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Original research article

A SOCIO-EPIDEMIOLOGICAL STUDY OF HYPERTENSION AND ITS ASSOCIATED RISK FACTORS AMONG ADULTS (20-60 YEARS) IN RURAL NORTH KARNATAKA

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Abstract

Introduction: Hypertension is an emerging public health problem in rural India due to its high prevalence and association with cardiovascular and overall morbidity and mortality. Two-thirds of India's one billion population still lives in rural areas with very sparse data regarding non-communicable diseases. Hence, the present study intended to find out the prevalence & associated risk factors of hypertension among adults in rural parts of Vijayapur.

Objectives: To study the prevalence of hypertension and its associated risk factors among adults (20-60 years of age).

Material and Methods: After obtaining ethical clearance from the Institutional Ethical Committee, the study was carried out in rural Vijayapur. Participants were then interviewed using a predesigned, pretested questionnaire and general physical examination was done.

Results: The overall prevalence of hypertension was 4.6%. It was highest among females (6.9%), 41-50 years of age (65%), illiterates (51.6%), lower middle class (64.5%), stress due to aging (80.6%), tobacco users (6.5%) and alcoholics (6.7%). Also, a positive association was found between body mass index (BMI) and hypertension ($p<0.05$).

Conclusion: Hypertension is more prevalent among adults in their fourth decade of life in rural India. This has been found to be influenced by some of the modifiable and non-modifiable risk factors due to lifestyle changes. Therefore, it is necessary to create

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awareness about hypertension and its complications rather than just avoiding the risk factors.

Keywords: Hypertension, rural, prevalence, risk factors, adults

Introduction

Hypertension or raised blood pressure is an emerging public health problem due to its high prevalence and association with cardiovascular and overall morbidity and mortality. Defining hypertension is difficult, and by necessity, arbitrary. Sir George Pickering first formulated the concept that blood pressure in a population is distributed continuously as a bell-shaped curve with no real separation between 'normotension' and 'hypertension'. Evans and Rose defined it as that level of blood pressure at which detection and treatment can do more good than harm [1, 2].

Based on diastolic and/or systolic blood pressure; high diastolic blood pressure has commonly been used to measure blood pressure. But there is evidence showing that cardiovascular risk is strongly associated with both systolic and diastolic blood pressures. The current definition of hypertension is therefore a level of systolic blood pressure of 140 mmHg or above, or a level of diastolic blood pressure of 90 mmHg or above [1, 3, 5]. This is followed by Joint National Committee and European Society of Hypertension as well [3, 4].

In the INTERHEART and INTERSTROKE study, hypertension accounts for 17.9% and 34.6% population attributable risk for coronary artery diseases and stroke respectively [6]. A direct relation exists between cardiovascular risk and blood pressure: the higher the blood pressure, the higher the risk of both stroke and coronary events. Therefore, the dividing line between normal and high blood pressure is defined only in an operational way [2].

Hypertension is an "iceberg" disease. Patients seeking medical attention owing to symptomatic disease may represent the "tip of the ice-berg" when considering manifest and subclinical disease together [7]. This became evident in the early 1970s. Only about half of the hypertensive subjects in the general population of most developed countries were aware of the condition, only about half of those aware of the problem were being treated and only about half of those treated were considered adequately treated. India is slowly and steadily acquiring the status of the global chronic disease capital. It is undergoing an epidemiologic, socioeconomic and nutritional transition and is on the threshold of an epidemic of cardiovascular diseases. The rise is attributed to stress, high blood pressure, dyslipidemia, steep rise in blood sugars, cholesterol, obesity, physical inactivity, poor diet and smoking [5]. These factors are interrelated to such an extent that the occurrence of one factor leads to another factor, thereby leading to the development of non-communicable diseases. High blood pressure is one of the most preventable causes of premature death worldwide.

The World Health Day theme for the year 2013 was hypertension which is 'a silent killer being the cause of global public health crisis'. The slogan for the campaign was "healthy heart beat, healthy blood pressure". This highlighted an important priority area of public health concern all over the world.

