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Assessing the risk of hypertension and prehypertension; and its determinants among rural women

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ABSTRACT

The increasing prevalence of hypertension in India as indicated by recent studies is a matter of public health concern, as it is one of the major risk factor for heart diseases, stroke, kidney failure and premature mortality. This cross-sectional survey was conducted among 200 women between the ages 20 to 60 years residing in a rural area of Tiruvallur district, Tamil Nadu. Statistical tests like Chi-square and logistic regression analysis were carried out to attain the study objective. Results showed that 20% of women were found to be hypertensive while another 21% were diagnosed with pre-hypertension. Among the total hypertensive 55% (22) were being diagnosed for the first time during the survey. Factors such as older age, personal history of diabetes mellitus, family history of hypertension, higher body fat percentage and habit of chewing betel nut were associated with elevated blood pressure. Higher odds of developing hypertension were found to be in older women and individuals with a maternal history of hypertension. Intervention strategies to detect individuals with hypertension and prehypertension are needed to prevent the spread of cardiovascular diseases.

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INTRODUCTION

Hypertension or elevated blood pressure is one of the leading health challenges worldwide. It contributes to the burden of heart diseases, stroke, kidney failure and premature mortality (Mendis, 2014). Hypertension is an important modifiable risk factor for premature death which affected 1.39 billion people globally in 2010. Data from different national and regional surveys indicate that the burden of hypertension is increasing among low and middle-income countries than high-income countries, as the prevalence of hypertension has decreased by 2.6% in high-income countries, but increased by 7.7% in low/middle–income countries (Mills *et al.,* 2016). The transition in the disease pattern from communicable diseases to non-communicable diseases in low and middle-income countries could be attributed to rapid urbanisation, increasing elderly population, mechanization, sedentary lifestyle, and unhealthy dietary pattern (Singh *et al.,* 2017). In low and middle-income countries such as India, the prevention and management of hypertension are poor due to numerous barriers like political and bureaucratic inaction, weak health systems, overburdened healthcare providers and unempowered patients (Gupta *et al.,* 2016). A recent meta-analysis noted that the prevalence in hypertension in India was 29.8%, with a significant difference in prevalence between urban (33.8%) and rural (27.6%) parts (Anchala *et al.,* 2014). The escalating burden of hypertension in India could be linked to advancing age, higher body mass index, smoking, diabetes and excessive salt intake (Devi *et al.,* 2013).

According to the 7th JNC (Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure) criteria, Systolic Blood Pressure (BP) of 120 to 139 mm Hg and diastolic BP of 80 to 89 mm Hg was defined as prehypertension (Chobanian *et al.,* 2003). Prehypertension is associated with an increased risk of hypertension and cardiovascular events (Papadopoulos *et al.,* 2008; Huang *et al.,* 2013). Identifying individuals with prehypertension can be a vital tool to track people at risk of hypertension and sensitize them to adopt a healthy lifestyle (Nary *et al.,* 2013). The present study aimed to identify the risk of hypertension and prehypertension; and its associated factors among rural women.

MATERIALS AND METHODS

Study Design and sample

This cross-sectional survey was carried among women in the age group 20-60 years in a rural panchayat Perumalpattu in Tiruvallur district. The study protocol was approved by the Independent Institutional Ethics Committee of Women's Christian College, Chennai, India. The study recruited 200 female participants based on their willingness to participate in the survey. All the participants gave written informed consent before the commencement of the study.

Data Collection

Information regarding socio-demographic characteristics, personal and family history of non-communicable disease; and lifestyle behaviour were collected using a structured questionnaire.

Anthropometric measurements

The participant's physical measurements such as height, body weight, body fat percent and waist circumference were taken. Height was measured using a calibrated portable stadiometer. Bodyweight and body fat percent was recorded using Karada scan (Omron HBF-375). BMI was calculated, based on BMI obtained, the subjects were classified into different categories according to the WHO global classification given for Asians (WHO, 2000). Waist circumference was obtained by measuring the distance around the waist half an inch above the umbilicus (belly button) using a non- stretchable plastic measuring tape and was recorded to the nearest 0.1 cm. Waist circumference greater than 80 cm indicates abdominal obesity (Misra *et al.,* 2006). Blood pressure was measured two times using an automatic electronic device (OMRON HEM-7261). The average of two readings was used. Hypertension was classified using JNC criteria. Normal blood pressure is systolic blood pressure (SBP) level <120 and diastolic blood pressure (DBP) level <80 mmHg. Hypertension is defined as SBP level 140–159 and/or DBP = 90–99 mmHg. If the systolic blood pressure was 120-139 mmHg and diastolic blood pressure was 80-89 mmHg, it was considered prehypertension (Chobanian *et al.,* 2003).

