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A STUDY OF RISK FACTORS OF HYPERTENSION IN INPATIENTS OF A TERTIARY CARE HOSPITAL

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ABSTRACT

The incidence of hypertension and its mediated diseases is escalating worldwide. The present study was undertaken to study the risk factors of hypertension in inpatients of a tertiary care hospital.

The patient details like demographics, laboratory tests, final diagnosis were collected. A total of 160 patients were included in the study, which was conducted for 6 months. A total of 80% were hypertensive and 20% were non hypertensive.

The risk factors of hypertension like smoking, alcohol consumption, demographics, socioeconomic status, diet, family history, family size, education level, salt intake, lifestyle, basic metabolic index was compared between hypertensive and non-hypertensive population.

It was found that smoking, alcohol consumption and mixed diet were important risk factors for hypertension in the study population. Hence these factors can be considered while developing appropriate prevention strategies and formulating management guidelines for hypertension at the study site.

KEYWORDS: Hypertension; Risk factors; Inpatients; Smoking; Alcohol; Diet

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INTRODUCTION

Cardiovascular disease (CVD) causes nearly 18 million deaths annually. Despite the phenomenal progress in disease management, 30% of global deaths are attributable to CVD. The development of CVD can be attributed to a number of genetic and acquired risk factors. One of the important risk factors is systemic hypertension which is the leading root cause of excessive premature mortality and morbidity due to CVD.

Overall prevalence for hypertension in India was found to be 29.8%. About 33% urban and 25% rural Indians have hypertension. In the elderly (>70 years), the incidence of hypertension is nearly 60%. In India the incidence of hypertension mediated disease is escalating. The control of this syndrome is very much required as India is marching towards an alarming increase in cardiovascular mortalitynever witnessed earlier.[1]

Epidemiology is the study of the distribution of diseases and other health-related conditions in populations, and the application of this study to control health problems. The purpose of epidemiology is to understand what risk factors are associated with a specific disease, and how disease can be prevented in groups of individuals; Epidemiologic studies can be used for many reasons, commonly to estimate the frequency of a disease and find associations suggesting potential causes of a disease. To achieve these goals, measures of disease (incidence) or death (mortality) are made within population groups. Epidemiology is fundamentally multidisciplinary and it uses knowledge from biology, sociology, statistics, and other fields.[2]

Many modifiable factors contribute to the current high prevalence rates of hypertension. They include overweight and obesity, harmful use of alcohol, physical inactivity, psychological stress, eating food containing too much salt, inadequate intake of fruits and vegetables, socioeconomic determinants etc[3]

The present study was undertaken, to measure the prevalence of hypertension and to identify the risk factors responsible for the development of hypertension in inpatients of a tertiary care hospital so that it will help the health care professionals and policymakers in developing the guidelines and treatment protocols. Though many studies have been done on some selected populations, there is scarcity of studies performed to identify the risk factors of hypertension in urban Bengaluru.

MATERIALS AND METHODS

The study was conducted for a period of six months from October 2018 to March 2019.

The patients were enrolled into the study as per the inclusion and exclusion criteria stated in the study protocol.

Inclusion and Exclusion criteria: All patients admitted to study site hospital above 18 years of age during the study period and patients who were willing to participate in the study were included in the study.Mentally retarded individuals and critically ill patients were excluded in the study.

Source of data:In patient record, personal interview of patients and their representatives were used to collect data.

This study was initiated after obtaining approval and clearance from Institutional Ethics Committee. The patients were enrolled in the study after obtaining the consent by signing in the informed consent form. After taking the informed consent form from each patient, patient details including demographics, final diagnosis, laboratory tests and other information were collected from the patients records and documented in the self-designed patient data collection forms.

