## **Research Article**

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# The prevalence of hypertension and its associated risk factors among adults in rural Mandya, Karnataka, India

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#### **ABSTRACT**

**Background:** Hypertension is the commonest cardiovascular disorder due to its role in the causation of coronary heart disease, stroke and other vascular complications. In India, hypertension is one of major risk factors for cardiovascular mortality and is attributed for 10% of all deaths. Increasing prevalence in hypertension is expected due to economic transition, increased population growth, ageing, behavioural risk factors such as, unhealthy diet and excessive alcohol consumption. Awareness of hypertension and risk factors for hypertension is less among rural population. Proposed study addresses the risk factors and awareness of the rural community.

**Methods:** Cross sectional study was conducted over a period of one year from June 2013 to May 2014 among adults from randomly selected villages in the Keragodu primary health centre area. House to house survey was conducted among adults in each village and was examined for hypertension and interviewed regarding the risk factors of hypertension using a pre tested, semi structured questionnaire.

**Results:** Among 1786 study subjects, 38.6% were males and 61.4% were females. The prevalence of hypertension was observed to be 25.9%. Prevalence increased as the age increased. The prevalence of hypertension was high among obese, those who had history of diabetes mellitus. Among the study subjects 24.1% (112) were aware of their hypertensive status, of these 56.3% were on regular treatment.

**Conclusions:** The prevalence of hypertension was 25.9%. Various factors like increase in age, obesity, history of diabetes are implicated in the occurrence of hypertension.

Keywords: Prevalence, Hypertension, Risk factor, Rural

#### INTRODUCTION

Hypertension is the commonest cardiovascular disorder and one of the important non-communicable diseases due to its role in the causation of coronary heart disease, stroke and other vascular complications. It is posing a major public health challenge to populations in socioeconomic and epidemiological transition. It is one of the major risk factors for cardiovascular mortality, which accounts for 20-50% of all deaths in the world. In 2008, the prevalence of hypertension among adults aged above 25 years was estimated to be 40% worldwide. The

prevalence is more among developing nations because more people live in developing world, further the health system is weaker with more undiagnosed and untreated cases of hypertension. Increasing prevalence is due to increased population growth, ageing, behavioural risk factors such as, unhealthy diet and excessive alcohol consumption.

Genetic factors play a definite role in determining Blood pressure levels, environmental factors can modify the impact of genetic determinants. Stress, obesity, smoking, and physical inactivity and heavy consumption of salt have all been implicated as exogenous factors in hypertension. <sup>2,3</sup>

#### **METHODS**

This community-based cross sectional study was carried out over a period of one year from June 2013 to May 2014. The study was conducted in the Keragodu Primary Health Centre (PHC) covering 18 villages. It is one of the rural field practice areas of Mandya Institute of Medical Sciences (MIMS), Mandya. The total population of Keragodu PHC is 14,303 and the number of households is 3282. The prevalence of hypertension for the purpose of study was taken as 18.3%. The sample size was 1786 (formula 4pq/d², with an allowable error of 10%).

Study was initiated after obtaining approval from the Institutional Scientific Committee and the Institutional Ethics Committee of MIMS, Mandya. All villages in the Keragodu PHC area were arranged in the alphabetical order. Based on simple random sampling list of villages to be visited was obtained in the beginning by lottery method. The place of public interest was identified in each village. The visit was started in the village from the first household which was on left side of the place of public interest. The process was continued till the all the households were covered in that village. In these households all the adults aged 18 and above who consented to participate in the study were interviewed, examined and assessed for the risk factors regarding the hypertension using pretested, semi structured questionnaire. Similarly the remaining villages were covered till the sample size was attained.

Blood pressure was measured indirectly using a mercury sphygmomanometer. Blood pressure was measured after building a good rapport with the subject to avoid white coat effect. Measurement was taken in the sitting position, with arm supported at the level of heart. The cuff was applied evenly to the exposed arm. The cuff was inflated above a systolic blood pressure of 30 mmHg after confirming by palpatory method, so that pulse disappears and slowly deflated at approximately 2 mmHg. During this kortokoff sound was heard using the stethoscope placed over the brachial artery in the cubital fossa. The pressure at which sounds are heard first was taken as systolic blood pressure. Diastolic pressure was measured at pressure at which kortokoff sounds disappeared. Both systolic and diastolic blood pressure was measured twice, 5 minutes apart and the mean value of two readings were taken as blood pressure of an individual.8

Data was entered into Microsoft excel sheet and analysed using SPSS (statistical package for social sciences). Statistical methods like percentages, chi-square test and multiple logistic regression were used. The statistical significance was evaluated at 95% confidence level (p <0.05).

#### Inclusion criteria

- All subjects of age 18 years and above in the Keragodu primary health centre area.
- All subjects of age 18 years and above who consented to participate in the study.

#### Exclusion criteria

- Adults who refused to participate in the study.
- Not a permanent resident of the household.
- Persons not available even after two visits during the study period.