Statistical Analysis

Frequencies and percentage were used to summarize categorical variables. Continuous variables were analysed using means and standard deviation. Chi-square analysis was used to test the association between hypertension and independent variables. Binomial logistic regression analysis was used to determine the strength of association between some independent variables and hypertension. p-value < 0.05 was accepted as statistically significant.

RESULTS

The mean age (±SD) of the population was 41.93±9.2, the majority of the participants were in 36-45 years' age category. Socioeconomic status of the participants was determined by the annual income of the family using the classification given by National Council of Applied Economics and research (Shukla, 2010). Family's annual income for the majority of the participants was in the range Rs.90, 000 – 2, 00,000. More than a quarter of the participants (29 %) had no formal education. Majority of them were involved in moderate unskilled manual work. The mean anthropometric measurements of the participants are given in table 1.

Table 1: Mean anthropometric measurements of the study population

Anthropometric Measurements	Mean±SD
Height (cm)	150.7±12.4
Body weight (Kg)	60.7±13.2
BMI (Kg/m^2)	26.3±5.2
Waist Circumference (cm)	84.7±11.27
Body fat %	34.0±5.9

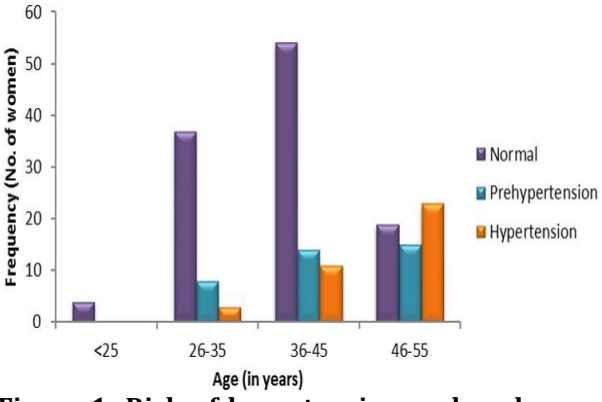

Figure 1: Risk of hypertension and prehypertension among the studied population

Table 2: Risk Factors of hypertension and prehypertension

Risk Factors	Total (N = 200)	Normal	Prehypertension	Hypertension	p-Value
Age					
<25	4	4	0	0	0.000*
26-35	48	37	8	3	
36-45	79	54	14	11	
46-55	57	19	15	23	
>55	12	4	5	3	
Education					
Illiterate	58	32	11	15	0.495NS
Primary (I to V)	29	17	8	4	
Upper primary (VI to VIII)	36	19	9	8	
Secondary (IX to X)	44	31	8	5	
Senior secondary (XI to XII)	9	5	0	4	
Undergraduate	16	8	4	4	
Postgraduate	8	6	2	0	
Occupations					
Sedentary	85	44	23	18	0.135NS
Moderate	115	74	19	22	
BMI					
<18.5	10	8	1	1	0.447NS
18.5-22.9	36	25	6	5	
23-24.9	37	18	9	10	
25-29.9	78	48	17	13	
30-34.9	27	13	5	9	
>35	12	6	4	2	
Waist circumference					
>80	139	75	34	30	0.07NS
<80	61	43	8	10	
Body Fat %					
<20	5	4	1	0	
20-29.9	40	33	4	3	0.014*
30-34.9	57	29	11	17	
>35	98	52	26	20	
Personal H/o Diabetes					
Yes	15	4	6	5	0.029*
No	185	114	36	35	
Paternal H/o Hypertension					
Yes	16	7	8	1	0.010*
No	184	111	34	39	
Maternal H/o Hypertension					
Yes	28	10	6	12	0.003*
No	172	108	36	28	
Physical Activity					
Yes	114	71	20	23	0.369NS
No	86	47	22	17	
Chewing betel nut					
Yes	12	4	6	2	0.037*
No	188	114	36	38	

* significant at p-value <0.05, NS – not significant

The presence of hypertension and prehypertension among the studied population is illustrated in Fig. 1. Among the studied population 40 (20 %) individuals were diagnosed with hypertension, and 42 (21 %) individuals were in prehypertension stage as per 7th JNC criteria. Twenty-two (55 %) participants were newly detected cases of hypertension among the total hypertensive.

