

## Prevalence and the Associated Modifiable Risk Factors of Hypertension in the Geriatric Population in a Block of Dibrugarh District

Pragyan Prakash Gogoi<sup>1\*</sup>, Ratna Sarma<sup>2</sup>

<sup>1</sup>Demonstrator, Department of Community Medicine, Assam Medical College & Hospital, Dibrugarh, Assam, India

<sup>2</sup>Professor, Department of Community Medicine, Assam Medical College & Hospital, Dibrugarh, Assam, India

### Original Research Article

\*Corresponding author

Pragyan Prakash Gogoi

### Article History

Received: 05.07.2018

Accepted: 15.07.2018

Published: 30.07.2018

### DOI:

10.36347/sjams.2018.v06i07.027



**Abstract:** Hypertension is emerging as a major public health problem in India. Although it can affect any age group, the elderly are at an increased risk of developing the disease because of decreased physiological reserves and changes in the arterial structure and functions. To assess the prevalence of hypertension and find out its risk factors in the geriatric population a community based cross-sectional study was conducted among the elderly residing in villages under Lahowal Block of Dibrugarh District. The study was carried out from August 2013 to July 2014. Data was collected by using a pre-designed and pre-tested proforma. The study participants were clinically examined for blood pressure and anthropometric parameters using standardized technique. Data was analysed using SPSS 16.0 software. Out of the 370 study participants, 62.2% were females while the remaining 37.8% were males. The mean age of the study group was  $68.8 \pm 7.1$  years. 59.5% belonged to the 60-69 years age-group and 30% belonged to 70-79 year age-group. The prevalence of hypertension in the study population was 71.4%. On univariate analysis salt consumption, tobacco use, stress, physical activity at work, physical activity during leisure time, BMI and WHR were found to be significantly associated with hypertension.

**Keywords:** Elderly, Geriatric, Hypertension, BMI, WHR.

### INTRODUCTION

Hypertension is an important public health problem both in the developing and developed countries. Of the many host and environmental factors that contribute to cardiovascular diseases, the single most important factor for detecting persons at increased risk of developing cardiovascular diseases is the blood pressure. Although a person at any age may develop hypertension, the risk of developing the disease increases in the elderly. Multiple mechanisms, including stiffening of large arteries, cardiac remodelling, autonomic dysregulation and renal aspects make the elderly more prone to develop hypertension [1]. According to the Framingham Heart Study, by age 60 years approximately 60% of the population develop hypertension, and by 70 years about 65% of men and about 75% of women have the disease. In the Framingham study, it was also found that 90% of the people who were non-hypertensive at age 55 went on to develop hypertension at a later stage [2].

Several studies have been carried out in different parts of the country to estimate the prevalence

of hypertension among the elderly. However the prevalence rate of hypertension among the elderly is not uniform and varies considerably from one region to another. On the above context, it is necessary to study the magnitude of the problem in the elderly in this part of the country. Comparison of prevalence in different communities may throw light on the consistency of the association of the risk factors and hypertension or it may bring out new factors associated with the prevalence of hypertension. Thus keeping in view all these facts the present study was undertaken with the following objectives:

- To assess the prevalence of hypertension in the geriatric population in a block of Dibrugarh district.
- To determine the associated modifiable risk factors of hypertension in the study population.

### MATERIALS AND METHODS

A community based cross-sectional study was carried out among the elderly people aged 60 years and above of both the sexes residing in villages under Lahowal Block of Dibrugarh District. The study was

carried out over a period of one year from August 2013 to July 2014.

Sample size calculation:

The sample size (n) was calculated by using the formula:

$$n = \frac{4pq}{L^2}$$

Where n = sample size

p = prevalence of hypertension among the elderly

q = (1-p)

L = allowable error

Considering the prevalence of hypertension among the elderly in Assam to be 63.63% [3]<sup>1</sup> and the absolute error to be 5% the sample size was calculated to be 370.

### Sampling design

There are 6 blocks in the Dibrugarh district. For conducting the study, among all the blocks Lahowal block was randomly selected. A list of all the villages under the Lahowal block was prepared. Considering the geriatric population in the age group of 60 years and above to be 8% [4]<sup>1</sup> the number of geriatric population in each village was estimated and the number of villages required to obtain the sample size was determined. The villages were then selected by simple random sampling.

