

AN EPIDEMIOLOGICAL STUDY OF HYPERTENSION IN A RURAL HOUSEHOLD COMMUNITY

L. Kannan^a, T.S.Satyamoorthy^b

ABSTRACT

BACKGROUND and OBJECTIVES

Chronic Non-Communicable diseases are important among adult population all over the world. The prevalence of chronic diseases like hypertension, diabetes etc, is showing an upward trend. Hence the study was undertaken, to measure the prevalence of hypertension and identify the risk factors.

METHODS

A cross sectional study was carried out among the adults in the age group of 30 years and above, residing under Mugalivakkam Primary Health Centre (PHC) area of Kancheepuram District, Tamilnadu. The mid-year population for 2002 covered in this PHC area was 40,850, out of which 12,051 were adults in the age group of 30 years and above (29.5%). By using cluster-sampling method, 750 individuals were selected and studied. Data entry was made using SPSS and Epi-info.

RESULTS

189 individuals (25.2%) were found to have hypertension including 93 known hypertensives. Among 357 adult males, 81 (22.6%) and among 393 adult females 108(27.4%) were found to have hypertension. The odds ratio for hypertension among Smokers were 2.4 (1.52-3.61) and was statistically significant ($P < 0.003$), similarly alcohol use, obesity, tobacco chewing, diabetes and oral contraceptive use were statistically significant.

CONCLUSION

The prevalence rate of hypertension was 25.2%. The prevalence rate was higher (27.4%) among females. Increase in age, family size, occupation, alcohol, smoking, chewing tobacco, obesity, oral contraceptives use and diabetes mellitus have been found to have association. Hence health care providers should take note and institute appropriate preventive measures.

Keywords: hypertension, cross sectional study, rural population

INTRODUCTION:

Although blood pressure is easily measurable it has taken several decades to realize that hypertension is a frequent world wide health disorder[1]. Chronic Non-Communicable diseases are assuming greater importance among adult population in developed as well as developing countries. The prevalence of chronic diseases such as hypertension, diabetes mellitus etc, is showing an upward trend in most countries. The main factors responsible for this rising trend are changing life styles, obesity, and behaviour pattern of people etc[2]. The Joint National Committee reports on prevention, detection, evaluation and treatment of high blood pressure (JNC – VI & VII) emphasized the necessity of clinicians' appropriate judgment of their patients in diagnosis and treatment. Further, these guidelines for primary care physicians have been specified in the report. Therefore this national guideline should serve as a tool to be adopted and implemented in local and individual situation[3].

Even though 72.2 % of Indian populations live in rural areas⁴, many studies have not been carried out to determine the prevalence of hypertension among rural folks and the

contributing risk factors, if any. The present study was undertaken, to measure the prevalence of hypertension and to identify the risk factors responsible with reference to medical, social and individual characteristics, with a view to formulate preventive measures especially applicable to rural population.

MATERIALS & METHODS:

Place of study: The study was conducted in areas under the jurisdiction of Primary Health Centre, Mugalivakkam covering five sub centers namely Mugalivakkam, Mowlivakkam, Manapakkam, Gerugampakkam and Kolapakkam.

Study population: The study population comprised of adult individuals in the age group of 30 years and above residing under Mugalivakkam Primary Health Centre area of Kancheepuram District, Tamilnadu. The mid year population for 2002 covered in this Primary Health Centre area was 40, 850, out of which 12, 051(29.5%) were adults in the age group of 30 years and above residing in this area.

Sampling methods & Sample size: The sampling methods used in the study were cluster-sampling method. This method was used according to their sub divisions of "Nagar" and colony were identified and 30 cluster sampling technique. With the available studies relating to prevalence of hypertension in India, the prevalence of 24%[5] was taken for estimating the sample size requirement with limit of accuracy as 18% of prevalence and a design effect of 2, accordingly the minimum sample size required for the study was found to be 750 individuals.