#### **RESULTS**

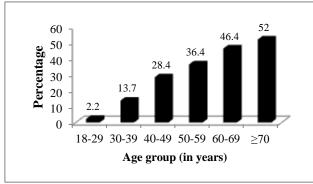
A total of 1786 adults aged 18 years and above were interviewed and examined of them 38.6% (690) were males and 61.4% (1096) were females. Majority of the study subjects were aged  $\geq$  60 years, followed by adults in the age group of 18-29 years who comprised 23.2% (414).

Table 1: Prevalence of hypertension in the study subjects.

Sex	Hypertensive (%)	Normotensive (%)	Total
Male	185 (26.8)	505 (73.2)	690
Female	279 (25.5)	817 (74.5)	1096
Total	464 (25.9)	1322 (74.1)	1786

(chi square ( $\chi^2$ )- 0.405, degree of freedom (df)-1, p-0.525).

Among the study subjects, the prevalence of hypertension was observed to be 25.9% (464). It was observed to be higher among males at 26.8% (185) compared to females 25.5% (279). However the difference was not statistically significant (Table 1). The prevalence of hypertension was increased as the age increased (p <0.005) as indicated in the below diagram (Figure 1).



(P < 0.05)

Figure 1: Diagram showing age wise distribution of hypertension in the study subjects.

The prevalence was more in individuals who had history of diabetes mellitus which was statistically significant (p<0.005).hypertension was more among those with history of alcohol intake and smoking, however the observed difference was not statistically significant (p>0.005). Among the study subjects, majority (1116) were consuming salt  $\geq$ 6 g/day. In them, the prevalence of hypertension was observed to be 25.8% (288). However this difference was not statistically significant (p>0.005).

Below Table 2 depicts that 'B' is the regression coefficient and is the rate of unit change in the dependent variable per unit change in the independent variable. For waist circumference B value is 0.272, so every 0.27 cm

change in the waist circumference is going to increase 0.7 times the chance of hypertension in the study population. For BMI classification B value is 0.285, so every 0.285 change in the BMI is going to increase 1.3 times the chance of hypertension in the study population. For every 0.129 unit rise in waist hip ratio there is 1.138 times the risk of hypertension. These differences among the categories mentioned in the table with relation to hypertension were statistically significant.

Among the study subjects, 24.1% (112) were aware of their hypertensive status. Of the 112 subjects 91.9% (103) were put on treatment. Of the 103 subjects 56.3% (58) were on regular treatment.

Table 2: Multiple logistic regression for hypertension status of study subjects.

Hypertension status According to	В	Std. error	Wald	df	Sig -p	Exp (B)	95% confidence interval for exp (B)	
variables							Lower bound	Upper bound
Waist circumference	0.272	0.077	12.596	1	< 0.001	0.762	0.656	0.885
BMI	0.285	0.056	26.085	1	< 0.001	1.330	1.192	1.483
Waist hip ratio	0.129	0.103	1.590	1	< 0.001	1.138	0.931	1.392

(B- regression coefficient, p < 0.05)

#### **DISCUSSION**

Almost all including our study revealed the prevalence of hypertension was increasing as the age increased. 6-10 In our study no association was observed between hypertension and gender whereas Kokiwar PR et al in their study reported higher prevalence among females compared to males. Studies conducted by Bansal SK et al., among rural adults in Uttarakhand, Gupta S et al., among rural adults in Haryana, Srinivas S et al., in rural adult population of Andhra Pradesh reported higher prevalence of hypertension in males compared to females. 10-13

In this study there was significant association between diabetes and hypertension among the study subjects. A study conducted by Kannan L et al, on 'prevalence rate of hypertension in a rural community in Tamilnadu' reports higher prevalence of hypertension among those who have history of diabetes mellitus.<sup>6</sup>

In our study no association was reported with hypertension and smoking. Similar findings reported from study by Srinivas S et al, among rural adults in Andhra Pradesh. Whereas Agarwal VK et al, on 'Prevalence and determinants of hypertension in a rural community in rural Pune reports there is significant association. <sup>10,14</sup>

A study done by Kokiwar PR et al on the prevalence of hypertension in a rural central India reported similar findings as our study revealing no significant association

between hypertension and alcohol consumption. Whereas a study by Kannan L et al, among adults in rural Tamilnadu reported significant association between alcohol consumption and hypertension.<sup>6,11</sup>

A study done by Kumar K et al, on prevalence of hypertension among rural and urban adults in Jaipur district reported similar findings observed no significant association hypertension and salt intake. Whereas significant association was reported from Gupta S et al, on prevalence and predictors of essential hypertension in the rural population of Haryana. <sup>13,15</sup>

In our study there was significant association between hypertension and obese individuals based on waist hip ratio and BMI. Similar findings were reported from the study conducted by Bansal SK et al, among rural adults in Uttarakhand.<sup>12</sup>

#### **CONCLUSION**

Prevalence of hypertension is increasing in rural areas and various factors like increase in age, obesity, history of diabetes were observed to be associated with occurrence of hypertension.

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