Table 2 shows the risk factors associated with hypertension and prehypertension. Advancing age, current diabetic status, family history of hypertension, higher body fat percentage and habit of chewing betel nut were significantly associated with hypertension. From Table 2 it can be inferred that a higher proportion of the subjects were under Grade I obesity category and 69.5% had abdominal obesity, i.e. waist circumference measuring more than 80cm. A higher percentage of subjects were involved in some physical activity. However, there was no association between physical activity and hypertension in the present study.

Logistic regression analysis showed that the odds of being hypertensive were higher among older women and subjects with a maternal history of hypertension. Odds of hypertension were significantly higher among older women (OR 1.11; 95% CI: 1.07-1.16, p-value <0.05). The odds of hypertension were 3.45 times higher among individuals who had a maternal history of hypertension, and it was statistically significant (OR 3.45; 95% CI: 1.41-8.54, p-value <0.05).

DISCUSSION

The present study aimed to assess the risk of hypertension and prehypertension among rural women and to identify its associated risk factors. The study findings highlight the increasing burden of hypertension and prehypertension in rural India. About one-fifth of the study participants had hypertension while 55% of those women were unaware of their elevated BP. The results of the study are comparable with the previous study conducted in Tiruvallur by Kaur *et al.,* (2012) which reported a 21.2% prevalence rate of hypertension. The rising epidemic of hypertension in rural India is evident from various studies conducted in Maharastra (Arun *et al.,* 2016), Andhra Pradesh (Singh *et al.,* 2017), West Bengal (Dutta *et al.,* 2012) and Karnataka (Rao *et al.,* 2012; Gupta *et al.,* 2015). This is a cause of concern because awareness, treatment and control of hypertension are poor in a rural setting lower literacy rate, lower health perception and disproportionate access and quality of health services (Anchala *et al.,* 2014). Among the studied women, pre-hypertension was more common than hypertension. As a prehypertensive individual is at high risk of progression to hypertension, identifying them and providing timely lifestyle intervention would prevent the development of hypertension (Greenlund *et al.,* 2000; Liszka *et al.,* 2005).

The relationship between age and hypertension was found to be significant in our study. This association is due to structural changes in the arteries and large artery stiffness occurring with advancing age (Pinto, 2007). Around 69.5% women had waist circumference more than 80cm. Although in our study there was no association between abdominal obesity and hypertension, various studies have suggested that prevalence of abdominal obesity was significantly higher among women and was positively correlated with hypertension (Amole *et al.,* 2011; Rouf *et al.,* 2018). Moreover, abdominal obesity is associated with hyperglycemia, cardiovascular disease (CVD), hypercholesterolemia, arthritis, asthma and cancer (Lindstorm *et al.,* 2003; Mokdad *et al.,* 2003). Body fat % (>35 %) was associated with elevated BP among the study participants. A cross-sectional study among Korean adults showed that individuals with a high BF% had a higher prevalence of high blood pressure, hyperglycemia, and dyslipidemia (Kim *et al.,* 2013).

The present study established that betel nut consumption was associated with elevated blood pressure. This finding is in line with the study by Heck *et al.,* (2011) that reported a higher prevalence of hypertension among subjects with betel nut chewing habit. Non-communicable diseases are associated with multimorbidity, in a National health and nutrition examination survey conducted in Korea found that most chronic conditions such as obesity, dyslipidemia and impaired fasting glucose were more prevalent in adults with hypertension than in those without hypertension (Noh *et al.,* 2016). The importance of screening for cardiovascular diseases, diabetes mellitus and other chronic conditions should be emphasized once hypertension is diagnosed (Bushara *et al.,* 2016).

Logistic regression analysis indicated that older age and maternal history of hypertension were strong determinants of hypertension in the present study. These factors can be used as a tool to screen at-risk population and provide the necessary intervention.

CONCLUSION

The present study indicates the rising epidemic of hypertension among rural Indians and that the majority of individuals are unaware of their hypertension state. Intervention strategies to detect individuals with hypertension and

prehypertension are needed to prevent the spread of cardiovascular diseases. Periodic screening and awareness programmes regarding non-communicable diseases are recommended for the rural population.

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