CORRESPONDING AUTHOR :

Dr. L. KANNAN

Assistant Professor, Department of Community Medicine, Sri Ramachandra Medical College & Research Institute Sri Ramachandra University, Porur, Chennai - 600 116
email: kannan1974@rediffmail.com

^a Department of Community Medicine

^b Associate Controller of Examinations

Data collection: Data for this study was collected from the community, by visiting the house holds in the selected area. Since the sampling was done during the day time, there may be a sampling bias. It was a household based study and questionnaires were administered to those in the household and the necessary information were collected to meet the objectives of the study. The data were collected from the selected 30 clusters as designated by the probability proportionate to size (PPS) method[6]. So, 25 individuals from the each cluster were selected randomly to attain the required sample size of 750 for the study. On an average, three families were examined during each day of the visit. The medico social history and other required detailed were filled up in the Proforma.

The following techniques were used as per the recommendation of Joint National Committee (JNC) VI Criteria[3].

1. The individual was seated in a chair with his back supported and his arms bared and supported at heart level and was refrained from the use of tobacco in any form or ingestion of caffeine during the 30 minutes preceding the measurement.
2. Under special circumstances measuring blood pressure in the supine and standing position were indicated. The appropriate (RIVA-ROCCI) cuff size was used to ensure an accurate measurement. The inflatable rubber bag within the cuff was encircling at least 80% of the arm. Many adults required a large adult cuff. Measurements were taken preferably with mercury sphygmomanometer. Both systolic and diastolic blood pressure was recorded.
3. The first appearance of sound [phase I] is used to define systolic blood pressure. The disappearance of sound [phase V] is used to define diastolic blood pressure. Two or more reading was be repeated after 3-5 minutes interval. If the first two readings differ by more than 5 mm of Hg, additional readings were obtained and averaged.

After following the measurement guidelines of blood pressure prescribed by JNC-VI criteria, the classification of hypertension was done as per the JNC-VII guidelines[18], as there was no proper cut-off point for deciding the category of prehypertensives in JNC-VI.

Those found to have hypertension were examined again after 2 days in the similar manner to confirm that hypertension was constant. The individuals were not informed of the results of the previous screening. However the newly diagnosed hypertensive individuals were referred to the primary health center for further investigations and management. The known hypertensive cases were emphasized to continue their regular treatment.

Limitation of the study: Investigation of urine and blood analysis and ophthalmoscope examinations could not be carried out due to various constraints.

STATISTICAL ANALYSIS

Method of data analysis was done by using SPSS software 8.Version between the two gender groups in relationship to different stages of hypertension and normal individuals, by using appropriate test of significance (Chi Square) with 95% Confidence level and $p < 0.05$ level. In case of associated risk factor, subgroup analysis was done for different groups like family size, occupation, smoking, tobacco chewers, alcohol use, obesity, diabetes and oral contraceptive use was done with calculation of odds ratio, 95% CI and $p < 0.05$ level. Epi- info 2000 Center for Disease Control software was used for doing trend analysis.

RESULTS

Out of 12,051 adults in the age group of 30 years and above residing under Primary Health Centre, Mugalivakkam, 750 individuals (6.2%) were studied.

Out of 750 adults surveyed, 189 individuals (25.2%) were found to be suffering from hypertension including 93 known hypertensives. Among 357 adult males, 81 (22.6%) and among 393 adult females, 108(27.4%) were found to be suffering from hypertension. The majority of hypertensives (25.2%) had both systolic and diastolic hypertension followed by 20.4% who had only systolic and 19.2% who had only diastolic hypertension. Both systolic and diastolic pressures are important criteria for classification of hypertension.

Among 357 males studied, 233 (65.26%) were prehypertensives (systolic pressure 120-139 mm of Hg and diastolic pressure 80-89) followed by 61(17.08%) who were stage I hypertensives (systolic pressure 140-159 mm of Hg and diastolic pressure 90-99 mm of Hg) and 20 (5.60%) were stage II (systolic pressure > 160 mm of Hg and diastolic blood pressure > 100 mm of Hg) hypertensives. Of the 393 females, 196 (49.87%) were prehypertensives followed by 67 (17.04%) in stage I hypertension (systolic pressure 140-159 mm of Hg and diastolic pressure 90-100 mm of Hg) and 41(10.4%) were stage II (systolic pressure > 160 mm of Hg and diastolic blood pressure > 100 mm of Hg) hypertensives (Table1).

