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Prevalence of Hypertension, Pre-Hypertension and Associated Risk Factors in Rural Field Practice Area of a Private Medical College in South-India

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ABSTRACT

Introduction: Globally hypertension is responsible for majority of mortality and morbidity among the non-communicable disease burden. A Community based cross sectional study was carried out to find the prevalence of hypertension, pre-hypertension and associated risk factors in the rural field practice area of Saveetha Medical College between January to March 2020.

Methodology: The sample size calculated was 203 and equal numbers of participants between the age group of 30 to 60 years were selected from each of the 6 villages in field practice area by Stratified Random sampling method. A semi- structured pretested questionnaire was used for data collection.

Results: The prevalence of hypertension and pre-hypertension was found to be 29.4% and 28.9% respectively. Major determinants of hypertension were age, marital status, diabetes mellitus, excess salt intake, sedentary lifestyle, stress, family history of hypertension and disturbed sleep pattern. Increased odds of hypertension were seen in marital status, diabetes mellitus and excess salt intake.

Conclusion: Interventional measures done in the pre-hypertensive stage prevents risk of developing hypertension. Regular screening for high blood pressure, lifestyle modifications, treatment with anti-hypertensive medication are required to decrease the prevalence of hypertension in the community.

Keywords: Screening, NPCDCS, Sedentary Lifestyle, Excess Salt Intake

INTRODUCTION

The force exerted by circulating blood against the walls of arteries is called blood pressure. Increased blood pressure is called hypertension. Hypertension is considered to be a 'Silent killer' as it has no warning signs and symptoms hence the hypertensives tend to remain unaware of their raised blood pressure. Nearly 1.13 billion people globally have been diagnosed with hypertension. Hypertension also increases the risk of developing heart, kidney, brain and other diseases. The prevalence of hypertension varies across the WHO regions. The WHO African Region has the highest prevalence of hypertension (27%) while the WHO Region of the Americas has the lowest prevalence of hypertension (18%).The prevalence of hypertension is more in developing countries than developed countries.[1] In 2025, the number of individuals to develop hypertension is expected to increase about 60% to a total of 1.56 billion

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globally.[2]Hypertension accounts for 7% of global disability adjusted life years, hence considered to be the largest contributor to global burden of disease.[3]Overall prevalence for hypertension in India is 29.8%.[4] 57% of all stroke deaths and 24% of all coronary deaths have occurred due to hypertension in India. Modifiable risk factors for hypertension include smoking, alcohol consumption, high salt intake, obesity and non-modifiable risk factors include age, gender, family history of hypertension.[1]According to various studies [5-8], increased level of blood glucose, increased total cholesterol, increased BMI, increased triglyceride were found in pre-hypertensive group when compared with normotensive group. Hence proper intervention measures in the pre-hypertensive group are required to prevent the occurrence of full-blown hypertension.[9]Data suggests that over the past decade prevalence of hypertension has been increasing in developing countries. As prevalence is increasing there is a need to quantify the same, in order to take stock of the situation, implement health programmes and increase awareness among the public. In a country like India, it is important that hypertension be controlled so that risk of mortality, morbidity and disease burden is reduced.

With the above background this study was planned with the aim to find out the prevalence of hypertension, pre-hypertension and its association with the risk factors in rural field practice area which may represent the rural population of South India and be helpful in strategizing preventive measures.

METHODOLOGY

This is a community based descriptive cross-sectional study conducted in the rural field practice area of Saveetha Medical College, Mappedu, Tamil Nadu. There are 6 villages covered under the rural field practice area namely, Mudhugur, Ulundhai, Kilacherry, Mappedu, Thodugadu and Sengadu. The total population covered is 15373. The study was carried out from January 2020 to March 2020.

Sample size: The sample size was calculated using the formula $1.96*1.96\ pq/d^2$ here the p value is taken as 20% based on the previous study done by Mohan V et l[8] and the allowable error value [d] is taken as 5.5%. The sample size is thus calculated to be 203.

Sampling method: Stratified Random sampling was employed. In order to get the required sample size, 34 study participants in the age group of 30-60 years were selected from the 6 villages to reach the required sample size. The first house in the village was selected by going to the centre of the village, spinning a pencil, and selecting the first house in the direction of the pencil. From each house one person was interviewed.

Selection criteria: People aged between the age group of 30 to 60 years residing in Mappedu, Tamil Nadu who were willing to participate in the study by giving informed oral consent were included in this study.