A rise in the prevalence of non-communicable disease risk factors in rural areas has important public health implications, since, two-thirds of India's one billion population still lives in rural areas [8]. Lifestyle interventions such as reducing dietary salt intake

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and increasing the consumption of fruit and vegetables will be of great benefit when applied to a population [9, 10]. Blood pressure-lowering trials have demonstrated immense benefits in preventing stroke, heart failure and coronary heart disease. Also, there is no difference in outcome between the different methods used to lower blood pressure and the benefit is proportional to the degree of blood pressure-lowering [11].
Studies on the prevalence of the risk factors in adults are warranted to study the trend and to formulate guidelines for periodicity of monitoring and management [5]. Several surveys have examined the prevalence of risk factors for non-communicable disease in urban India, but recent data from rural India is inadequate. Vijayapur is one of the district headquarters in northern Karnataka which is undergoing rapid socioeconomic transition & lifestyle modifications. Data regarding NCDs is very sparse in this area. Hence, the present study intends to find out the prevalence & associated risk factors of hypertension among adults in rural parts of Vijayapur.

Objectives

1. To study the prevalence of hypertension among adults (20-60 years of age).
2. To study the socio-demographic, economic and other factors influencing hypertension among adults (20-60 years of age).

Materials & Methods

After taking ethical clearance from the Institutional Ethical Committee, a community based cross-sectional study was conducted in Ukkali village, Vijayapura from March 2016 to February 2017.

Sample Size: Considering 37.6% prevalence of hypertension among adults from previous studies [10], sample size calculated using the formula, sample size, $n = \frac{Z_\alpha^2 \times p \times q}{l^2}$ at 95% confidence level would be 670.

Z_α^2 = 1.96 with p<0.05 at 95% confidence level (probability of alpha error <5%).

p is the prevalence from previous studies.

q = 1-*p*.

l is the allowable error (10% of the prevalence).

Sampling Method: Systematic random sampling. House was taken as the sampling unit.

Step 1: Sampling interval, $m = \frac{\text{total number of houses}}{\text{sample size}} = \frac{1800}{670} = 2.68 \approx 3.$

Step 2: k, random number was less than or equal to sampling interval i.e., m.
Random number, k, was selected by using lottery method and so k^{th} house was taken as the first house and from then on every 3^{rd} house was visited to find the eligible person. If more than one eligible person was present at the time of the visit, the subject to be interviewed was selected by lottery method. If the inhabitants were not at home at the time of the visit, the next house was visited.

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Step 3: k, k+3, (k+3)+3,……This process was continued till the required sample size was reached.

Informed consent was obtained after informing all the participants about the nature and purpose of the study. Participants were then interviewed using a predesigned, pretested questionnaire and examined.

Inclusion Criteria

- Adults of the age group of 20-60 years willing to participate in the study.

Exclusion Criteria

1. Those who were not willing to participate in this study.
2. Persons with severe chronic illness, immuno-compromised individuals, those with physical disability, mental disability and pregnant & lactating women were excluded from the study.
3. Individuals on steroids.

Statistical Analysis

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean, standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries. Chi-square (χ^2)/Freeman-Halton Fisher exact test was employed to determine the significance of differences between groups for categorical data. The difference of the means of analysis variables between two independent groups was tested by unpaired t test. If the p-value was < 0.05, then the results were considered to be statistically significant otherwise it was considered as not statistically significant. Data were analyzed using SPSS software v.23.0. and Microsoft office.

Results

The prevalence of hypertension among the study participants was 4.6% and that of pre-hypertension was 15.7% (Figure 1). Among the hypertensives, 90.3% were known cases while 9.7% were newly diagnosed with hypertension. This was statistically significant. 46.4% of the study subjects belonged to 20-30 yr age group. Only 7.6% of the study subjects were from the 51-60 yr age group. It is evident from the table that the prevalence of hypertension is increasing with age. It was 6.6% in the 20-30 yr age group and 64.5% in the 41-50 yr age group. This steep rise in the prevalence of hypertension in the fourth decade was statistically significant (p<0.05). On the contrary, the prevalence of pre-hypertension was higher in the 20-30yr age group (31.4%) when compared to the 41-50yr age group (13.3%) (Table 1).

