

Epidemiological study of systemic hypertension in urban population in central Kerala

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Abstract

Aim: Study the prevalence of systemic hypertension in population surveyed. **Background:** Hypertension, a major public health problem, is directly responsible for stroke deaths and coronary heart disease related deaths in India. The prevalence of hypertension is increasing rapidly in developing countries more in urban areas due to changing life style and increasing longevity. **Objectives:** To study systemic hypertension in relation to age sex and associated risk factors. **Materials and methods:** 1000 individuals of either sex, belonging to the age group above 18years, were selected from Thrissur district, central Kerala and studied. **Results and Discussion:** Prevalence of hypertension was 43.9% in the whole population studied and among the hypertensives, 39.6% individuals were newly detected ones. This study showed a higher prevalence of hypertension among females (44.6%), when compared to males (43.1%) in contrary to many other studies. **Conclusion:** This study showed a high prevalence of hypertension in the urban population, risk factors being increasing age, post menopausal period, diabetes mellitus, dyslipidemia, Ischemic heart disease and addictions. This study could not find an association of hypertension with added salt.

Keywords: Hypertension, Prevalence, risk factors, family history, urban.

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INTRODUCTION

Hypertension is a chronic condition of concern due to its role in causation of coronary heart disease, cerebrovascular accidents, and other vascular complications like retinopathy, nephropathy, and peripheral vascular diseases. It's the commonest cardiovascular disorder, posing a major health challenge to population in socio-economic and epidemiological transition. It's one of the major risk factors for cardiovascular mortality, which account for 20-50% of all deaths¹. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease

deaths in India². This fact is important because hypertension is a controllable disease and a 2mmHg population-wide decrease in BP can prevent 1,51,000 stroke and 1,53,000 coronary heart disease deaths in India². Epidemiological studies show a steadily increasing trend in hypertension prevalence in India over the last few years. It has increased by 30 times among the urban population over a period of 55 years and about 10 times among the rural population over a period of 36 years³. This is converse to findings reported from developed countries where there is significant decrease in prevalence. The world prevalence is estimated to be 26.4% of adult population in developed countries⁴. Epidemiological studies have shown that hypertension is present in 25% of urban and 10% of rural subjects in India⁴. Objectives of clinical assessment of hypertension of individual are: to establish that BP is elevated; to seek evidence for a causal or contributory factor which may influence management; to assess target organ involvement and to assess relevant factors which will influence the particular mode of treatment to be adopted. Despite the growing awareness among health-care providers of the value of improving patients' adherence, only 50% of patients comply with long term drug therapy,

and an even smaller of them complies with lifestyle alterations⁵. In order to improve a patient’s adherence, both provider and patient must work in partnership. Effective strategies are multifaceted, addressing the 3 factors of patient, provider, and environment. It’s also important to recognise that some patients are resistant to change their behaviour. Better patient education or tools must be developed, incorporating visual aids that motivate adherence to prescribed regimen.

AIM

Study the prevalence of systemic hypertension in population surveyed.

OBJECTIVES

1. Study the age and sex distribution of systemic hypertension in population surveyed.
2. To study the association between hypertension and its risk factors.
3. To determine the relation between socio-economic status and prevalence of hypertension
4. To compare male and female hypertensives

METHODOLOGY

- Type of study: cross-sectional study
- Duration of study: 6 months from January 2013 to June 2013
- Place of survey and population: 1000 cases of either sex, belonging to the age group above 18years, were selected from Thrissur district, central Kerala.
- Definition of hypertension: (Based on JNC-VII criteria)⁶

Normal: Systolic and diastolic < 120/80 mm of Hg

Prehypertensives: systolic 120-139 or diastolic 80-89 mm of Hg

Stage-1 hypertensives: systolic 140-159 or diastolic 90-99 mm of Hg Stage-2 hypertensives: systolic 160 or diastolic 100 mm of Hg. The participants with history of hypertension and on antihypertensive drugs were also labelled as hypertensives. In patients with hypertension, BP control target is <140/90 mm Hg, target is <130/80mm Hg in patients with DM or renal disease⁶

Methods

Administer the structured questionnaire after due explanation to the participant about the objective of the study and taking informed consent from each one of them. After verifying the questionnaire, detailed history is taken and clinical assessment is done. Finally measure the blood pressure of each participant. Blood pressure Measurement: standard measures as recommended by WHO⁷⁻⁹ and American heart association⁹ are adopted.