The number of study participants to be included from each selected village was decided by proportional allocation. Thereafter house to house visits were carried out in the selected villages and the elderly aged 60 years and above were interviewed after obtaining their informed consent. On reaching the required sample size, the house to house visits were stopped. If required sample size was not obtained in that village, the remaining data were collected from the next nearest village.

### Data collection tools and technique

Data was collected by interviewing the study participants using a pre-designed and pre-tested proforma and were clinically examined for blood pressure and anthropometric parameters using standardized technique. Detailed information regarding

age, sex, lifestyle or behavioural risk factors such as tobacco use, alcohol use, stress, diet and physical activity was collected.

### Inclusion criteria

- All the elderly aged 60 years and above of both sexes who gave consent to participate in the study

### Exclusion criteria

- Those elderly who were seriously moribund and unable to respond to the interview.
- Those elderly who did not give consent.

### Measurement procedures

- **Blood pressure:** - The blood pressure was measured using the auscultatory method. The study subject was first seated for 5 minutes with legs uncrossed and arms and back supported. The study subject was advised to refrain from smoking or taking caffeine during the 30 minutes preceding the measurement. The blood pressure was measured in the upper arm. Two readings were taken, with one minute interval between them and the average of these measurements recorded. If there is a difference of >5 mmHg between the first and second readings, additional readings were obtained and the average of these multiple readings was used [5].
- **Anthropometric measurements:** The height was measured without footwear using an anthropometric rod to the nearest centimetre. The weight was measured in light clothing using bathroom type of scales in kilograms. The waist circumference was measured at the end of a normal expiration, at the approximate midpoint between the lower margin of the last palpable rib and the top the iliac crest. A stretch resistant tape was used for taking the measurement. The hip circumference was measured around the widest part of the buttocks with a stretch resistant tape parallel to the floor.

Waist hip ratio (WHR) was calculated as the ratio of waist (cm) to hip (cm). Abdominal obesity was defined as W.H.R >0.90 (in males) >0.85 (in females) [6]. BMI was calculated as weight/height<sup>2</sup> with the weight being in kilograms and the height being in meters.

### Classification of BMI [7]

Classification	BMI (kg/m <sup>2</sup> )
Underweight	<18.5
Normal range	18.5-22.9
Overweight at risk	23-24.9
Obese I	25-29.9
Obese II	≥30

**Definitions**

- **Hypertension:** Hypertension was defined as the systolic blood pressure (SBP) of 140 mm Hg or greater and/or diastolic blood pressure (DBP) of 90 mm Hg or greater. Individuals who were known hypertensive (with or without treatment) were also labeled as hypertensive [8].
- **Geriatric person:** A geriatric person or an elderly was defined as a person who was 60 years or above [9].

**STATISTICAL ANALYSIS**

The analysis of the data involved descriptive statistics such as mean standard deviation,

percentage and frequency. The association between two categorical variables was tested using Chi-square test. P-value <0.05 was considered to be statistically significant. Data was analysed using SPSS 16.0 software.

**RESULTS**

Out of the 370 study participants, 62.2% were females and 37.8% were males. The mean age of the study participants was 68.8±7.1 years. Majority of the study participants (59.5%) belonged to the 60-69 years age-group followed by 30% in the age-group of 70-79 years.

**Table-1: Distribution of the study participants based on age and sex**

Age (in years)	Male		Female		Total	
	No	%	No	%	No	%
60-69	78	55.7	142	61.7	220	59.5
70-79	50	35.7	61	26.6	111	30
≥80	12	8.6	27	11.7	39	10.5
Total	140	37.8	230	62.2	370	100

**Table-2: Distribution of the study participants according to caste, religion, type of family, socio-economic and educational status**

Characteristics		Number	Percentage
Religion	Hindu	325	87.8
	Muslim	45	12.2
Caste	General	65	17.6
	OBC	236	63.8
	SC/ST	69	18.6
Type of family	Nuclear	136	36.8
	Joint	234	63.2
Socio-economic class	Class I	25	6.7
	Class II	58	15.7
	Class III	71	19.2
	Class IV	81	21.9
	Class V	135	36.5
Educational status	Illiterate	197	53.2
	Literate but below primary	38	10.3
	Primary	28	7.6
	Middle	68	18.4
	High school and above	39	10.5

From Table 2: Majority of the study participants (87.8%) were Hindus. 63.8% of the study participants belonged to OBC category followed by 17.6% in the General category and 18.6% in SC/ST category. Majority of the study participants (63.2%) belonged to joint families. Majority of the study

participants (36.5%) belonged to socioeconomic class V followed by 21.8% study participants in class IV. The least number of study participants belonged to socioeconomic class I (6.7%). Most of the study participants (53.2%) were illiterate.