Genderwise, 6.9% females were hypertensive while only 1.1% of the males had HTN and this was statistically significant (p<0.05). However, pre-hypertension was more among the males (17.6%). Majority of the subjects completed secondary level of education (28.5%) followed by illiterates (23.4%) and primary education (20.1%). The prevalence of hypertension was highest among illiterates (51.6%) as compared to literates and this difference was statistically significant (p<0.05). Most of the subjects were professionals (43%) followed by unskilled workers (26.1%). The prevalence of hypertension was highest among unskilled workers (64.5%) and this was statistically

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significant (p<0.05). On the other hand, professionals had the highest prevalence of pre-hypertension (55.2%). 16.4% of the subjects had aging stress and 7% had stress due to their health issues. 80.6% of the hypertensives said that they had aging stress and 41.9% had health related stress which was higher than the other stresses listed above and they were statistically significant (p<0.05). (Table 3) Majority of the hypertensives belonged to SES III (64.5%) followed by SES IV (19.4%) and SES V (16.1%) and this difference was statistically significant. HTN was found to be 6.5% and 4.3% among tobacco users and non-users, respectively. This difference was statistically significant (p<0.05). Pre-hypertension was present among 23.1% tobacco users. Among the alcohol consumers, 6.7% had hypertension and 23.8% had pre-hypertension which was statistically significant (p<0.05). Statistically significant association was found between HTN and family history of hypertension (p<0.05).38.7% of hypertensives and 17.1% pre-hypertensives gave family history of HTN. Majority of the hypertensive subjects were vegetarians (67.7%) as compared to non-vegetarians (32.3%) though it was not statistically significant (p>0.05). The prevalence of HTN was found to be more among those who consumed extra salt in the form of pickle, papad, or groundnut chutney (5.1%) as compared to those who did not consume these (4.5%). This was statistically significant (p<0.05). 3.2% hypertensives and 11.4% pre-hypertensives consumed extra fat in the form of ghee, oil, or butter. However, this association was not statistically significant. Hypertension was significantly associated with BMI (p<0.05). 25.8% hypertensives and 52.4% pre-hypertensives were found to be overweight. (Figure 2) The mean BMI among normotensives was 23.8±3.6. Those with pre-hypertension had a mean BMI of 25.1±2.9 and the hypertensives had a mean BMI of 25.1±3.0. This difference in the mean BMI according to the blood pressure category was statistically significant (p<0.05). The mean pulse rate among the hypertensives was 82.1 ± 6.7 and among those with pre-hypertension was 79.2 ± 6.5. This difference was statistically significant (p<0.05). Mean systolic blood pressure among those with HTN was 143.8 ± 3.4 and was 129.5 ± 3.3 among those with pre-hypertension. This difference was statistically significant (p<0.05). The mean diastolic blood pressure among the hypertensives was 75.5 ± 33.9 and was 74.4 ± 5.6 in the pre-hypertension group. This was statistically significant.

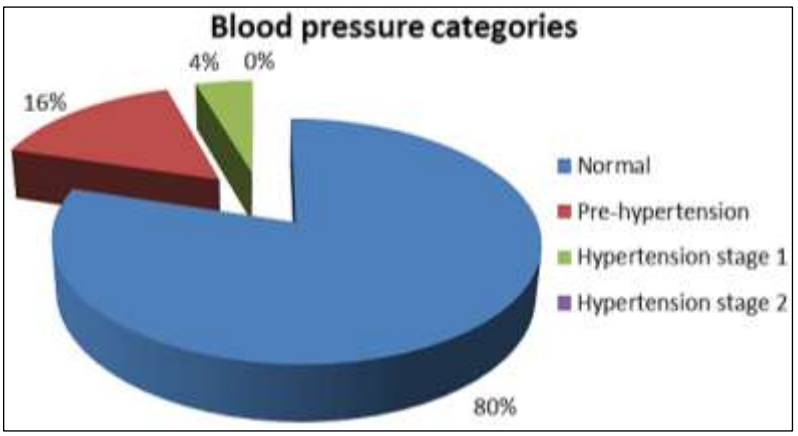

Fig 1: Distribution of subjects according to blood pressure category

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Table 1: Distribution of blood pressure categories versus Socio-demographic factors