Table 1. Distribution of hypertensive cases by sex.

Sex	Normal	Pre-hypertension	Stage I hypertension	Stage II hypertension	Total No (%)	p-value
Male	43	233	61	20	357 (47.6)	p < 0.001
Female	89	196	67	41	393 (52.4)	
Total	132	429	128	61	750 (100)	

Note: Figures in parentheses denote percentages

Table 2. Distribution of hypertensive subjects as per age among both sexes

Age in years	Total surveyed	Hypertension No (%)	95%CI	p-value
Male				
30-39	146	9(6.16)	2.26-10.07	p<0.001
40-49	97	16(16.4)	9.11-23.8	
50-59	58	22(37.9)	25.44-50.42	
60-69	42	24(57.1)	42.18-72.11	
>70	14	10(71.4)	47.76-95.09	
Total	357	81(22.6)	18.34-27.03	
Female				
30-39	173	23(13.2)	8.24-15.6	p<0.001
40-49	85	24(28.2)	18.67-37.8	
50-59	72	23(31.9)	21.17-42.71	
60-69	50	30(60)	46.42-73.58	
>70	13	8(61.5)	35.09-87.99	
Total	393	108(27.4)	23.07-31.89	

It has been observed from table 2 that the prevalence rate of hypertension shows an upward trend as age advances in males as well as in females. The difference was found to be statistically significant ($p < 0.001$), which indicates that age and sex have some influence in the association of hypertension.

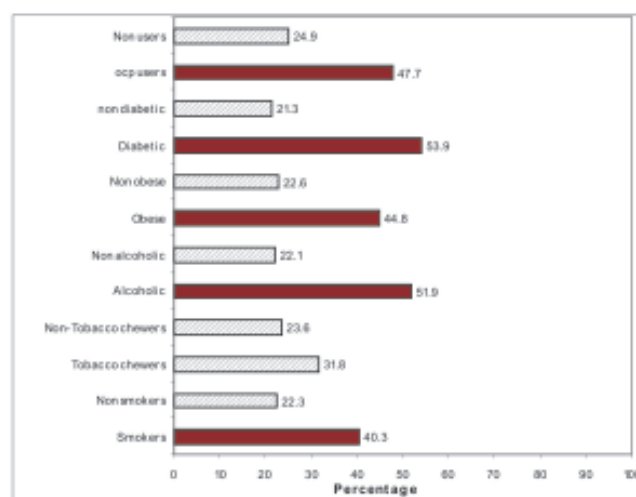
It has been observed from Table 3 that the prevalence of hypertension was higher (41.07%) among those living in house holds having 6 or more members compared to individuals living in house holds having 5 or less members (22.42%). Greater prevalence of hypertension was observed in unemployed (31.3) and unskilled (31.8) category of occupation followed by professional (22.05), semiprofessional (20.0) and skilled labourers (18.7) of the selected population. The higher prevalence in the unemployed and unskilled category is statistically significant as compared to the other three categories of the study population.

Hypertension and risk factors

Table 3 shows the prevalence of hypertension to be higher among smokers 48(40.33%) and 141(22.3%) in non-smokers. These differences were found to be statistically significant. The prevalence of hypertension was higher 33.3% among those who were in the habit of chewing tobacco for more than 5 years as compared to 31.6% who had this habit for less than 5 years. The lower prevalence rate of hypertension among non-tobacco chewers was 23.5%. It has been found out of 750 individuals, 79(10.5%) were found to be consuming alcohol. Among the drinkers 41 (51.8%) had hypertension followed by 34(43.0%) who

Table 3. The comparative figures of various factors in relation to hypertension.