Definitions for various variables:

Hypertensives:

Measurement of blood pressure: Two measurements of blood pressure (BP) on each study participant with a mercury column sphygmomanometer were made, also everyday measurements of BP were recorded from the patient record.[4]The patients were divided into normal, prehypertensive, hypertensive stage 1 and hypertensive stage 2 as per the JNC VI guidelines as represented in Table 1.[4]

Table 1: Patient categories based on BP measurements [4]

Category	SBP mmHg	DBP mmHg
Normal	<120	<80
Pre hypertension	120-139	80-89
Hypertension Stage 1	140-159	90-99
Hypertension Stage 2	≥160	≥100

Smoker: A person who has smoked at least 100 cigarettes in his lifetime and has continued to smoke every day or some days in last 30 days.[5]

Tobacco consumption: Defined as a person who has consumed smokeless tobacco once a day or nearly every day in any form for the last 12 months.[5]

Alcohol consumption: Present consumer was defined as a person who has consumed alcohol every day or some days in the last 30 days. Past consumer was defined as a person who used to consume alcohol but stopped taking alcohol 12 months ago.[5]

Salt intake: Estimated salt intake was calculated by taking the amount of salt used by the family divided by number of members in the family multiplied by 1000.

Economic background: Based on the annual income per year the study subjects were divided into Lower Income = < 5 Lacks; Middle Income = 5-10 Lacks and Higher Income = > 10 Lakhs. [6]

Body mass index: The Body Mass Index (BMI) was calculated based on the formula = Weight (Kg)/(Height(cm)) [2]. Based on BMI values patients were divided into Underweight (BMI<18.5); Normal (BMI 18.5 – 25); Overweight (BMI >25).[5]

Statistical analysis: A data was entered in Microsoft excel and analysed using GraphPad InStat chi square test of significance was performed to find out the results. A two tailed p value ≤ 0.05 was considered significant. The value of Relative Risk (RR) was also calculated.

RESULTS AND DISCUSSION

The area of interest in this study was to identify the risk factors of hypertension and prevalence of hypertension in a population admitted to a tertiary care hospital. A total of 160 subjects were included in the study which was conducted for six months - from October 2018 to March 2019. Out of 160 study subjects, 128 (80%) and 32 (20%) were found to be hypertensive and normotensives respectively as shown in Figure 1.

In the study population, maximum number of subjects (26%) were in the age group of 60-69 years followed by people in the age range of 40-49 years; above 70 years (21%) and people in the age group of 50-59 years (18%) as represented in Table 2. The similar trend was observed in hypertensive population as shown in Table 2. In the study population, the number of male and female patients were almost equal which was 51% & 49% respectively as in Table 3. When hypertensive population was divided based on the stages of hypertension as given in JNC VII guidelines, most of the hypertensive were in Stage 1 (35%) i.e Systolic140-149mmHg Diastolic 90-99mmHg, followed by patients in pre hypertension stage (30%) and patients with Stage 2 hypertension (15%) as shown in Figure 2.

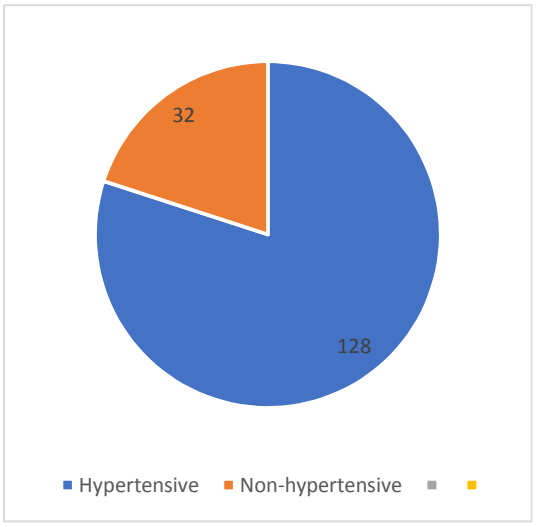

Fig 1: Prevalence of Hypertension in the Study Population

Table 2: Age wise Distribution of Study Population

	Total (%)	Hypertensive (%)	Normal (%)
Male	83 (51)	63 (76)	20 (24)
Female	77 (49)	65 (84)	12 (16)