Socio-demographic factors	Normal		Pre-hypertension		Hypertension stage 1		Total		p value
	N	%	N	%	N	%	N	%	
1. Age (years)									
20-30	248	46.4	33	31.4	2	6.6	283	42.2	**<0.001***
31-40	162	30.3	32	30.5	3	9.7	197	29.4	
41-50	84	15.7	26	24.8	20	**64.5**	130	19.4	
51-60	40	7.6	14	13.3	6	19.4	60	9.0	
Total	534	100.0	105	100.0	31	100.0	670	100.0	
2. Gender									
Male	217	81.3	47	17.6	3	1.1	267	100.0	**0.002***
Female	317	78.7	58	14.4	28	6.9	403	100.0	
Total	534	79.7	105	15.7	31	4.6	670	100.0	
3. Education									
Illiterate	124	23.2	17	16.2	16	**51.6**	157	23.4	**0.008***
Primary	107	20.1	22	21.0	6	19.4	135	20.1	
Secondary & Higher	155	29.0	32	30.5	4	12.9	191	28.5	
Graduate	88	16.5	18	17.1	5	16.1	111	16.6	
Post Graduate	60	11.2	16	15.2	0	0.0	76	11.4	
Total	534	100.0	105	100.0	31	100.0	670	100.0	
4. Occupation									
Professional	225	42.2	58	55.2	5	16.1	288	43.0	**<0.001***
Skilled	104	19.5	17	16.2	5	16.1	126	18.8	
Semiskilled	75	14.0	5	4.8	1	3.3	81	12.1	
Unskilled	130	24.3	25	23.8	20	**64.5**	175	26.1	
Total	534	100.0	105	100.0	31	100.0	670	100.0	
5. SES									
I	29	5.4	10	9.5	0	0.0	39	5.8	**0.003***
II	101	18.9	19	18.1	0	0.0	120	17.9	
III	227	42.5	46	43.8	20	64.5	293	43.7	
IV	120	22.5	28	26.7	6	19.4	154	23.0	
V	57	10.7	2	1.9	5	16.1	64	9.6	
Total	534	100.0	105	100.0	31	100.0	670	100.0	

Note: * significant at 5% level of significance (p<0.05).

Table 2: Distribution of blood pressure categories versus risk factors

Risk factors	Normal		Pre-hypertension		Hypertension stage 1		Total		p value
	N	%	N	%	N	%	N	%	
1. Known case of hypertension									
Yes	0	0.0	0	0.0	28	90.3	28	4.2	**<0.001***
No	534	100.0	105	100.0	3	9.7	642	95.8	
Total	534	100.0	105	100.0	31	100.0	670	100.0	
2. H/o tobacco use									

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Yes	76	70.4	25	23.1	7	6.5	108	100.0	
No	458	81.5	80	14.2	24	4.27	562	100.0	**0.031***
Total	534	79.7	105	15.7	31	4.62	670	100.0	
3. H/O alcohol intake									
Yes	73	69.5	25	23.8	7	6.7	105	100.0	
No	461	81.6	80	14.2	24	4.2	565	100.0	**0.018***
Total	534	79.7	105	15.7	31	4.6	670	100.0	
4. F/H/O hypertension									
Yes	37	6.9	18	17.1	12	38.7	67	10.0	
No	497	93.1	87	82.9	19	61.3	603	90.0	**<0.001***
Total	534	100.0	105	100.0	31	100.0	670	100.0	
5. Food Habits									
Veg	315	59.0	62	59.0	21	67.7	398	59.4	
Non-veg	219	41.0	43	41.0	10	32.3	272	40.6	0.626
Total	534	100.0	105	100.0	31	100.0	670	100.0	
6. Extra Salt intake									
Yes	37	62.7	19	32.2	3	5.1	59	100.0	
No	497	81.3	86	14.2	28	4.5	611	100.0	**0.001***
Total	534	79.7	105	15.7	31	4.6	670	100.0	
7. Extra Fat intake									
Yes	40	7.5	12	11.4	1	3.2	53	7.9	
No	494	92.5	93	88.6	30	96.8	617	92.1	0.241
Total	534	100.0	105	100.0	31	100.0	670	100.0	

Note: * significant at 5% level of significance (p<0.05).