Variables	Hyper tensive	Non hypertensive	Odds ratio	95%C.I	P value
Family Size					
<5	143	495	0.41	0.27-0.64	<0.001
>6	46	66			
Occupation					
Un employed	77	169	25.56-37.5	12.9-33.76	p<0.001
Professional	15	53			
Semiprofessional	13	52			
Skilled	49	238			
Unskilled	35	73 (75)	23.7-42.09		
Smoking					
Smokers	48	71	2.4	1.5 - 3.61	<0.003
Non smokers	141	490	1.0		
Tobacco					
Tobacco chewers	47	101	1.507	0.99-2.27	0.040
Non-Tobacco chewers	142	460	1.0		
Alcohol					
Alcoholic	41	38	3.812	2.36-6.15	0.001
Non alcoholic	148	523	1.0		
Obesity					
Obese	39	48	2.778	1.70-4.51	0.001
Non obese	150	513	1.0		
Diabetes					
Diabetic	48	41	4.32	2.66-7.00	0.001
Non diabetic	141	520	1.0		
Oral contraceptive					
Users	21	23	2.749	1.37-5.47	0.001
Non users	87	262	1.0		

**Figure 1.** The comparative figures of hypertension by various risk factors

were pre hypertensives, only 4(5.0%) had normal blood pressure. Out of 189 hypertensives, 75 (39.6%) of hypertensive individuals had normal/expected weight, 20 (10.5%) were under weights, 55(29.1%) were pre-obese, 26(13.7%) were class I obese and 11(5.8%) were class II obese. Only 2 individuals were in class III obesity, these difference were highly significant $p < 0.001$.

Among the diabetics, a majority of 48 (26.46%) individuals were found to be in stage I and II of hypertension and were followed by 30(6.99%) who were prehypertensives. Only 11(8.33%) were having normal blood pressure.

Among 393 females studied, only 44(11.9%) were taking oral contraceptives and among these individuals 41(93.18%) were taking oral contraceptive pills for less than 3 years and the remaining 3(6.8%) were taking oral contraceptive pills for more than 3 years. The prevalence of hypertension was 66.6% among those who were taken oral contraceptive pills for more than 3 years and it was 46.3% among those taking the oral contraceptive pills for less than 3 years.

Smokers were 2.4 times at a greater risk for hypertension compared to non-smokers (Table 3) and the difference was statistically significant, similarly alcohol use, obesity, tobacco chewing, environmental stress, anxiety, diabetes and oral contraceptive use were found to have statistically significant higher risk for hypertension.

DISCUSSION:

Until recently hypertension was considered to be one of the important public health problems in the developed and industrialized countries only. In the developing countries, its impact was not fully felt due to presence of rampant communicable diseases. However with control of communicable disease and increased life expectancy with life style changes, hypertension is becoming one of the emerging problems with its implications for concomitant increase in risk of cardiovascular and renal disease.

In the present study, out of 750 individuals examined 189 individuals (including 93 old hypertensive cases) were found to be suffering from hypertension and over all prevalence rate of hypertension was found to be 25.2 percent among both sexes. However the prevalence of hypertension was 22.6 percent among males (81 cases in 357 males) and 27.4 percent was among females (108 cases in 393 females).

Different studies carried out by Indian workers revealed varying prevalence rate of hypertension among adult population depending upon the criteria taken for classification, age group and type of population studied. The prevalence rate of hypertension reported in the present study 25.2% was the highest as compared to other studies in rural populations of India. The criteria taken for labeling hypertension (that is > 140/90 mm of Hg.), the increasing global trend in high prevalence of hypertension including rural areas due to changing life styles, stress and strain of life. The awareness of the problem and the co-operation of rural population for subjecting themselves readily for medical examination might be some of the factors for finding the high prevalence of hypertension in the present study. According to W H O scientific group 10-20 percent of adults in the world have hypertension based on the criteria suggested by their expert committee[7]. In the developing countries[3] the prevalence rate of hypertension varied from

15 to 33 percent[8]. Thus the prevalence rate of hypertension differs from population to population depending upon the cut off point used.

