90 mm of Hg. All subjects on anti hypertension medications or having a prescription of anti-hypertensive drugs were classified as Hypertensive (HT) irrespective of their current BP reading. The additional dietary salt intake was defined as those individuals who ate more than two pinches of salt per meal excluding the previously added salt to meal during preparation .Statistical analysis was performed by SPSS statistical package.

Results

Out of the total population of 1570, 69 (4.3%) were excluded from the study due to non availability in spite of 3 visits and also refusal to get examined. A total of 1501 people were interviewed and examined. The total population screened was 1501. Of the total population screened males were 56.29% and females were 43.7%. Age wise the mean age ± S.D for males was 37.8 ± 17.2 years and for females 34.8± 16.0 years. The females were younger than males by 3 years. Overall 36.5% of the population was illiterate .Illiterate percentages was higher in older age groups than in younger age groups. 38% of the screened population was unemployed. The unemployed includes the housewives. As expected, more than half of the study women were housewives (55%). Among the unemployed, unskilled or manual labour was the predominant (45.5%). The proportion of skilled workers was 13.7%. Hence this population occupationally represents a typical agricultural rural population. Almost 14% of the screened population had BMI more than 25. Among the population screened 18.38% were smokers and 14 % were consuming alcohol.

The prevalence of hypertension was 8.06% with 121 subjects being hypertensives out of 1501 study subjects. The age distribution of the study subjects along with the prevalence of hypertension in each group is shown in Table 1.

Table-1: Age wise distribution of study population

Age groups	Hypertension(%)	Normotensives(%)	Odds ratio
15-24 years	0	570	-
25-34 years	3 (0.9%)	302	1
35-44 years	22 (7.63%)	216	10.25
45-54 years	30 (16.94%)	147	20.54
55-64 years	33 (25.98%)	94	35.34
65-74 years	23 (34.84%)	43	53.84
>75 years	10 (55.55%)	08	125.83
Total	121 (8.06%)	1380	-

The prevalence of hypertension increased significantly with increasing age (trend chi square $p<0.0001$). While there were no cases detected in the age group 15-24 years, lowest prevalence was found in the age group 25-34 years (0.90%) and was highest in the age group above 75 years (55.55%). Prevalence in males at 9.58% was significantly higher than that in females at 6.09% ($p<0.01$). However the prevalence did not vary significantly among skilled (7.69%) and unskilled workers (6.93%), probably meaning that the pattern of physical exercise was similar in the two groups.

Of the 121 hypertension patients 104 (85.95%) were aware of their disease. Only 68 (65.38%) were taking regular treatment and 49 (72.0%) had their BP under control. The rest of the 14% were new cases detected to have hypertension in this survey. Out of 104 patients who knew to have hypertension 31.7% had made some life style modifications, dietary modifications and had compliance for taking medicines. Of the hypertensive, 28% were having a family history of hypertension. The prevalence of hypertension in study subjects without any family history was 3.8%. (OR = 9.86; 95% CI 6.52 to14.95). As far as smoking is concerned, 18.38% of the study populations were smokers. The prevalence of hypertension in smokers was 31.15% as compared to the prevalence of hypertension in non smokers (2.85%) (OR= 15.39; 95% CI 9.09 to 24).

Table no 2- Risk factors and Hypertension

Risk factors		**Total no. of Individuals**	**Hypertension (%)**	**O R (C I)**
Sex	Male	845	81 (9.6%)	1.63 (1-2.47)
	Females	656	40 (6.09%)	
BMI	BMI >25	210	76 (36%)	15.70 (10.23-24.16)
	BMI<25	1291	45 (3.5%)	
Family History	Yes	264	74 (28%)	9.86 (6.52-14.95)
	No	1237	47 (3.8%)	
Additional salt intake	Yes	92	29 (31%)	6. 59 (3.93-11.02)
	No	1409	92 (6.5%)	
Diet	Non Veg	868	76 (8.8%)	1.2 (1-1.87)
	Veg	633	45 (7.1%)	
Smoking	Yes	276	86 (31.15%)	15.39 (9.90-24)
	No	1225	35 (2.9%)	
Alcohol	Yes	213	83 (38.96%)	21 (13.4-32.85)
	No	1288	38 (2.95%)	

In the study population about 51.96% were thin (Body mass index - BMI <18) while it was 14.0% among those overweight or with obesity, with BMI > 25. and the rest normal. Prevalence of hypertension in overweight or obese group was 36%, while that in the normal BMI was 5.8% (Odds Ratio –OR = 18.85 with 95% Confidence Interval (CI) 1 to 23.1) Among the study subjects 92 (6.1%) were in the group "additional dietary salt intake" meaning that they added extra salt to the salted cooked food. The prevalence among additional salt takers was observed to be 31% and this was higher than those not taking extra salt at 7.3% (OR 6.36; 95% CI 0.82 to 3.59). Among the population, 14% had the habit of regular alcohol consumption.