Measure the blood pressure for each participant, using the auscultatory method with a standardized calibrated mercury column type sphygmomanometer and an appropriate sized cuff encircling at least 80% of the arm in the seated posture, with feet on the floor and arm supported at heart level. Make two separate measurements after proper rest and record the average of the two measurements. In some cases, where high blood pressure is recorded for the first time, blood pressure is checked again after 2 weeks. Systolic BP is the point at which the first of 2 or more sounds is heard (phase I) and diastolic BP is the point before the disappearance of sounds (phase 5).

Ethical consideration

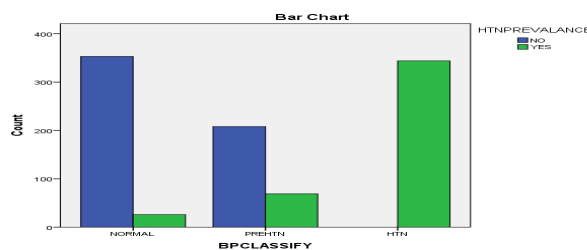
1. Informed consent was sought from all the participating patients.
2. Strict confidentiality was maintained.
3. No expenses was incurred by the patients.

Statistical analysis

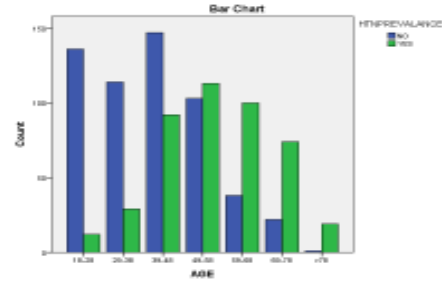
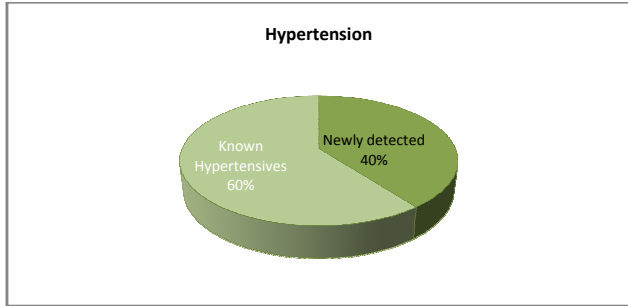
Using SPSS software for data entry and analysis. Using chi-square to find out the results for the select risk factors and outcome variables. Assess the association between these variables and each of the following outcome measures: normal blood pressure, prehypertensive status, Stage I and Stage II hypertensives status.

RESULTS AND OBSERVATION

Prevalence of hypertension was 43.9% in the whole population studied. Out of this 6.9% was known hypertensives whose blood pressure is now under the limit of pre hypertension and 2.6% had normotensive status with appropriate treatment. Among the hypertensives, 39.6% individuals were newly detected hypertensives (174/439). The prevalence of newly detected prehypertensives were 20.8% in the population studied.