Table 3: Gender wise Distribution of Study Population

Age in Years	Total Surveyed (%)	Hypertensives	Non-Hypertensive
18 – 29	7 (4)	5	2
30 – 39	15 (9)	12	3
40 – 49	34 (21)	28	6
50 – 59	29 (18)	22	7
60 – 69	41(26)	32	9
ABOVE 70	34 (21)	29	5

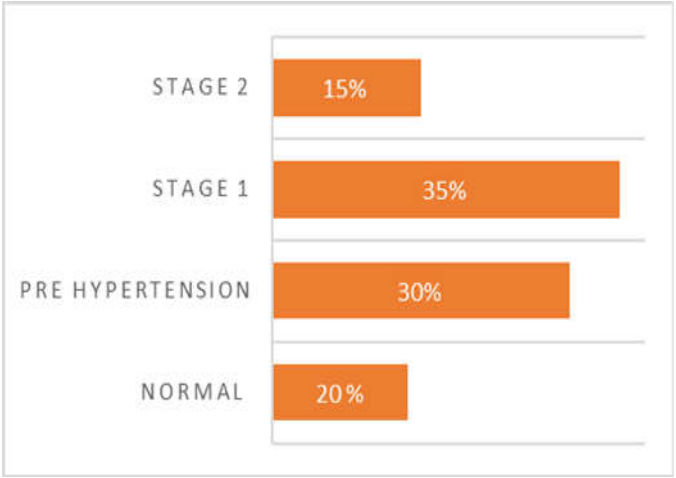

Fig 2: Distribution of Study Subjects as per Stages of Hypertension based on JNC VII guidelines

Socio-Demographic Variables and Prevalence of Hypertension

In this study the sociodemographic characteristics of the hypertensive and non-hypertensive population were compared. Statistics was applied to find out the significance. In the hypertensive population 55% were smokers whereas in non-hypertensives only 25% were smokers. There was a statistically significant association between smoking and hypertension (p = 0.001; RR = 1.134) as shown in Table 4. In our study a statistically significant association (p=0.0025; RR=1.22) was found between high alcohol consumption and hypertension wherein 57% of the hypertensive population was alcoholic and only 28% of non-hypertensives were alcoholics as presented in Table 4.In hypertensive population of our study 23% of patients were diabetic and in non-hypertensives 58% were diabetic and 72% of hypertensives were non diabetic as represented in Table 4. The socioeconomic status of hypertensives and non-hypertensives shows similar distribution between low, middle- and high-income groups (Low 31% in both groups; middle 46% & 44% in hypertensive and non-hypertensives and high 23% & 25% in hypertensive and non-hypertensives respectively) as presented in Table 4. There was no statistically significant relationship between income group and hypertension (p=0.99). In both the populations maximum number of patients belonged to the middle-income group as shown in Table 3. In this study higher percentage of hypertensive and non-hypertensive patients were consuming mixed diet (85% and 66% in hypertensive and non-hypertensive population respectively) but higher percentage of patients in non-hypertensive population (34%) were consuming vegetarian diet as shown in Table 4. The relationship between diet and hypertension was statistically significant (p=0.0028; RR=2.9). More number of people in the hypertensive group (59%) had a family size of more than 5 compared to the smaller family size (41%) represented in Table 4. There was no statistically significant relationship between family size and hypertension (p=0.81; RR=0.97). In our study maximum number of hypertensive patients did not have the family history of hypertension (62%) as presented in Table 4. The family history of hypertension was seen in 38% of hypertensive population and 25% of non-hypertensive population. The relationship between family history and hypertension was statistically significant (p=0.036; RR=1.38). Table 4 also shows that the higher incidence of hypertension was observed in subjects who finished their basic education (literates) (55%) whereas illiterates' group (35%) and graduates' group (10%) had lower incidence of hypertension.

