



## PREVALENCE AND ASSOCIATED RISK FACTORS OF HYPERTENSION AMONG ADULTS IN SELECTED RURAL AREAS OF COIMBATORE DISTRICT, TAMIL NADU

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### Abstract

Hypertension, also known as high or raised blood pressure, is a global public health issue. It is one of the most common lifestyle diseases today, prevalent in every third person and contributes to the burden of heart disease, stroke, kidney failure, premature mortality and disability. Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries. Hypertension epidemiological studies from India in the last twenty years have shown that prevalence of hypertension (diagnosed by systolic BP  $\geq 140$  mm Hg and/or diastolic BP  $\geq 90$  mm Hg) in urban locations has stabilized to about 25–30% but it has increased in rural populations from 15 to 25%. The study was taken to assess the prevalence of hypertension among rural adults and to explore the associated risk factors of hypertension among them. Rural areas from Coimbatore district, Tamil Nadu, India were selected for the study. Health camps were conducted at the selected areas with help of medical practitioner and 985 were screened for hypertension. The overall prevalence was found to be 26 per cent, where it was slightly higher among men than in women. The per cent of hypertensives in men and women increases with increase in age. Salt intake, alcohol consumption, tobacco usage and smoking were found to be the prevalent associated risk factors of hypertension.

**Key Words:** Hypertension, Rural Adults, Salt Intake, Risk Factors.

### Introduction

Hypertension, also known as high or raised blood pressure, is a global public health issue. It is one of the most common lifestyle diseases today, prevalent in every third person and contributes to the burden of heart disease, stroke, kidney failure, premature mortality and disability. Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries (WHO.,2013).

According to Indian Hypertensive guidelines (2007) hypertension in adults aged 18 years and older is defined as Systolic Blood Pressure (SBP) of 140 mmHg or greater and/or Diastolic Blood Pressure (DBP) of 90 mmHg or greater or any level of blood pressure in patients taking antihypertensive medication.

There is a misconception among the general public that high blood pressure affects only the old people and youngsters need not have to worry until they reach at least 40 years old. Contrary to this popular belief, studies have proven high blood pressure does not discriminate based on age, and both young and old are equally affected by this disease. The sad part is that most people who have this disease are not aware of it because it has practically no symptoms, but the consequences are deadly. Since it has no symptoms, it can remain undetected for many years. If undetected and not treated properly, it can lead to death, and is therefore referred to as a silent killer. (Nadkarni.,2010).

Raised blood pressure is a major risk factor for coronary heart disease and ischemic as well as hemorrhagic stroke. Blood pressure levels have been shown to be positively and continuously related to the risk for stroke and coronary heart disease. In some age groups, the risk of cardiovascular disease doubles for each increment of 20/10 mmHg of blood pressure, starting as low as 115/75 mmHg. In addition to coronary heart diseases and stroke, complications of raised blood pressure include heart failure, peripheral vascular disease, renal impairment, retinal hemorrhage and visual impairment (WHO.,2015)

There are several factors trigger the onset of hypertension. In India, industrialization, urbanization and migration have played havoc with healthy lifestyles. Nevertheless it was the Industrial Revolution with the widespread use of refined vegetable oils, refined cereal grains, and refined sugars and the modern Age with the advent of the “junk food” industry, generalized physical inactivity, reduction in sleep time and quality coupled with increased chronic psychological stress that brought about the most disruptive and maladaptive changes, which may have serious pathophysiological consequences like cardio vascular disease, diabetes, hypertension and obesity (Bastos et al.,2011).

Hypertension epidemiological studies from India in the last twenty years have shown that prevalence of hypertension (diagnosed by systolic BP  $\geq 140$  mm Hg and/or diastolic BP  $\geq 90$  mm Hg) in urban locations has stabilized to about 25–30%



but it has increased in rural populations from 15 to 25%. This urban–rural convergence of hypertension in India is due to rapid urbanization of rural populations with consequent changes in lifestyles (sedentariness, high dietary salt, sugar and fat intake) and increase in overweight and obesity. Hypertension prevention, screening and control, policies and programs, need to be widely implemented in India, especially in rural populations (Gupta.,2015).