Of these, more than a third (38.96%) had hypertension. The Odds ratio between alcoholics and non-alcoholics was as high as 21 i.e. 21 times higher risk to hypertension was found in alcohol consumers compared to the non-alcoholics.

Discussion

The overall prevalence of Hypertension in our study subjects was 8.06%. In the recent Indian studies reviewed, prevalence of hypertension ranging from a low of 3.4% to 8.6% have been reported. While Todkar SS et al reported a prevalence of 7.24% in rural Maharashtra (2007) [6], Jajoo UN et al (1995) reported 3.41% prevalence in Rural Sevagram[7].Prevalence in Mumbai hospitals (2000) was found to 7.8% [8]. Reddy SS et al reported a prevalence of 8.6% in an urban slum, Tirupathi [9]. The prevalence gradually increased as age advanced with an Odds as high as 125 for those above 75 years compared to the 25 to 34 years age group.

The rise of BP with age is said to be ageing process due to atherosclerotic changes in blood vessels, especially in those under stress and unknown factors. This also could be because of the sedentary lifestyle by the age of 55 years and the subsequent increase in BMI .Also increased levels of stress in the family due to social factors such as providing higher education, marriages of children etc. Further it was interesting to note that hypertension has set in as early as 25 years indicating a shift in onset of this disease to younger age groups.

The prevalence of hypertension was more in males (9.6%) compared to females (3.1%) This could be possibly because of the increased prevalence of risk factors of hypertension in males. The prevalence of hypertension did not vary among the different occupational groups Thus in unemployed it was 5.1%, unskilled workers or manual workers it was 5.3%. The present study has also revealed a higher proportion of hypertension in males, the overweight and obese with BMI >25, alcoholics, smokers and "additional high salt intake" group. In the current study being obese increased the odds of getting hypertension by 15 times. Similar association has been reported by Jajoo 1993 [7]. Malhotra 1998 [10], Todkar 2007 [6]. Association between additional salt intake, smoking, alcohol and hypertension has been observed by Singh [11]. However other risk factors such as exercise, sedentary life style could not be measured due to standardization problems for measurement at a community level. As the present study is a cross sectional community based study, the authors have been able to find a significant association with influencing factors such as BMI, alcohol intake and smoking. The strength of the association should be further studied by longitudinal study. Such attempts by epidemiologists will help the physician to recommend preventive and control measures best suited for the community that s/he practices.

Limitations of study: As already mentioned this is a cross-sectional study conducted in a rural village in Bangalore rural district. Study subjects were chosen from a single locality so may not be the representative of the rural population of India. The association of risk factors and hypertension should be interpreted with caution.

Conclusions and Recommendations

The prevalence of Hypertension in rural areas of "Bangalore Rural" district was 8.06%. Prevalence of hypertension increased significantly with intervenable risk factors such as BMI, smoking, alcohol, additional salt intake. However the 14% of the newly diagnosed hypertensive through this study points out the need to devise Specific Screening Programs for early detection and control to avoid further complications. Standardization of methodology for measurement of other life style variables including exercise needs to be done immediately. If all the intervenable risk factors could be standardized and then measured and design an intervention that would control the riskiest factors for hypertension. As public health professionals, we recommend well designed epidemiological studies for hypertension so as to have a newer strategy, national level control programs for hypertension.

IEC activities should be started to create awareness about healthy life styles and measures like weight reduction, restriction of smoking, alcohol, dietary salt restriction and fat restriction. Thus, both prevalence and risk factor studies are needed to estimate the prevalence of Hypertension as well as get at specific risk factors for Indian Population. Such studies will help in setting the baseline by which the risk factor can be ranked and specific control strategies planned to promote health of the middle age and elderly population

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*All correspondences to: Dr. Suwarna Madhukumar, Associate Professor, Department of Community Medicine, MVJ Medical College & RH, Dandupalya, Kolathur Post, Hoskote, Bangalore Rural 562114 Karnataka, India. Email: suwarna.sj@gmail.com