Study tool and data collection method: Data was collected by house-to-house survey. A semi-structured pretested questionnaire was used in the study. The questionnaire had questions about the demographic details of the subject, whether the subject already had hypertension, if medication was taken, risk factors like smoking, alcohol consumption, salt intake, physical activity, family history, stress.

Informed consent: Informed oral consent in the local language (Tamil) was obtained from the participants involved in this study before administering the questionnaire and measuring the blood pressure.

Measurement: After obtaining informed oral consent from the subject the height, weight and the blood pressure of the subjects were measured.

The blood pressure of the subject was measured using OMRON [Digital Automatic Blood Pressure Monitor]. The blood pressure was measured on the right arm of the subject. The first reading was taken, followed by which a second reading was taken after one minute. The average of the two measurements was recorded. If the difference between the two readings were found to be more than 5 mmHg than a third reading was taken.[9]

The weight of the subject was measured using weighing machine. The weight was measured in kg. The height of the subject was measured using a measuring tape. The height of the subject was measured in metre.[10]

Table 1: Classification of Hypertension among patients with history and without history of Hypertension[11,12]

Hypertension (HTN) Classification	SBP (mmHg)	DBP (mmHg)
Persons with History of HTN		
Controlled Blood Pressure	< 140	< 90
Uncontrolled Blood Pressure	> 140	> 90
Participants without history of HTN		
Normal	< 120	< 80
Prehypertension	120-139	80-89
Stage 1 HTN	140-159	90-99
Stage 2 HTN	> 160	> 100

SBP=Systolic Blood Pressure; DBP= Diastolic Blood Pressure

Operational definition: Participants were divided based on the history of hypertension. Those with history of hypertension were looked if their blood pressure is controlled or not and participants without history of hypertension were divided into normotensive, prehypertension, Stage 1 and Stage 2 hypertensives based on JNC 7 criteria.[11,12] (Table 1)

Body Mass Index (BMI) was calculated using the formula weight [kg]/ height^2[m]- Quetelet's index.[13]

Obesity was calculated according to BMI. BMI ≥25.00 was considered as overweight.[14]

Socioeconomic status was determined by using 2019 modified Kuppuswamy's scale.[15]Education of the head of the family, occupation of the head of the family and the monthly income of the family were the parameters collected.

Statistical analysis: The data was entered in MS Excel and analysed in SPSS software version 21, The descriptive statistics were expressed in frequency tables, Mean and standard deviation of the age, BMI and systolic blood pressure were calculated. Factors associating with the study variable were analysed by calculating the significance using Chi-square and p value and the strength of association by Adjusted Odds Ratio using Multiple Logistic Regression.

RESULTS

Out of 204 people who participated in the study, 60 (29.4%) were found to be suffering from hypertension. Around 13.7% of the study participants were having a history of hypertension. Among them, 53.6% were on medication and only 29.3% were having controlled blood pressure. Among those without history of hypertension, 16.5% were suffering from Stage 1 hypertension, 1.7% from Stage 2 hypertension and 28.9% from prehypertension and 48.3% were normotensive according to JNC 7 criteria.[12] (Table 2)

A total of 204 subjects participated in this study. The mean age of the study population was 46±8 years. The mean systolic blood pressure and mean diastolic blood pressure was found to be 128±14 mmHg and 80±8 mm Hg respectively. The mean BMI of the study population was found to be 25±3kg/m^2.

The highest percentage of people in the study 147 (72.1%) were more than 40 years old. In the study population, majority were females 118 (57.8%). 183 (89.7%) of the study participants were married. Predominantly the participants were literate 180(88.2%). Illiteracy was found to be more among females (16.9%) compared to males (4.7%). 74 (36.3%) of the study population were skilled workers. Unemployment was seen in 59 (28.9%) individuals, was more in females (45.8%) than in males (5.8%). Most of the population belongs to Upper Lower class (36.3%). As for diabetes mellitus, 74 (36.3%) individuals had the condition. Current consumption of alcohol (12.25%) and cigarettes (9.8%) were low among the study participants (Table 3)