**Hence the study was carried out with the following objectives**

- To assess the prevalence of hypertension among rural adults
- To study the demographic profile of the selected hypertensives
- To explore the associated risk factor of hypertension among rural adults

**Methodology**

In the present study, seven rural areas located about 22 km to 60 km from city were selected from Coimbatore District, Tamil Nadu, India. To identify the hypertensives in the selected areas, health camps were organized at each selected villages with the help of local panchayat leaders, Self Help Group (SHG) leaders and youth volunteers residing in that areas. The health camps were conducted with the help of a Medical practitioner and a group of medical assistants. Male and female in the age group of 25 -55 years were randomly screened for hypertension in the health camp.

The blood pressure was measured for all the men and women, who came voluntarily for the health camp, by using standard sphygmomanometer with the help of a medical practitioner. The subject was asked to sit quietly in a chair with his or her back supported for 5 minutes before taking the measurements. Equipment with correct cuff size with the air bladder encircling at least 80% of the arm and supporting the arm at heart level during the cuff measurement was used to measure the blood pressure. The blood pressure was measured in both the arms and the arm with the higher pressures was generally used to make further measurements. A minimum of 3 readings were taken at intervals of at least 2-3 minutes and the average of 3 readings were taken to represent the subject’s blood pressure. Based on the blood pressure measurements, hypertensives men and women were identified and included in the study with their willingness to analyse the associated risk factors.

A well structure questionnaire was formulated and validated to study the demographic profile and associated risk factors for hypertension. The questionnaire was divided into five parts to elicit the information regarding socio economic status, dietary pattern, lifestyle pattern, family and personal history, psycho social and environmental factor responsible for hypertension. Questionnaire was distributed to all the identified hypertensive men and women from selected rural areas.

The background information such as name, sex, age, family type, marital status educational qualification, occupation, monthly income, were collected. The Food and dietary pattern of the subjects were recorded including the type of food habits, consumption frequency of fat fried foods and amount of salt used. The lifestyle patterns like history of smoking or tobacco use, alcohol intake, leisure time activity were also observed. Psychosocial behavior of the individual also elicited using the questionnaire. The data collected were tabulated and analysed.

**Results and Discussions**

The findings of the present study are discussed under the following headings

**A. Hypertension prevalence**

**a. Prevalence of hypertension among rural adults**

Table-I gives the Prevalence of hypertension among rural adults

**Table –1, Prevalence of Hypertension among Rural Adults**

Particulars	Men		Women		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
Normal blood pressure	341	73	388	75	729	74
Hypertensives	127	27	129	25	256	26
<b>Total</b>	<b>468</b>	<b>100</b>	<b>517</b>	<b>100</b>	<b>985</b>	<b>100</b>



From the Table-1, it is clear that about 985 adults between 25yrs -55yrs including 468 men and 517 women participated in the health camps, organized at selected rural areas. On the whole prevalence of hypertension among the rural adults was found to be 26 per cent and it was found to be slightly more among men (27 per cent) when compared to women (25 per cent).

**b. Classification of Hypertensives**

The Table-2 and Figure –I depicts the Classification of hypertensives based on JNC-VII

**Table –2, Classification of Hypertensives based on blood pressure**

**\*Classification based on Joint National Committee on Detection, Prevention and Treatment of Hypertension-VII**

Classification of Hypertension	Men (n=127)		Women (n=129)		Total (n=256)	
	Number	Per cent	Number	Per cent	Number	Per cent
<b>Pre hyper tension (120-139 mm Hg or 80-89)</b>	77	61	63	49	140	55
<b>Hypertension Stage I (14-159 mm Hg or 90-99)</b>	41	32	43	33	84	33
<b>Hypertension stage II (&gt;160 mm Hg or &gt;100)</b>	9	7	23	18	32	12
<b>Total</b>	<b>127</b>	<b>100</b>	<b>129</b>	<b>100</b>	<b>256</b>	<b>100</b>

(JNC-VII)

The identified hypertensives were classified based on JNC-VII and Table-2 states that greatest percent of men (61 per cent) and women (49 per cent) were found to be prehypertensives with the blood pressure 120-139 or 80-89mm Hg followed by Hypertension stage-I in men (32 per cent) and women (33 per cent) with the blood pressure 140-159 or 90-99 mm Hg. About 7 per cent of rural men and 18 per cent of rural women were in hypertension stage –II with the blood pressure of >160 or >100mm Hg.

**B. Demographic Profile**

The demographic profile of the selected hypertensive men and women from rural areas are discussed below.

**a. Age**

Table- 3 gives the Age wise distribution of the selected hypertensives.