The prevalence rate of hypertension as shown in Table 2 showed an upward trend as age advances in both sexes. This proportionate increase of prevalence of hypertension as age advances in both sexes has been observed in many other studies. Joshi et al[2] observed in a study in Mumbai that there was an increasing trend of hypertension as age advances and even in post menopausal women, as the prevalence rate rose from 4% among young to 17.2% in 60 years of age group and similar findings was also contributed by Shakuntala Chockalingam[9] among both sexes.

Increased family size has got a positive association with hypertension. The difference was found to be highly significant. There was no such observation made in the earlier studies.

The occupational status has been found to have association with hypertension in the present study. Those who were in professional group had lesser prevalence rate as compared to other category of occupation. On the contrary Padmavathi and Guptha[10] at Delhi, Gosh & Joshi et al[11] at Simla found that hypertension was more common in professional group as compared to unskilled and semiskilled groups, but Mill et al[12] did not find any significant association between occupational status and hypertension. Probably, the level of occupation may materially affect physical activity and other aspect of life in relation to hypertension.

In the present study among hypertensives, smoking and tobacco chewers had important risk factor for the association of hypertension and the difference was statistically significant compared to nonsmokers and non tobacco chewers. Studies done by Benovitz Neal L [13] observed that sodium absorption was higher (107 mmol/day) among persons who smoked cigarettes and chewed tobacco as compared to non-tobacco users. This increased sodium absorption in the body due to tobacco use, has got some role in association of hypertension.

Among the over all alcoholics, 4 (5.06%) were normotensives followed by 34(43.03%) who were pre-hypertensive and remaining 41(51.8%) were found to have higher prevalence of hypertension. Statistical analysis was found to be significant indicating that alcohol is one of the risk factors in association with hypertension compared to non-alcoholics. Fried-man[14] reported similar finding that excessive alcohol intake is related to development of hypertension.

Obesity is one of the risk factors for hypertension, and this has been observed in this study, as increased BMI was resulting in hypertension in the selected subjects. Similarly, Friedman et al[14] carried out a 6-year follow-up study on

hypertension and obesity and found that obesity and weight gain were clear precursors of hypertension.

In the present study (table 3) among hypertensive, 48 (25.3%) were suffering from diabetes mellitus. Among the over all diabetics, 11 (12.3%) were normotensives followed by 30(33.7%) were prehypertensives and 48(53.93%) were in stage I and stage II hypertension. On statistical analysis the difference was found to be significant indicating that hypertension and diabetes mellitus have got an association, similarly Raj B singh[16] et al carried out a study among ethnic groups of rural and urban population of North India and revealed that the diabetes mellitus was risk factor for hypertension.

Oral contraceptive usage was found to be a significant risk factor in causation of hypertension. Among female hypertensive, 44(40.7%) were using oral contraceptives. In their usage 41(93.18%) were taking oral contraceptive for less than 3 years and 3(6.8%) were taking oral contraceptive for more than 3 years. The difference was less significant indicating that long term usage of oral contraceptive had an association. On the contrary, studies carried out in China¹⁷ revealed that prevalence rate of hypertension was significantly higher with long term usage of oral contraceptive and the mean systolic pressure and diastolic pressure in groups on oral contraceptive pills were higher by 6.5 mm of Hg and 3.24 mm of Hg respectively as compared to blood pressure readings in control group.

The over all prevalence rate of hypertension in the rural community studied, among the age group 30 years and above in both sexes was 25.2 percent. The prevalence rate was higher (27.4%) among females than males (22.6%). Increase in age, large family size, occupation, alcohol, smoking, chewing tobacco, obesity, use of oral contraceptives and diabetes mellitus were found to be associated with hypertension. There is a necessity for the health care providers to take note of this trend and institute appropriate preventive measures, including changing life style modifications.

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