Table 2: Distribution of Hypertensive states among study population

Variable	Frequency (%) (n = 204)
Prevalence of Hypertension	**60 (29.4)**
Participants with history of HTN = 28 (13.7%)	
On Medication = 15 (53.6%)	
Controlled Blood Pressure	11 (29.3)
Uncontrolled Blood Pressure	17 (60.7)
Participants without history of HTN = 176 (86.7)	
Stage 1 Hypertensives	29 (16.5)
Stage 2 Hypertensives	3 (1.7)
Pre-Hypertensives	59 (28.9)
Normotensives	85 (48.3)

Table-3: Association between Socio-demographic factors and Hypertensive states of study population

Factors	HTN	Pre-HTN	Normotensives	Total	Chi-square Value	P value
Age					34.459	.000*
<40 Years	5 (8.8)	10 (17.5)	42 (73.7)	57(28)		
>40 Years	55 (37.4)	49 (33.3)	43(29.3)	147(72)		
Gender					1.546	.462
Male	29 (33.7)	22 (25.6)	35 (40.7)	86(42.2)		
Female	31 (26.3)	37 (31.4)	50 (42.4)	118(57.8)		
Education						
Illiterate	9 (37.5)	9 (37.5)	6 (25)	24(11.7)	3.110	.211
Literate	51 (28.3)	50 (27.8)	79 (43.9)	180(88.3)		
Occupation						
Unemployed	18 (30.5)	19 (32.2)	22 (37.3)	59(28.9)	3.512	.742
Unskilled Worker	18 (36)	14 (28)	18 (36)	50(24.5)		
Skilled Worker	19 (25.7)	19 (25.7)	36 (48.6)	74(36.2)		
Professional	5 (23.8)	7 (33.3)	9 (42.9)	21(10.4)		
Marital Status						
Unmarried	13 (61.9)	6 (28.6)	2 (9.5)	21(10.3)	14.209	.001*
Married	47 (25.7)	53 (29)	83 (45.4)	183(89.7)		
Socioeconomic Status						
Upper Middle	6 (20.7)	9(31)	14 (48.3)	29(14.2)	6.273	.393
Lower Middle	18 (25.4)	18 (25.4)	35 (49.3)	71(34.8)		
Upper Lower	24 (37.8)	22 (29.7)	28 (37.8)	74(36.2)		
Lower	12(26.7)	10 (33.3)	8 (26.7)	30(14.8)		
TOTAL	60	59	85	204		

*P value<0.05, statistically significant at 95% confidence interval

Table-4 Association between Hypertensive states of study population and related variables

Variables	HTN	Pre-HTN	Normotensives	Total	Chi-square Value	P value
Diabetes Mellitus						
Yes	35 (47.3)	28 (37.8)	11 (14.9)	74 (36.3)	35.842	.000*
No	25 (19.2)	31 (23.8)	74 (56.9)	130(63.7)		
Smoking						
Yes	4 (20)	7 (35)	9 (45)	20(9.8)	1.01	0.603
No	56 (30.4)	52 (28.3)	76 (41.3)	184(90.2)		
Alcohol Intake						
Yes	10 (40)	7 (28)	8 (32)	25(12.25)	1.733	0.42
No	50 (27.9)	52 (29.1)	77(43)	179(87.75)		
Excess Salt Intake						
Yes	35 (51.5)	27 (39.7)	6 (8.8)	68(33.3)	47.383	.000*
No	25 (18.4)	32 (23.5)	79 (58.1)	136(66.7)		
Sedentary Lifestyle						
Yes	17 (42.5)	14 (35)	9 (22.5)	40(19.6)	7.92	.019*
No	43 (26.2)	45 (27.4)	76 (46.3)	164(80.4)		
Stress						
Yes	25 (48.1)	18 (34.6)	9 (17.3)	52(25.4)	18.987	.000*
No	35 (23)	41 (27)	76 (50.)	152(74.6)		
Family History of HTN						
Yes	9 (32.1)	13 (46.4)	6 (21.4)	28(13.7)	6.712	.035*
No	51 (29)	46 (26.1)	79 (44.9)	176(86.3)		
Disturbed Sleep Pattern						
Yes	35 (50)	21 (30)	14 (20)	70(34.3)	28.501	.000*
No	25 (18.7)	38 (28.4)	71 (53.)	134(65.7)		
Frequent Mood Changes						
Yes	6 (28.6)	8 (38.1)	7 (33.3)	21(10.2)	1.077	0.584
No	54 (29.5)	51 (27.9)	78 (42.6)	183(89.8)		
Obesity						
Yes	37 (33.6)	34 (30.9)	39 (35.5)	94(46)	3.986	0.136
No	23 (24.5)	25 (26.6)	46 (48.9)	110(54)		
Total	60	59	85	204		