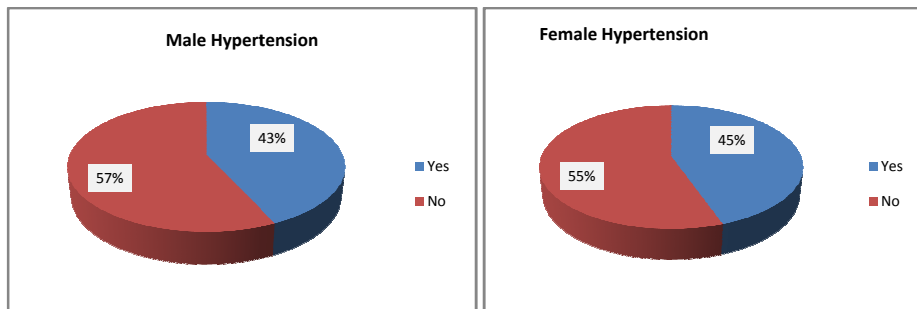
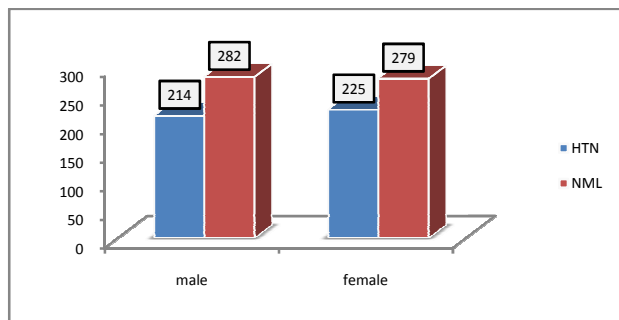


| | | Htnprevalance | | Total |
|--------------|--------|---------------|------------|-------------|
| | | No | Yes | |
| Bpclassify | Normal | 353 | 26 | 379 |
| | Prehtn | 208 | 69 | 277 |
| | Htn | 0 | 344 | 344 |
| Total | | 561 | 439 | 1000 |



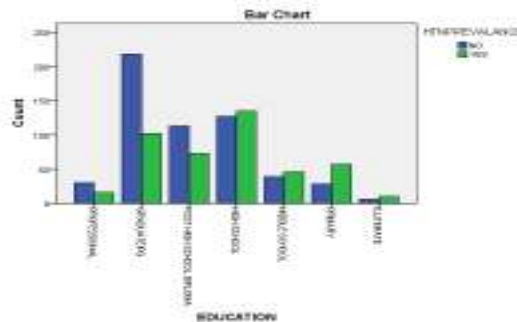
AGE: Prevalence of hypertension within each age group was found to be steadily increasing from 8.1% in younger subjects(18-28 years) to 95% in the subgroup >78 years.

SEX: Among 1000 individuals studied 496 were males and 504 were females. This study proved a higher prevalence of hypertension among females (44.6%), when compared to males (43.1%) in contrary to many other studies.



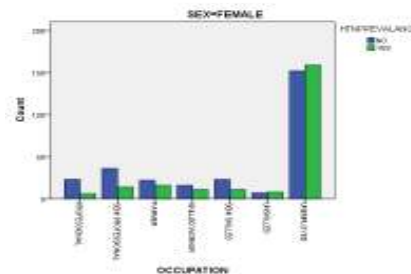
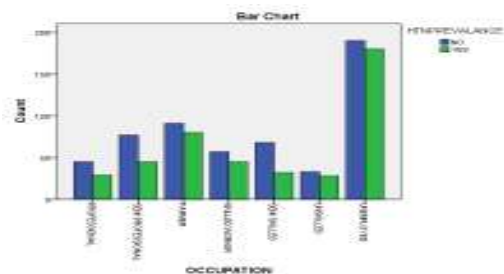
EDUCATION: Present study showed a low prevalence of hypertension among educated persons as noted from the crosstab i.e., Graduates and post graduates had a total prevalence of only 31.9% where as those with only

primary education had a high prevalence of 67.1%. This may be due to the lack of awareness among this subgroup.