**Table-3: Distribution of the study participants according to their blood pressure status**

Characteristics	Number	Percentage
Hypertensive	264	71.4
Non-hypertensive	106	28.6
Total	370	100.0

The prevalence of hypertension in the study was found to be 71.4%. Only 28.6% of the elderly were found to be non-hypertensive.

**Table-4: Distribution of the study participants based on fruit and salt consumption and blood pressure status**

Variables	Hypertensive		Non-hypertensive		Significance
	No	%	No	%	
Fruit consumption					p>0.05
Occasionally	206	72.5	78	27.5	
2-3 times/week	58	67.4	28	32.6	
Salt consumption					p<0.05
<5 g	10	50.0	10	50.0	
≥5 g	254	72.6	96	27.4	

Consumption of salt (≥5 g) was found to be significantly associated with hypertension. No association was found between fruit consumption and hypertension.

**Table-5: Distribution of the study participants according to pattern of tobacco use and alcohol consumption and blood pressure status**

Variables	Hypertensive		Non-hypertensive		Significance
	No	%	No	%	
Tobacco use					p<0.05
Current	144	72.4	55	27.6	
Former	38	86.4	6	13.6	
Never	82	64.6	45	35.4	
Alcohol use					p>0.05
Current	99	72.3	38	27.7	
Former	92	74.8	31	25.2	
Never	73	66.4	37	33.6	

The pattern of tobacco use was found to be significantly associated with the blood pressure status of the study participants while alcohol consumption didn't show any association with hypertension.

**Table-6: Distribution of the study participants according to psychological stress and blood pressure status**

Variable	Hypertensive		Non-hypertensive		Significance
	No	%	No	%	
Psychological stress					p<0.05
Never/ Some periods	170	68.0	80	32.0	
Several periods/ Permanent	94	78.3	26	21.7	

The prevalence of hypertension was higher (78.3%) among those who had experienced several periods of stress or permanent stress. A statistically significant association was observed between prevalence of hypertension and stress of the study participants.

**Table-7: Distribution of the study participants according to physical activity at work and blood pressure status**

Variable	Hypertensive		Non-hypertensive		Significance
	No	%	No	%	
Physical activity at work					p<0.05
Does not work	43	95.6	2	4.4	
Mainly sedentary	26	57.8	19	42.2	
Predominantly walking	136	71.6	54	28.4	
Mainly walking	41	66.1	21	33.9	
Heavy physical worker	18	64.3	10	35.7	
Total	264	71.4	106	28.6	

The prevalence of hypertension was highest (95.6%) in those who did not work. 57.8% of the study participants who were mainly sedentary were hypertensive. A statistically significant association was observed between physical activity at work and prevalence of hypertension.

**Table-8: Distribution of the study participants according to physical activity during leisure time and blood pressure status**

Variable	Hypertensive		Non-hypertensive		Significance
	No	%	No	%	
Physical activity during leisure time					p<0.05
Mainly sedentary	124	73.4	45	26.6	
Mild exercise	125	72.7	47	27.3	
Moderate exercise	12	60.0	8	40.0	
Strenuous exercise	3	33.3	6	66.7	
Total	264	71.4	106	28.6	

The prevalence of hypertension was highest (73.4%) in those who were mainly sedentary and lowest (33.3%) in those who did strenuous exercise. A

statistically significant association was observed between physical activity during leisure time and prevalence of hypertension.

**Table-9: Distribution of the study participants according to body mass index (BMI) and Waist-hip ratio (WHR) and blood pressure status**

Variables	Hypertensive		Non-hypertensive		Significance
	No	%	No	%	
BMI					p<0.05
Underweight	87	73.1	32	26.9	
Normal	110	65.1	59	34.9	
Overweight	29	78.4	8	21.6	
Obese	38	84.4	7	15.6	p<0.05
WHR					
Normal	108	62.1	66	37.9	
Obese	156	79.6	40	20.4	

The prevalence of hypertension was highest (84.4%) in those who were obese and lowest (65.1%) in those who had normal BMI. The prevalence of hypertension was observed to be significantly associated with BMI of the study participants.

individuals who were 60 years or above [10]. Gupta RK *et al.* observed that the prevalence of hypertension in individuals who were 60 years and above was 63.2% in their study in East Delhi [11]. The findings of this study are in accordance with the findings of Parikh S *et al.* and Gupta RK *et al.*

The prevalence of hypertension was highest (79.6%) in those study participants who had truncal obesity. Only 20.4% of the study participants who had truncal obesity were found to be non-hypertensive. The association between WHR and the prevalence of hypertension was found to be statistically significant.