**Table -3, Age Wise Distribution of the Selected Hypertensives**

Age (yrs)	Men (n=127)		Women (n=129)		Total (n=256)	
	Number	Per cent	Number	Per cent	Number	Per cent
<b>20-29</b>	11	9	3	2	14	5
<b>30-39</b>	37	29	24	19	61	24
<b>40-49</b>	53	42	55	43	108	42
<b>50-59</b>	26	20	47	36	73	29
<b>Total</b>	<b>127</b>	<b>100</b>	<b>129</b>	<b>100</b>	<b>256</b>	<b>100</b>

The above Table-3 clearly states that the most of the selected hypertensive men and women ranged between 42-43 per cent in rural areas were in the age group of 40-49 years.

This was followed by 30-39 years in men (29 per cent) and 50-59 years in women (36 per cent). Among 20-29 years, the percentage of hypertensive men (9 per cent) is greater than women (2 per cent). The table observed that number of hypertensives in men and women increases with increase in age. A study by Prabakaran et al (2013) states that as age advances blood pressure also advances 1.07 times and it was one of the independent risk factors of hypertension.

**b. Income Level**

Table-4 depicts the Income level of the selected hypertensives



**Table-4, Income Level of the Selected Hypertensives**

Income Level*	Men (n=127)		Women (n=129)		Total (n=256)	
	Number	Per cent	Number	Per cent	Number	Per cent
Low income	83	65	67	52	150	58
Middle income	33	26	46	36	79	31
High income	11	9	16	12	27	11
Total	127	100	129	100	256	100

In the latest study, researchers found that lower household income was most strongly associated with elevated blood pressure (Duke medicine.,2011). Table-9 depicts that In rural areas more than half of the men (65 per cent) and women (52 per cent) belonged to low income group (Rs.3,301-7,300). About 26 per cent of men and 36 per cent of women belong to middle income group (Rs.7,301 – 14,500) and nine per cent of rural hypertensive men belonged to high income group (Rs.14,501 & above) while it was found to be 12 per cent in their counterparts.

### C. Dietary Profile

#### a. Type of Dietary Habit

The Table –5 states the Type of dietary habit of selected hypertensives.

**Table-5, Dietary Habits of Selected Hypertensives**

Food habits	Men (n=127)		Women (n=129)		Total (n=256)	
	Number	Per cent	Number	Per cent	Number	Per cent
Vegetarian	18	14	19	15	37	15
Non –vegetarian	94	74	96	74	190	74
Ova vegetarian	15	12	14	11	29	11
Total	127	100	129	100	256	100

The EPIC-Oxford study found that non–meat eaters had a lower prevalence of hypertension and lower systolic and diastolic blood pressures than meat eaters. (Marsh et al.,2012). From the above table it is clear that the present study results were on par with the above statements. Three in one of the selected hypertensive rural men and women followed non vegetarian diet where as less than 16 per cent followed vegetarian diet. Only eleven to twelve per cent of rural hypertensive were found to be ova vegetarians.

#### b. Salt Intake Level

Table-6 gives the Amount of salt intake by the selected hypertensives

**Table -6,  
Amount of Salt Intake by the Selected Hypertensives**

Salt intake/day	Men (n=127)		Women (n=129)		Total (n=256)	
	Number	Per cent	Number	Per cent	Number	Per cent
<10 g	30	24	21	16	51	20
10g – 12g	61	48	63	49	124	48
12g – 14g	36	28	45	35	81	32
Total	127	100	129	100	256	100

From the table -6, it is clear that, nearly fifty per cent of the selected hypertensives rural men and women consumed 10g – 12g of salt per day. Dhemia and Varma (2015) says that the urban Indian's routine diet, pickled with takeaways from fast food joints and instant foods that are ready in a jiffy at the end of a long working day, could worsen the present epidemic of hypertension due to its high proportion of salt.



The study result is similar to the population studies given by Asian Scientist News Room (2013) which observed 9 to 12 grams/ day intake among Indians. The result was slightly higher than the amount observed in a study published in Moghul (2013) which states that the intake of salt by Indians is nearly twice the amount recommended by the World Health Organisation (WHO). Indians consume about 3.7 grams of sodium, corresponding to about 9.3 grams of salt per day.

Among rural hypertensives, less than 24 per cent of men and women consumed <10g salt /day and 28 per cent of men and 35 per cent of women consumed 12g – 14g of salt /day. It might be due to their traditional Indian food habits and they eat many foods with a high salt content, including pickle (achar) and snacks like namkeens, samosas and pakoras. In India, people who eat meat tend to put more salt on their food (Chopra.,2014). The salt consumption of the most of the selected subjects might be also due their non-vegetarian food habits.