*P value<0.05, statistically significant at 95% confidence interval; HTN=Hypertensives

Table 5-Multivariate analysis of risk factors for Hypertension and Pre-hypertension

Variable	Normo-tensives	Hypertensives			Pre-Hypertensives		
		Adjusted odds ratio	P Value	Confidence Interval	Adjusted odds ratio	P Value	Confidence Interval
Age	R	.309	.071	.806-1.106	.489	.156	.182-1.314
Marital Status	R	11.871	.013*	1.682-83.788	5.283	.096	.746-37.418
Diabetes Mellitus	R	11.445	.000*	3.896-33.621	5.986	.000*	2.230-16.072
Excess Salt Intake	R	21.649	.000*	6.332-74.020	13.710	.000*	4.319-43.518
Exercise	R	.017	.062	.000-1.223	.052	.156	.001-3.073
Stress	R	2.014	.319	.509-7.973	2.561	.160	.689-9.518
Family history of HTN	R	3.878	.061	.940-15.989	4.923	.014*	1.381-17.553
Disturbed Sleep Pattern	R	1.754	.391	.486-6.331	.668	.519	.196-2.275
Sedentary Lifestyle	R	.087	.265	.001-6.320	.221	.464	.004-12.581

R-Reference Category is Normotensives

*P value<0.05, statistically significant at 95% confidence interval.

Among various socio-demographic factors, age and marital status were found to have a statistically significant association with hypertension. The prevalence of hypertension and pre-hypertension was found to be more in people who are more than 40 years of age, 37.4% and 33.3% respectively. In case of marital status, hypertension was more prevalent (61.9%) in unmarried individuals, while pre-hypertension was prevalent (29%) more in married individuals. The prevalence of hypertension was more in males (33.7%), people belonging to upper lower class (37.8%) and in unskilled workers (36%). While pre-hypertension was more prevalent in females (31.4%), professionals (33.3%) and in people belonging to lower class (33.3%). It is interesting to find that prevalence of hypertension and pre-hypertension distributed (37.5%) equally among illiterates of the study population. (Table - 3).

Out of the variables identified for hypertension, variables like diabetes mellitus, excess salt intake, sedentary life style, stress, family history and disturbed sleep patterns were found to have statistically significant association. The prevalence of hypertension and pre-hypertension was found to be more in those

having a sedentary life style, which was 42.5% and 35% respectively. Hypertension (48.1%) and pre-hypertension (34.6%) was present in individuals with stress. The prevalence of hypertension and pre-hypertension was found to be more in those having family history of hypertension, which was 32.1% and 46.4% respectively. As for sleep pattern, hypertension (50%) and pre-hypertension (30%) were more prevalent in those having disturbed sleep. Presence of hypertension was found to be more in individuals who are obese (33.6%), consume alcohol (40%), not having frequent mood changes and are non-smokers (30.4%). Pre-hypertension was present more in obese individuals (30.9%), smokers (35%), non-consumers of alcohol (29.1%) and those who did not have frequent changes in their mood. (Table 4)

On multivariate analysis, it was found that people who were unmarried, were consuming excess salt in their diet had higher odds to suffer from pre-hypertension and hypertension and people who had diabetes mellitus were at higher odds of suffering from prehypertension and the association between them was also found to be statistically significant. (Table 5)

DISCUSSION

The prevalence of hypertension is increasing every decade due to change in modern lifestyle which results in increased risk factors for hypertension like smoking, alcohol consumption, change in diet with high salt intake, sedentary lifestyle which result in obesity, stress. Hypertension itself is a risk factor of various morbid conditions.

The prevalence of hypertension in this study was found to be 29.4%. Nearly similar results were found in the study done by Raja Tet al., Ponnaganti SC et al., and Singh R et al. where the prevalence of hypertension was found to be 26.2%, 27.7% and 23.73% respectively.[5, 6,16]The prevalence of pre-hypertension in this study was 28.9%, while the prevalence in the study done by Mohan V et al was 36.1%.[8]and 55% in a study done by Parthaje PM et al.[17]The prevalence of hypertension is quite high thereby, proving that measures for control of hypertension and awareness among public for lifestyle modifications, behavioural changes which might help in reducing the prevalence is needed immediately. The frequency of screening camps, NCD clinics that are organised by the government should also be increased.