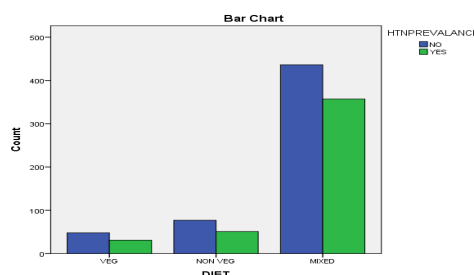
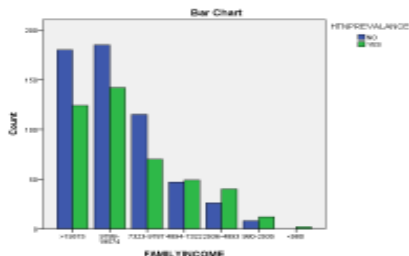


OCCUPATION: This study noted a higher prevalence of hypertension among the unemployed group and it was

predominantly females.

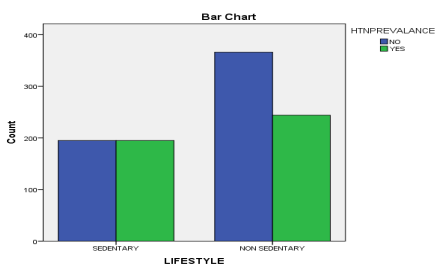


FAMILY INCOME: According to the present study the prevalence of hypertension was found to be higher in the low family income group. Again the reason being probably the lack of awareness regarding the diet and lifestyle modification

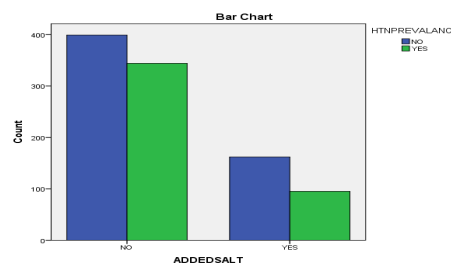


| | Htnprevalance | | Total |
|--------------|---------------|------------|-------------|
| | No | Yes | |
| Diet Veg | 48 | 31 | 79 |
| Diet Non veg | 77 | 51 | 128 |
| Diet Mixed | 436 | 357 | 793 |
| Total | 561 | 439 | 1000 |

LIFESTYLE: Those subjects coming under the sedentary lifestyle showed high prevalence of hypertension i.e., 50%, when compared to non sedentary group (40%) and it is statistically significant. (p value=0.002)

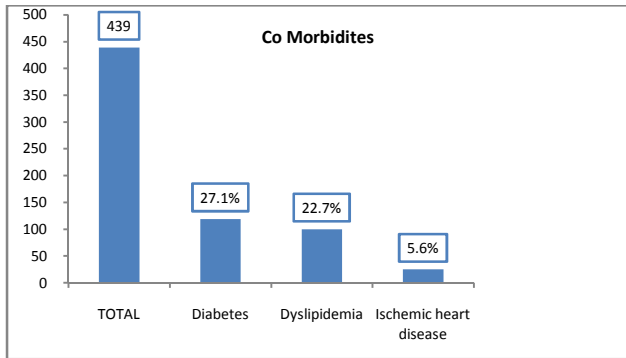


ADDED SALT: In the hypertensive group 37% had a history of added salt (>6gm) in their diet and this observation is in contrary to previous studies which showed more association with added salt.

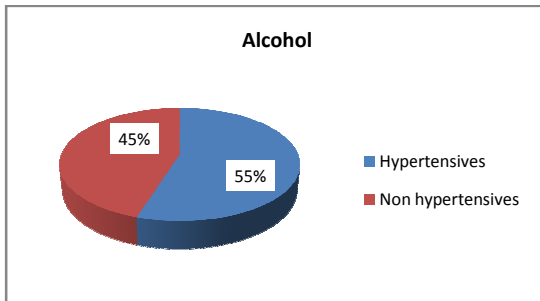
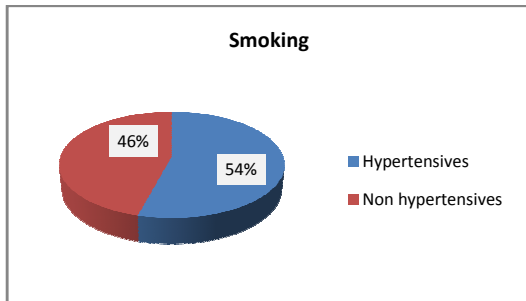


DIET: Vegetarian diet showed a protective effect on hypertension in our study which is similar to the observation in a recent study from south kerala, even though it is statistically not significant.