### c. Consumption Pattern of Fat Fried Foods

The following Table-7 gives the Consumption pattern of fat fried foods

**Table- 7, Consumption Pattern of Fat Fried Foods**

Frequency	Men (n=127)		Women (n=129)		Total (n=256)	
	Number	Per cent	Number	Per cent	Number	Per cent
Daily	27	21	21	16	48	19
Weekly twice	50	39	51	40	101	40
Weekly once	38	30	45	35	83	32
Monthly twice	12	10	12	9	24	9
<b>Total</b>	<b>127</b>	<b>100</b>	<b>129</b>	<b>100</b>	<b>256</b>	<b>100</b>

Table -7 shows that cent per cent of the rural hypertensives ate fat fried Indian foods namely bajji, bonda, vadai, samosa, chips, murukku, chilly chicken, grilled chicken, etc often. About 39 per cent of men and 40 per cent of women ate fat fried foods weekly twice, 30 per cent of men and 35 per cent of women hypertensives in rural areas consumed these foods weekly once. About 16-21 per cent of the selected hypertensives consumed one or other fried products daily.

### D. Life style pattern

#### a. Physical Activity Pattern

Table -8 gives the Physical activity pattern of the selected hypertensives.

**Table-8,Physical Activity Pattern of the Selected Hypertensives**

Exercise pattern	Men (n=127)		Women (n=129)		Total (n=256)	
	Number	Per cent	Number	Per cent	Number	Per cent
Yes	44	35	29	22	73	29
No	83	65	100	78	183	71
<b>Type of physical activity</b>						
<b>Moderate</b>						
<1/2 hrs	23	52	23	79	46	63
>1/2 hrs	18	41	6	21	24	33
Vigorous	3	7	-	-	3	4
<b>No. of days / Week</b>						
5-7	15	34	9	31	24	33
2-4	17	39	12	41	29	40
<2	12	27	8	28	20	27

According to the Table-8, the greatest parts of the selected rural hypertensives in men and women were not doing any physical exercises. It might be due to lack of interest, time and ignorance. Only 35 per cent men and 22 per cent of women in rural areas practiced some form of physical exercise like walking, cycling, jogging, gardening, etc.

Even moderately intense physical activity, such as brisk walking, is beneficial when done regularly for a total of 30 minutes or longer at least 5 days a week (www.heart.org). But in rural areas moderate level physical activity was observed among 52



per cent hypertensive men and 79 per cent of hypertensive women for less than half hour and about 41 per cent of hypertensive men and 21 per cent of hypertensive women were engaged in physical exercise more than half hour. Among the rural hypertensives only 7 per cent of men were doing vigorous physical exercise for 30mts – 45mt.

**b. Consumption pattern of pan/tobacco**

Table-9 highlights the details on Habit of Pan Chewing by the Selected Hypertensives.

**Table-9, Details on Habit of Pan Chewing by the Selected Hypertensives**

The	Pan chewing	Men (n=127)		Women (n=129)		Total (n=256)	
		Number	Per cent	Number	Per cent	Number	Per cent
	<b>Yes</b>	71	56	97	75	168	66
	<b>No</b>	56	44	32	25	88	34
	<b>Frequency</b>						
	<b>Daily</b>	11	15	17	18	28	16
	<b>Weekly twice</b>	9	13	33	34	42	25
	<b>Weekly once</b>	21	30	39	40	60	36
	<b>Monthly twice</b>	15	21	8	8	23	14
	<b>Monthly once</b>	15	21	-		15	9
	<b>Quantity/ week</b>						
	<b>&lt;4 nos</b>	49	69	62	64	111	66
	<b>&gt;4 nos</b>	22	31	35	36	57	34
	<b>Duration of habit</b>						
	<b>5-10years</b>	24	34	22	23	46	27
	<b>10-15 years</b>	23	32	40	41	63	38
	<b>&gt;15years</b>	24	34	35	36	59	35

present study also observed the habit of pan chewing including beetle leaves, areca nut and tobacco among the majority of the rural hypertensives. This was parallel to the statement given by WHO (2004) that habitual chewing is commonly practiced by men and women in India. Among south East Asian oral tobacco users, 82 per cent belonged to India.

About one in two men and three in four women were having the habit of pan chewing among the selected rural hypertensives. According to Rani et al (2003) the prevalence of both chewing tobacco/*pan masala* was significantly higher in rural, poorer, and uneducated populations compared to urban, wealthier, and more educated populations, respectively, both in men and women, though the differentials for chewing tobacco were smaller.