Table 3: Different types of Stresses (PSLE Scale) according to Blood pressure categories

Stress	**Normal**		**Pre-hypertension**		**Hypertension stage 1**		**Total**		**p value**
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Aging stress	65	12.2	20	19.0	25	80.6	110	16.4	**<0.001***
Financial stress	161	30.1	32	30.5	10	32.3	203	30.3	0.989
Job stress	12	2.3	3	2.9	1	3.2	16	2.4	0.888
Marital stress	0	0	0	0	0	0	0	0	-
Family stress	5	0.9	1	1.0	0	0.0	6	0.9	0.863
Social Stress	0	0	0	0	0	0	0	0	-
Health Stress	24	4.5	10	9.6	13	41.9	47	7.0	**<0.001***
Other Stress	5	0.9	3	2.9	0	0.0	8	1.2	0.208

Note: * significant at 5% level of significance (p<0.05).

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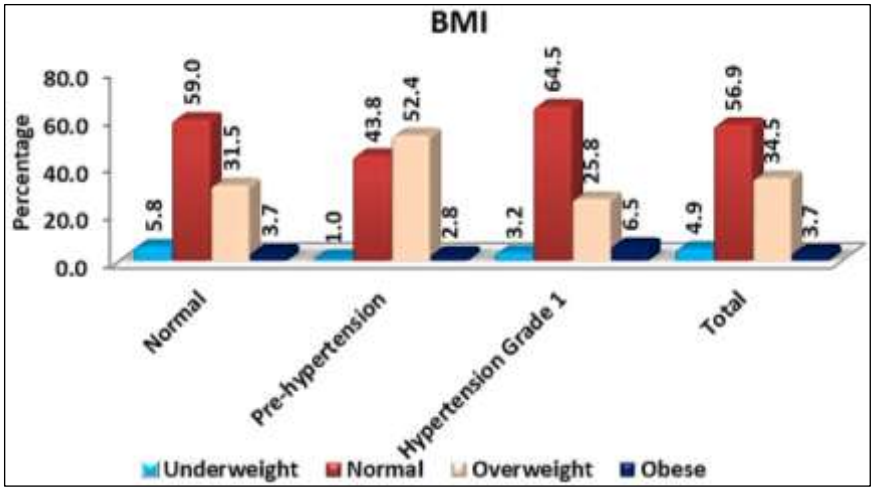

Fig 2: Categories of blood pressure vs. BMI

Table 4: Comparison of mean BMI, mean Pulse rate, mean SBP/DBP according to blood pressure categories

Variable	Normal		Pre-hypertension		Hypertension stage 1		ANOVA
	Mean	SD	Mean	SD	Mean	SD	p value
BMI	23.8	3.6	25.1	2.9	25.1	3.0	<0.001*
PR	77.9	6.6	79.2	6.5	82.1	6.7	0.001*
SBP	113.6	6.7	129.5	3.3	143.8	3.4	<0.001*
DBP	69.0	5.2	74.4	5.6	75.5	33.9	<0.001*

Note: * significant at 5% level of significance (p<0.05).

Discussion

The present study was carried out to study the prevalence of hypertension among adults (20-60 years of age) residing in Ukkali village of Vijayapur District, Karnataka and also to determine the socio-demographic, economic and other factors influencing hypertension among them. A total of 670 subjects were part of the study. Based on our observations, the magnitude of HTN and its distribution according to various risk factors are discussed below.

The prevalence of hypertension in India is increasing. The average prevalence of hypertension in the villages of India is 10% [12]. Lifestyle and dietary changes, environmental factors, rapid urbanization, demographic transition, behavioural factors like tobacco use or alcohol consumption, and increased life expectancy are few of the factors which may be held responsible in this regard. The prevalence of hypertension in our study was found to be 4.6%. Many other studies have reported a higher prevalence of hypertension in rural areas. Few of these studies include those done by Kumar [13] in rural Jaipur (13.17%), Shrivastava SRBL [14] in rural Pondicherry (24.7%) and Kumar S [15] in rural Nagpur (20.38%).