COMORBIDITIES: Among the comorbidities studied diabetes had the highest association (27.1%) followed by dyslipidemia (22.7%) and Ischemic heart disease (5.6%) in hypertensive population. Whereas in non hypertensives it was 9.8%, 9.1%, 1.9% for diabetes, dyslipidemia and Ischemic heart disease respectively.



ADDICTIONS: Among 439 hypertensives 33.6% had history of smoking whereas history of consumption of alcohol was found in 44.39% individuals



Systolic Vs Diastolic: In the whole population studied 60.6% individuals were noted to have high systolic blood

pressure (>140 mm of Hg) and 61.7% individuals had high diastolic blood pressure (>90mm of hg)

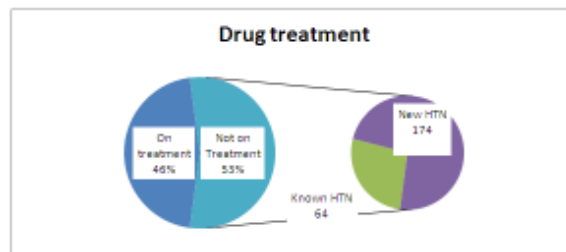
| | Htnprevalance | | Total | |
|--------------|---------------|------------|-------------|-----|
| | No | Yes | | |
| SBP | <120 | 374 | 44 | 418 |
| | 120-139 | 187 | 129 | 316 |
| | 140-159 | 0 | 193 | 193 |
| | >=160 | 0 | 73 | 73 |
| Total | 561 | 439 | 1000 | |

| | HTNPREVALANCE | | Total | |
|--------------|---------------|------------|-------------|-----|
| | NO | YES | | |
| DBP | <80 | 416 | 99 | 515 |
| | 80-89 | 145 | 69 | 214 |
| | 90-99 | 0 | 190 | 190 |
| | >=100 | 0 | 81 | 81 |
| Total | 561 | 439 | 1000 | |

BMI: The average BMI of hypertensive population was 26.25 while it was 24.59 in non hypertensive group

were not on any drugs despite knowing that they were hypertensives. Majority of those on treatment were taking ACEI and ARBS.

TREATMENT: The present study noted that 53% were not on any medications and out of that 64 individuals



| | | Htnprevalance | | Total |
|--------------|--------------------------|---------------|------------|-------------|
| | | No | Yes | |
| DRUGS | No treatment | 559 | 238 | 797 |
| | Acei/arbs | 2 | 168 | 170 |
| | Beta blockers | 0 | 22 | 22 |
| | Ccb | 0 | 5 | 5 |
| | Ace+diuretics | 0 | 5 | 5 |
| | Beta blockers+ diuretics | 0 | 1 | 1 |
| Total | | 561 | 439 | 1000 |

Table 1: Association between hypertension with its risk factors

| | Hypertensives | Non hypertensives | P value |
|--------------------------------|---------------|-------------------|--------------|
| Total Subjects | 439 | 561 | |
| Diet | | | |
| Veg | 31 | 48 | 0.376 |
| Non Veg | 51 | 77 | |
| Mixed | 357 | 436 | |
| Lifestyle | | | |
| Sedentary | 195 | 195 | 0.002 |
| Non sedentary | 244 | 366 | |
| Salt intake in grams | | | |
| <6gm | 344 | 399 | 0.009 |
| ≥6gm | 95 | 162 | |
| Smoking | | | |
| Yes | 72 | 61 | 0.011 |
| No | 367 | 500 | |
| Alcohol | | | |
| Yes | 95 | 78 | 0.001 |
| No | 344 | 483 | |
| BMI (Average)kg/m ² | 26.25 | 24.59 | |
| Diabetes | 119 | 55 | 0.000 |
| Dyslipidemia | 100 | 51 | 0.000 |
| IHD | 25 | 11 | 0.020 |