A statistically significant association was observed between salt consumption and the prevalence of hypertension in the present study. Saxena P *et al.* [12] in their study on hypertension in rural population of Tehri-Garhwal and Rajasekar VD *et al.* [13] in their study in a rural population of Tamil Nadu also reported a significant association between hypertension and salt consumption.

**DISCUSSION**

**Socio-demographic characteristics:** In this study out of the 370 study participants, 62.2% were females and 37.8% were males. The mean age of the study participants was 68.8±7.1 years. Majority of the study participants (59.5%) belonged to the 60-69 years age-group followed by 30% in the age-group of 70-79 years.

Farag YMK *et al.* [14] and Pandey A *et al.* [15] in their study observed that the use of tobacco was significantly associated with hypertension. These findings are similar to the findings of the present study.

Majority of the study participants (87.8%) were Hindus. 63.8% of the study participants belonged to OBC category followed by 17.6% in the General category. Majority of the study participants (36.5%) belonged to socioeconomic class V while the least number of study participants belonged to socioeconomic class I (6.7%). Most of the study participants (53.2%) were illiterate.

In the present study the prevalence of hypertension was higher (78.3%) among those who had experienced several periods of stress or permanent stress. Ganesh SG *et al.* in their study in Puducherry reported that the prevalence of hypertension was more among those who were highly stressed compared to those who had low level of stress or average stress level [16].

The prevalence of hypertension in the study was found to be 71.4%. Parikh S *et al.* in their study on hypertension in Gujarat reported a prevalence of 80% in

The prevalence of hypertension was highest (95.6%) among those who didn't work. A statistically significant association was observed between

prevalence of hypertension and work related physical activity. Gupta SK *et al.* in their study in Garhwal-Uttarakhand reported that the prevalence of hypertension was 21.1% in sedentary workers and 9.2% in heavy physical workers, which was statistically significant [17]. Agarwal R *et al.* in their study in Agra also observed that the prevalence of hypertension was significantly higher among sedentary workers compared to the heavy physical workers [18].

In the present study a significantly higher prevalence of hypertension was observed in those who were mainly sedentary (73.4%) compared to those who did strenuous exercise (33.3%) during leisure time. Agarwal R *et al.* in their study in an adult population of Agra district reported very significantly ( $p < 0.005$ ) lower prevalence of hypertension (27.17%) in people doing regular exercise [18].

A statistically significant association was observed between BMI of the study participants and hypertension in the present study. Farag YMK *et al.* [14] in their SEEK study and Bindhu SA *et al.* [19] in their study among adult population in rural Kerala also observed that the prevalence of hypertension was associated significantly with BMI.

Mohan V *et al.* reported that the prevalence of hypertension in obese individuals was significantly higher than in normal individuals [20]. ICMR study also reported that the association between hypertension with WHR was significant in both sexes [21]. These findings are similar to the findings of the present study.

## CONCLUSION

The prevalence of hypertension was relatively high in the present study. Although there may be a large number of factors influencing the blood pressure status of an elderly, the present study shows that excessive salt intake ( $\geq 5$  g), tobacco use, psychological stress, and physical activity both during work and leisure time, BMI (Body Mass Index) and truncal obesity might be some of the factors associated with hypertension.