Though there were more hypertensive patients consuming greater than 10g of salt in our study(76%) compared to those who consume less than 10g (24%), the association between amount of salt intake in the study population and incidence of hypertension was not significant (p=1;RR=1) as shown in Table 4. The study analysed that in hypertensive population 66% of the population had sedentary lifestyle;5% used to walk rarely and 28% were regular walkers. The observation was similar in non-hypertensive population where 53% had sedentary lifestyle, 19% rare walkers and 28% were regular walkers as given in Table 4. The association between physical activity and hypertension was not significant (p=0.36).

As shown in Table 4, the current study found that majority of the hypertensive subjects in the study had normal BMI. In hypertensives 77% had normal BMI and 16% were overweight whereas in non-hypertensives 53% had normal BMI and 18% were overweight. There was no statistically significant relationship between BMI and hypertension in our study (p=0.4).

In the study, 128 (80%) were hypertensive. As study population included inpatients admitted to a hospital, we can expect this pattern. In the recent JNC VIII guidelines higher BP goals have been recommended (<150/90 mmHg) in age >60 years. Therefore, we can infer that only few patients required aggressive treatment to reduce their hypertension (National Institute of Health). But this observation cannot be correlated to general population of the study site.

The incidence of hypertension was highest in 60-69 years. Many surveys, cross sectional studies have demonstrated a positive relation between age and BP with the highest incidence at the age group of 60-69 years[7,8]. Our study finding is aligned with the above observation.

The number of male and female patients was almost equal in the study population. Furthermore, this observation was also true in the hypertension group. This is a unique observation, as in some studies number of male patients predominate[9]and in other studies, the female patients were more in

Variables		*Hypertensive (%)*	*Non-hypertensive (%)*	p *value*	*Relative Risk*
Smoking	Smoker	71 (55)	8 (25)	0.001	1.134
	Non – Smoker	57 (45)	24 (75)		
Alcohol	Alcoholic	68 (57)	9 (28)	0.0025	1.22
	NonAlcoholic	60 (43)	23 (72)		
Diabetes	Diabetic	36 (28)	17 (53)		0.2
	Non Diabetic	92 (72)	15 (47)		
Socio Economic Status	Low(<5 Lpa)	40 (31)	10 (31)	0.99	
	Medium(6 – 10Lpa)	59 (46)	14 (44)		
	High(>10Lpa)	29 (23)	8 (25)		
Dietary Habit	Mixed	109 (85)	21 (66)	0.0028	2.91
	Veg	19 (15)	11 (34)		
Family size	Less than 5	53 (41)	15 (47)	0.81	0.97
	Greater than 5	75 (59)	17 (53)		
Family History	Yes	48 (38)	8 (25)	0.036	1.38
	No	80 (62)	24 (75)		
Education	Illiteracy	70 (55)	4 (13)		
	Schooling	45 (35)	13 (41)		
	Graduate	13 (10)	15 (47)		
Salt Intake	Less than 10 g	31 (24)	10 (31)	1.00	1.01
	More than 10 g	97 (76)	22 (69)		
Physical Activity	Sedentary	85 (66)	17 (53)	0.36	
	Rare Walking	7 (5)	6 (19)		
	Regular Walking	36 (28)	9 (28)		

BMI	Malnourished	8 (6)	5 (16)	0.40	
	Normal	99 (77)	17 (53)		
	Overweight	21 (16)	5 (18)		
	Obese	0	5 (18)		

Table 4: Socio demographic variables and prevalence of hypertension

number.[10,7]In male patients' higher exposure to risk factors like alcohol, smoking and lack of physical activity might be the reason for slightly higher prevalence. Better health consciousness in women and hesitation to report poor health might be the reasons for lower incidence of hypertension in women in few studies.[9,10]