MALE AND FEMALE COMPARISON

The total prevalence of hypertension and prehypertension in female subgroup was found to be more when compared to male subgroup. The maximum prevalence of hypertension in male subgroup was noted to be in the age group 49-58yrs, while the highest prevalence in females was in the age group 59-68 yrs. Incidence of hypertension in female unemployed group was extremely high in comparison to male unemployed group. On the other hand, female professionals were having low prevalence of hypertension. In both males and females, sedentary group had very high incidence of hypertension. 56.3% of diabetic hypertensives were females and 52% of hypertensive females had association with dyslipidemia. Incidence of Ischemic heart disease was apparently equal in both groups. High systolic bloodpressure was noted more among females. Family history of hypertension was also noted more in female subgroup even though statistically not significant. Average body mass index in male subgroup was 25.42 while it was 27.08 in females. In the present study all smokers and alcoholics were

exclusively males and none of the females had history of addictions.

DISCUSSION

Hypertension is a major public health problem in India and poses a significant risk for the development of heart disease and Chronic kidney disease. This is obvious from several Indian studies. The various studies done earlier estimated a prevalence rate of hypertension among urban population ranging from 1.24% in 1949 to 36.4% in 2003¹¹. The prevalence of hypertension is increasing in developing countries like India due to changing lifestyle and increasing longevity. One of the major cause for CKD worldwide is hypertension. Unlike developed countries only a small percentage of Indian population can afford renal replacement therapy. Hence prevention, early detection and treatment would be a better alternative. Prevalence of hypertension was found to be 43.9% in the present study. 61.4% of hypertensives were already diagnosed to have hypertension while 39.6% were newly detected hypertensives. This observation shows the submerged portion of the iceberg. Our

observations are similar to the earlier study conducted by Avadaiammal *et al* done in Trivandrum City of Kerala in 2009 where the prevalence of hypertension was 47%¹². Another study conducted recently among urban population in North Karnataka by Madhumitha M.*et al*. Showed a total prevalence of 37.6%¹³. Findings of our study are similar to Gupta, R in Jaipur, in urban adults in 2002 which showed prevalence of hypertension as 36% in men and 37% in women⁴. In our study 34.4% of the hypertensives were unaware of their condition. Improving awareness in the community is an important population strategy for prevention of complication of these diseases. Out of 43.9% hypertensives, 6.9% was known hypertensives whose blood pressure was under the limit of prehypertension and 2.6% had normotensive status with appropriate treatment. The present study proved that the prevalence of hypertension within each age group was found to be steadily increasing from 8.1% in younger subjects (18-28yrs) to 95% in the sub group (>78yrs). This observation is similar to the earlier study done in Trivandrum by Avadaiammal Vimala *et al* in which the prevalence of hypertension was 70% among those older than 50 yrs¹³. Again similar observation was made by Shyamal Kumar Das *et al* in a study of urban community survey in India (Kolkata), so also by Momin M H *et al*¹⁴. This may be due to the fact that the under developed social welfare systems for geriatric care in India compound the inadequate health care for the elderly individuals. Another observation made from our study was a slightly higher prevalence of hypertension among females (44.6%) when compared to males (43.1). Where as a study done by Momin MH, *et al* showed a higher prevalence in males as compared to females except in those more than 50 yrs¹⁴. Vimala *et al* study noted 56% and 42% prevalence of prehypertensive and hypertensive individuals respectively, at age from 30 to 49 yrs with equal sex distribution while prevalence of hypertension showed female preponderance in age group more than 50 yrs¹². In our study, the highest prevalence in females was noted within the age group 59-68yrs. The reason could be the postmenopausal period in females which poses a real threat for hypertension due to the lack of estrogen effect. Our study can be compared to the study by Vimala *et al* in which the prevalence of hypertension was less among those with higher educational status¹². The awareness of hypertension was more among persons with higher educational status, in contrast to the observation from a study conducted in Spain¹⁵. The lack of awareness among the illiterate/low educational status need to be corrected at the earliest. The present study noted a high prevalence of hypertension among unemployed group predominantly females as compared to males. Study conducted by Momin MH, *et al* showed highest prevalence of