## REFERENCES

1. Viridis A, Bruno RM, Neves MF, Bemini G, Taddei S, Ghiadoni L. Hypertension in the elderly: an evidence-based review. *Curr Pharm Des.* 2011; 17(28): p. 3020-31.
2. Chaudhry KN, Charez P, Gasowski J, Grodzicki T, Messerli FH. Hypertension in the elderly: Some practical considerations. *Cleveland Clinic Journal of Medicine.* 2012 October; 79(10): p. 694-704.
3. Hazarika NC, Narain K, Biswas D, Kalita HC, Mahanta J. Hypertension in the native rural population of Assam. *The National Medical Journal of India.* 2004; 17(6): p. 300-4.
4. Population Reference Bureau. India's Aging Population. *Today's Research on Aging.* ; 2012. March.
5. Pickering TG, Hall JE, Appel LJ, Falkner BE, Graves J, Hill MN, Jones DW, Kurtz T, Sheps SG, Roccella EJ. Recommendations for blood pressure measurement in humans and experimental animals: part 1: blood pressure measurement in humans: a statement for professionals from the Subcommittee of Professional and Public Education of the American Heart Association Council on High Blood Pressure Research. *Circulation.* 2005 Feb 8;111(5):697-716.
6. Waist circumference and waist-hip ratio: report of a WHO expert consultation. Geneva. 2008.
7. WHO/IASO/IOTF. The Asia-Pacific Perspective: Redefining Obesity and its Treatment. Health Communications Australia Pty Ltd. 2000.
8. The Sixth Report of the Joint Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. *Arch Intern Med.* 1997 Nov; 157: p. 2413-45.
9. UN General Assembly. Problems of the Elderly and the Aged. [Online].; 11 Dec 1980. A/RES/35/129. Available from: <http://www.refworld.org/docid/3b00/1894c.html>.
10. Parikh S, Choksi J, Bala DV. The study of epidemiology and determinants of hypertension in Urban Health Training Centre (UTHC). *Gujarat Medical Journal.* 2011 Feb; 66(1): p. 22-7.
11. Gupta RK, Pandey A. Occurrence of chronic diseases in East Delhi: Prevalence and some correlates. *Health and Population-Perspectives and Issues.* 2006; 29(4): p. 169-76.
12. Saxena P, Saxena V, Saxena Y. An Epidemiological study on Hypertension in Rural population of Tehri-Garhwal. *Indian J. Prev. Soc. Med.* 2012 April-June; 43(2): p. 218-23.
13. Rajasekar VD, Krishnagopal L, Mittal A, Singh Z, Purty AJ, Binu VS, Iillayabharathi V, Iillayabharathi V. Prevalence and risk factors for hypertension in a rural area of Tamil Nadu, South India. *Indian Journal of Medical Specialities.* 2012 Jan 1;3(1).
14. Farag YM, Mittal BV, Keithi-Reddy SR, Acharya VN, Almeida AF, Anil C, Ballal HS, Gaccione P, Issacs R, Jasuja S, Kirpalani AL. Burden and predictors of hypertension in India: results of SEEK (Screening and Early Evaluation of Kidney Disease) study. *BMC nephrology.* 2014 Dec;15(1):42.
15. Pandey A, Patni N, Sarangi S, Singh M, Sharma K, Vellimana AK, Patra S. Association of exclusive smokeless tobacco consumption with hypertension in an adult male rural population of India. *Tobacco induced diseases.* 2009 Dec;5(1):15.
16. Kumar SG, Sundaram ND. Prevalence and Risk factors of Hypertension among Bank Employees in Urban Puducherry, India. *The International Journal of Occupational and Environmental Medicine.* 2014; ; p. 94-100.
17. Gupta S, Dixit S, Singh AK, Nagaonkar J, Malik N. Prevalence and predictors of hypertension: A

- cross-sectional study among people coming to a tertiary care facility in Garhwal-Uttarakhand. *Indian Journal of Community Health*. 2012 Oct-Dec; 24(4): p. 275-9.
18. Agrawal R, Chaturvedi M, Singh S, Gupta SC. An Epidemiological study of dietary and exercise habits as correlates of hypertension in persons aged 45 years and above in Agra district. *Indian Journal of Community Health*. 2012 April-June; 24(2): p. 91-6.
  19. Bindhu SA, Thankam K, Girija V, Haran JC. Prevalence and determinants of hypertension among adults in a rural area in Thiruvananthapuram, Kerala. *International Journal of Medical and Applied Sciences*. 2014; 3(1): p. 77-83.
  20. Mohan V, Deepa M, Farooq S, Datta M, Deepa R. Prevalence, awareness and control of hypertension in Chennai-The Chennai Urban Rural Epidemiology Study (CURES-52). *J. Assc Physicians India*. 2007 May; 55: p. 326-32.
  21. National Nutrition Monitoring Bureau. Diet and nutritional status of population and prevalence of hypertension among adults in rural areas. NNMB Technical Report No. 24. 2006.