It has been postulated that smoking causes high BP by increasing sympathetic activity.[8]It was found that there is a statistically significant association between smoking and hypertension (p= RR=1.134)similar to the observations by one study,[8] but contrary to other two studies where there was no significant association between smoking and incidence of hypertension.[3,11]

A statistically significant relationship was also found between hypertension and alcohol consumption. Alcohol diminishes baro reflex by interacting with receptors in brain stem cells. Two studies have showed positive association[4,8]and one more study has showed significant association between alcohol consumption and hypertension[6].But one more study did not find significant association between smoking and incidence of hypertension.[3]

Diabetes was not seen along with hypertension in maximum number of patients in our study. This is a very unique observation of this study. This observation might be a result of low sample size or population characteristic. But in other two studies a significant association was found between diabetes and hypertension.[7,10]Diabetes and hypertension share common pathways such as sympathetic nervous system, renin-angiotensin-aldosterone system, oxidative stress, adipokines, insulin resistance, and Peroxisome proliferator-activated receptor. These pathways interact and influence each other and may even cause a vicious cycle. Hypertension and diabetes are both end results of the metabolic syndrome. They may, therefore, develop one after the other in the same individual.[13]

The maximum number of study subjects belonged to middle income group. There was no relationship between socioeconomic status and hypertension. This observation reflects the average economic status of the people visiting this hospital. In a study low economic status was linked to incidence of hypertension.[7] In one more study there was lower incidence of hypertension in people of higher socioeconomic status[3]

The vegetarian diet was found to be related to low incidence of hypertension in our study population. Animal fat (largely saturated) raises LDL cholesterol and increases the risk. But a vegetarian diet typically has low cholesterol and hence decreased incidence of hypertension[13]A similar observation was done in study done in Nellore, Andhra Pradesh, India.[7]

Though subjects with >5 members in a family had higher incidence of hypertension, this association was not statistically significant. This observation is similar to a study where increased family size was significantly associated with hypertension. Increased responsibility and lower self-care in large families might be the reason for this higher incidence of hypertension in large families in our study.[10]

Most of the hypertensive subjects in our study did not have the family history of hypertension. But when compared to non-hypertensive patients a greater number of patients in the hypertensive group had family history of hypertension and relationship between the family history in hypertensive and no hypertensive patients was statistically significant. As per the report of WHO expert group a family history of elevated BP is one of the strongest risk factor for future development

of hypertension in individuals.[3]In a study conducted among bank employees and in one more study by statistically significant association was present between family history of hypertension and hypertension in the individuals.[3,8]In the present study, the findings may be taken as subjective. Lack of communication and awareness, underdiagnosis in the family members can be attributed to this deviated result.

Though there was association between salt intake and hypertension this association was not statistically significant. In one study this association was significant.[7] The association was not significant in study by Brahmankar *et al*. [3] We can attribute this observation to lower number of sample size of our study.

In the current study sedentary lifestyle was found in the study population but more number of subjects in the non-hypertensive group exercised regularly. Sedentary lifestyle, older age, and obesity are associated with hypertension. Participants with a sedentary work style are more likely to have hypertension compared to the active ones. A similar observation was made in two more studies where the association was significant.[3,8]

Increased awareness about the effect of body weight on hypertension among study population may have led to this observation. Hence there was no significant association between BMI and hypertension (p=0.40). This observation is in contrast with observation by other studies where hypertension was significantly associated with the BMI.[3,8,10]

CONCLUSION

This study was performed to assess the risk factors for hypertension in inpatients of a tertiary care hospital. Smoking, alcohol consumption and diet were the important lifestyle risk factors for hypertension in this study population. Hence these factors should be considered during the management of hypertension by the physician with appropriate community -based screening and treatment strategies. This study has provided useful data for planning and implementing hypertension prevention programs in the hospital.

In the future studies sample size of the study can be increased to come out with more representative data. A similar study can be conducted in a community setting to know the prevalence and risk factors of hypertension.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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