hypertension among higher cadre officers¹⁴. The fact being due to the lack of physical activity in both unemployed females and officer cadre. This study proved a strong association between sedentary life style and hypertension and it was statistically significant. The observation throw light on the importance of physical activity in the prevention of hypertension. In contrary, studies conducted by Madhumithe M *et al* in North Karnataka and L. Patnaik *et al* in Orissa in 2005 noted no significant association between hypertension and physical activity^{13,16}. Chennai Urban Population Study and S. S. Reddy *et al* study in Tirupati found significant association between both^{17,18}. In contrast to the study by Momin MH *et al*, in which the prevalence of hypertension was noted highest among the higher socioeconomic group, our study found a positive correlation between hypertension and low family income group¹⁴. The attributing factor could be lack of awareness regarding diet and life style modification. In the present study vegetarian diet showed a protective effect on hypertension. Our observations can be compared with a study by Vimala *et al* which showed that the prevalence of hypertension among subjects on vegetarian diet vs mixed diet was 41% vs. 49%, respectively but the difference was not statistically significant¹². Gilberts E C *et al* study in south Indian population did not find significant association between diet and hypertension¹⁹. Our study could not prove definite association between hypertension and added salt. Only 37% hypertensive individuals had history of added salt in their diet. One explanation would be the high probability of subjective variation in the assessment of salt consumption. Studies by Avadaiammal *et al* and Madhumitha M *et al* noted strong association between added salt and hypertension and it was statistically significant^{12,13}. Through this study we tried to find association between hypertension and diseases like diabetes mellitus, dyslipidemia and ischemic heart disease. Diabetes had the highest association (27.1%) in our study. Study by Vimala *et al* observed a significant association between diabetes mellitus and hypertension. In our study, almost all individuals with ischemic heart disease were hypertensives¹². According to this study significant association of hypertension was found with smoking (54.1%) and alcohol (55%) and none of them were females. Studies done by Patnaik N *et al* in Orissa, S.S. Reddy *et al* in Tirupathi in 2005, S. Yadav *et al* (2008), Haresh Chandwani *et al* in Gujarat in 2010, Saunders *et al*, V.K. Desai *et al* in Surat showed similar results^{14,16,17,20-22}. A case control study from Bangalore showed that smoking was an independent risk factor for hypertension²³. The prevalence of systolic hypertension (60.6%) and diastolic hypertension (61.7%) was apparently equal in this study, in contrary to a study

of urban community survey in India by Shyamal Kumar Das in which systolic hypertension (140 mm of Hg) was present in 40.9% and diastolic hypertension in 29.3% of the participants²⁴. We observed high systolic blood pressure more in females unlike many other studies.

To Conclude

- Our study proved a high prevalence of hypertension as comparable to recent studies mentioned.
- Increasing age is definitely a risk factor for hypertension.
- Post menopausal females have increase risk for hypertension.
- This study noted a positive correlation with low educational status and unemployment.
- According to our study there is a strong association between sedentary lifestyle and hypertension.
- Our study could not prove an association between hypertension and added salt.
- Smoking and alcohol have got definite association with hypertension.
- Diabetes mellitus, Dyslipidemia and Ischemic heart disease were found to be strongly associated with hypertension.
- Vegetarian diet showed a protective effect on hypertension.
- Prevalance of pre hypertension was also found to be a high and thus timely detection and appropriate treatment of this group can prevent complications like CKD and heart diseases.

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