In our study the prevalence of HTN was maximum (64.5%) in the fourth decade which is comparable to the results obtained by Shrivastava SRBL [14] in rural Pondicherry. There was a steep rise in the prevalence which was probably the result of age related stress or deprivation of sufficient rest to the mind and the body. Several studies have

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shown a positive association between age and blood pressure. To name a few, Jogdand KS [16] in rural Andhra Pradesh (50.44%) and Paul PJ [17] in Pondicherry (91.7%) found that age specific prevalence of HTN was maximum in the sixth decade compared to other age groups.

The prevalence of HTN was higher among females (6.9%) in our study. Similar results were observed in a study done by Radhakrishnan S [18] in Tamil Nadu. This was probably because the number of females who participated in the study were more than the number of males who did so. Also, stress related to aging and financial stress could have posed as risk factors for developing HTN in them. On the contrary, a study done in North Karnataka has shown a higher prevalence of HTN among males [19].

In our study the prevalence of HTN was found to be highest among unskilled workers. This is probably due to their economic instability or financial insecurity. A study done in a rural area of Koppal district of Karnataka found a higher prevalence of HTN among the unemployed group [20]. Madhumitha M [19] and Kumar K [13] found a higher prevalence of HTN among professionals of North Karnataka and rural Jaipur, respectively. Kishore J [21] observed a higher prevalence of HTN among retired individuals of rural Delhi.

In the present study, the prevalence of HTN was highest among illiterates (51.6%) which was consistent with the findings of Satheesh BC [22] in rural Kerala and Kishore J [21] in rural Delhi. This might be attributed to their ignorance with regard to the risk factors related to the causation of disease. In contrast to this, some studies found a higher prevalence of HTN among literates which include those done by Basu G [23] in rural West Bengal, Shrivastava SRBL [14] and Bharati DR [24] in rural Pondicherry.

In our study the prevalence of HTN was highest among subjects belonging to SES III. This was probably because majority of the study population belonged to SES III. Kashyap V [25] observed that in rural Jharkhand the prevalence of HTN was directly proportional to the SES in that area. Several studies have shown a higher prevalence of HTN among those with higher SES. Some of them include those done by Thrift *et al*. [9] in rural South India, Kokiwar PR [26] in rural Central India, and Kishore J [21] in rural Delhi. But, Anand E [27] found a higher prevalence of HTN among those belonging to lower SES.

A family history of raised blood pressure is an important risk factor for the future development of HTN in individuals who are a part of the family. There are studies which have suggested that at least 20% of essential HTN is inherited and remaining may be acquired or environmental. In our study, 38.7% of the hypertensives had a family history of HTN which is comparable to the results obtained by Jogdand KS [16] in rural Andhra Pradesh. Some other studies done by Bharati DR [24] in rural Pondicherry and Gupta S [28] in rural Haryana have shown that lesser number of hypertensives had a family history of HTN.

Nicotine and carbon mono-oxide are potent vasoconstrictors produced as a result of tobacco combustion which have been reported to cause an acute rise in blood pressure. There is absolutely no tolerance to their pressor effect even though some tolerance may be developed to many of their effects [2]. Several Indian studies have shown a significant correlation of tobacco usage in any form with HTN prevalence. In our study, 6.5% of the subjects with a history of tobacco usage in any form had HTN which is comparable to the rates found by Pooja [29] in rural Uttarakhand and Gupta S [28] in rural

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Haryana. A study conducted in rural Central India and rural Rajasthan respectively found a higher prevalence of HTN among tobacco users [26].