In rural areas, among the pan chewers 18 per cent of women consumed beetle nut with or without tobacco even daily and most of them (40 per cent) had this habit weekly once followed by weekly twice (34 per cent). Only eight per cent used pan monthly twice. 15 per cent rural men were regular pan eater and maximum per cent (30 per cent) were having weekly once followed by 21 per cent monthly twice and monthly once. Only 13 per cent of the men used weekly twice. However the quantity consumed was less than four numbers in most of the rural men (69 per cent) and women (64 per cent). Less than 37 per cent consumed more than four numbers in a week time.

In rural areas entire selected men and women were having this habit for more than 5 years period. In 34 per cent of rural men, the duration of pan chewing habit was found to be more than 15 years and 5 to 10 years and in 32 per cent it was observed to be 10-15years. In women, greatest per cent (41 per cent) was observed to be in 10-15 years duration succeeded by more than 15 years (35 per cent) and 5-10 years (23 per cent).

**c. Consumption of alcohol**

Table-10 gives the Alcohol consumption pattern of the selected hypertensives





**Table- 10. Alcohol Consumption Pattern of the Selected Hypertensives**

Alcohol intake	Rural	
	Men (n=127)	
	Number	Per cent
Yes	70	55
No	57	45
<b>Frequency</b>		
Daily	7	10
Weekly twice	29	41
Weekly once	34	49
<b>Quantity/week</b>		
90ml -135ml	34	49
135ml -180ml	18	26
>180ml	18	26
<b>Duration of habit</b>		
<5 years	28	40
6-10years	24	34
>10 years	18	26

Nearly fifty per cent of the hypertensive men consumed alcohol weekly once and 41 per cent used weekly twice. Regular alcohol consumption was seen in 10 per cent of rural hypertensives.

Quantity of consumption per week was observed to 90ml to 135ml by maximum per cent of the rural hypertensive men and one in four selected hypertensives consumed 135ml -180ml alcohol/week . The study results showed that 26 per cent of hypertensive men drunk more than 180ml alcohol in a week.

Majority of the rural (40 per cent) hypertensive men were consuming alcohol for for >5 years and 34 per cent were having this habit for 6-10 years. About 26 per cent rural hypertensive men were drinking alcohol for more than 10 years.

#### **d. Smoking Pattern**

The following Table-11 illustrates the Details on smoking habit of the selected hypertensives.

**Table-11,Details on smoking habit of the selected subjects**

Smoking	Men (n=127)	
	Number	Per cent
Yes	75	58
No	52	42
<b>Type</b>		
Cigarette	23	31
Bidi	52	69
<b>Frequency</b>		
Daily	55	73
Weekly twice	12	16
Weekly once	8	11
<b>Quantity/week</b>		
1-2nos	6	8
3-5nos	10	13
>6nos	59	79
<b>Duration of habit</b>		
<5 years	17	23
6-10years	31	41
>10 years	27	36



According to the Table-15, it is clear that 58 per cent of selected hypertensive subjects were smokers. It was seen that smoking beedi (69 per cent) was more among the rural men than cigarette. A very likely reason for this observation is the pricing strategy of these tobacco products. Bidis cost nearly one-tenth of the cost of cigarettes. Among the selected hypertensives smokers in the present study, in rural area three in four were regular smokers and 16 per cent smoked weekly twice and 11 per cent smoked weekly once.

Whatever the frequency might be 79 per cent smoked more than 6 numbers per week. Percentage of this crowd was maximum when compared to subjects who smoked 3-5 number and 1-2 numbers and it was found to be 13 per cent, 8 per cent respectively.

The majority of the selected hypertensive subjects were having the smoking habit for more than 5 years. The duration of smoking habit in the majority of the smokers was found to be 6-10 years in 41 per cent of rural hypertensives and even 36 per cent were smoking for more than 10 years. 23 per cent of the smokers acquired this habit within past 5 years.

### Conclusion

Hypertension is emerging as a major public health problem in India and is more prevalent among even in rural areas on par with urban areas. The prevalence of prehypertension was observed more prevalent among younger adults. Salt intake, alcohol consumption, tobacco usage and smoking are the said associated risk factors of hypertension and it was found to be more common among the selected rural hypertensives. Reduction of this silent killer requires a population based approach that can be accessed by all levels of people.

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