In this study, prevalence of hypertension and pre-hypertension was found to be more in people who consumed excess salt and similar results were done in a study done by Bhavani PL et al.[18]Health Education should be provided in a larger way, so that people might start the habit of avoiding consuming excess salt in their diet. A model diet can be advocated for people who are at risk. High salt content foods should be avoided by at risk population. Regular outreach programmes may be held to emphasize the importance of food diet in controlling hypertension.

This study shows 47.3% prevalence of hypertension and 37.8% prevalence of pre-hypertension in subjects with diabetes and shows a significant association with hypertension which is similar to Lakshman A et al. study where hypertension prevalence of 61.5% was noticed in subjects having diabetes.[19]Diabetic individuals may also be screened regularly for hypertension. Strict glycaemic control needs to be achieved faster so that their quality of life is not further affected by hypertension.

The study also shows more prevalence of pre-hypertension (46.4%) in subjects who have had family history of hypertension. Similar results were obtained in a study done by Ravi MR et al and Chokkalingam A et al.[20,21]People with family history of hypertension need to be warned and given awareness about the risk they face, and to be screened much earlier than normal. They may be advised to follow lifestyle modifications before being diagnosed since they are at risk.

The prevalence of hypertension was found to be more in unmarried people (61.9%) in this study, while Lakshman A et al. study shows prevalence of hypertension to be more in married individuals which is 45.6%.[19]Screening of unmarried people and possible stressors may be identified through counselling and measures be taken.

Of the 28 participants who were already diagnosed with hypertension, only 15 people were on medications, indicating that health care seeking behaviour among the population needs to be advocated more. In this study, 15.7% of the 29.4% individuals were newly diagnosed as hypertensives while screening, which emphasizes the iceberg phenomenon and stresses the need for more screening camps and stricter implementation of already existing health programmes.

In 2016, WHO and the United States Centre for Disease Control and Prevention launched the Global Hearts Initiative to support governments to prevent and treat cardiovascular diseases. Of the five technical packages that comprise the Global Hearts Initiative, the HEARTS technical package aims to improve the prevention and management of cardiovascular diseases, including hypertension detection and management. The five modules of the HEARTS technical package (Healthy-lifestyle counselling, Evidence-based treatment protocols, Access to essential medicines and technology, Team-based care, and Systems for monitoring) provide a strategic approach to improve cardiovascular health in countries across the globe. India has already started implementing the HEARTS package, it now needs to spread the coverage and effective implementation of the programme. More focus and emphasis should be given on these programmes by the government[1].

According to the National Programme for prevention and control of Cancer, Diabetes, Cardio-Vascular diseases and Stroke (NPCDCS), drugs for non-communicable diseases (NCD) like hypertension and diabetes are given free of cost by the government in clinics for NCDs set up at various centres.[22]But the major problem is they are not utilised by everyone owing to lack of awareness and most patients are lost to follow up. In a study done by Ainapure K et al, awareness about the NPCDCS programme was low in their study area.[23] Useful programmes like this should be advertised and promoted through mass media so it reaches every nook and corner of the country. Targets should be set that a greater number of people are covered by such programmes. This helps in improving the control of hypertension, which ultimately leads to improvement in health and health- care status of the country. Self-screening of hypertension through digital blood pressure monitoring devices may be educated and advocated, so that they may reach the care of physician sooner. People should also be pro-active by learning healthy eating habits, lifestyle and adopting these so that hypertension could be kept at bay for as long as possible.

CONCLUSION

It was found that more than half of the study population were suffering from either prehypertension or hypertension. The importance of maintaining a good physical health by regular exercise, yoga, meditation and modifications in dietary risk factors like avoidance of salted and fried food items and avoidance of consumption of tobacco and alcoholic beverages must be emphasized to the people in the community by conducting Behaviour Change Communication (BCC) activities at regular intervals. This study re-emphasizes the needs of screening, awareness, intervention and treatment to decrease the prevalence of hypertension in the community.

LIMITATIONS OF THE STUDY: This study was conducted in our field practice area covered by one RHTC, therefore the findings cannot be generalised to other rural areas.

ETHICAL CLEARANCE: Ethical approval was obtained from the Institutional Review Board (IRB) and Institutional Ethics Committee.

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