Several mechanisms have been considered to be responsible for the relationship of alcohol consumption with HTN. They include a direct pressor effect of alcohol on the vessel wall, a sensitization of resistance vessels to alcohol, stimulation of the sympathetic nervous system, and an increased production of adrenocorticoid hormones [2]. In the present study, 6.7% of those who consumed alcohol regularly had HTN which is consistent with the rates observed in rural Delhi [27] and Uttarakhand [29]. Kannan L [30] and Oomen AM [31] have shown a higher prevalence of HTN among alcoholics in rural Tamil Nadu which is in contrast to a study by Kokiwar PR [26] who found a negative association between alcohol intake and HTN.

Throughout our lifetime, we all face challenges and adjustments in response to life experiences such as coping with losses and change, establishing meaningful roles, exercising independence and control, and finding meaning in life. It is difficult to define stress and even more difficult to measure it. Acute stressful stimuli are known to elevate blood pressure, lead to an increase in the circulating levels of catecholamines, vasopressin, endorphins and aldosterone and a reduction in the urinary sodium excretion. Therefore it has been speculated that in the long run, stress might have a crucial role in the development and maintenance of HTN. In our study, aging stress (80.6%) and stress due to health issues (41.9%) were significantly associated with HTN which is similar to the findings of a study done in North India by Ahmad S [32]. Anand E (38.4%) observed a lower prevalence of HTN among the stressed in his study [27].

Salt plays an important role in the auto-regulation of the water and fluid balance in the body. Excess dietary intake of sodium is a burden on the kidneys as they have to excrete the extra amount of salt administered. Also, cardiovascular system is one of the most vulnerable to the adverse effects of excessive dietary salt intake. Over the years, it has been found to be directly related to the occurrence of high blood pressure. In our study, it has been observed that extra salt intake has a significant association with hypertension ($p<0.05$). Only 5.1% of those who were consuming extra table salt in the form of pickle, papad, etc. had HTN which is lower than the rates observed by Basu G [23] in a village of West Bengal.

Our study did not show any causal relationship between hypertension and extra fat intake ($p>0.05$). Also, it was observed that the prevalence of pre-hypertension was higher (11.4%) among those who consumed extra fat regularly than that of hypertension (3.2%). Basu G [23] observed a significant association between extra fat intake and hypertension in rural West Bengal.

In our study, hypertension was significantly associated with BMI ($p<0.05$). 25.8% of the hypertensives were found to be overweight which is similar to the findings of Anand E [27], Gupta S [28] and Bharati DR [24] in rural India. In several studies, overweight is associated with atleast a two-fold increase in the risk of developing HTN. According to the Framingham study [2], for every 10% increase in weight the systolic blood pressure rose by 6.5 mmHg. In the present study, stress and reduced physical activity might have predisposed to the development of high BMI which cause hemodynamic and metabolic changes in the body that contribute to the development of HTN.

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Conclusion

Based on our study findings, it can be concluded that hypertension is more prevalent in the adults in their fourth decade of life in rural India. The non-modifiable risk factors like age, gender, family history appear to greatly influence the prevalence of hypertension along with the modifiable ones like dietary practices (extra salt and fat consumption), sedentary lifestyle and habits like tobacco use and alcohol consumption, and stress in all walks of life resulting due to changes in lifestyle. Therefore, rather than plainly avoiding the risk factors, it is necessary to create awareness about hypertension and its complications by health education programmes for lifestyle modification to decrease the risk of hypertension in the community. Health education of the community will be a cornerstone for successful detection, evaluation, and treatment of hypertension. NCD screening camps must be conducted on a monthly basis so that blood pressure can be checked and monitored regularly for those aged > 30 years and an annual lipid profile and renal function tests should be made mandatory as per NPCDCS guidelines. Also, the prevalence of pre-hypertension was highest among the 20-30 year olds in our study. Therefore, tracking of blood pressure can be done to identify children and adolescents at risk of developing hypertension at a later date. Health education should mainly focus on dietary restriction of salt and fat intake, cessation of tobacco usage and alcohol intake, increase physical activity and weight reduction. Reducing stress by addressing their spiritual dimension by way of transcendental relaxation techniques like yoga, meditation and other recreational activities which support the integration of body, mind and spirit. Multidisciplinary research is warranted for developing cost-effective programmes for primordial prevention of hypertension which should focus on general population as well as those at risk of developing hypertension.

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