



STUDY OF HYPERTENSION AND OBESITY IN ELDERLY IN A RURAL POPULATION: CROSS SECTIONAL STUDY

Community Medicine

**Dr. Sharada
Uddhavrao
Sonkhedkar***

Assistant Professor Community Medicine Department Vdgm, Latur *Corresponding Author

**Dr. Lalita Tukaram
Chinte**

Assistant Professor Community Medicine Department Vdgm, Latur

ABSTRACT

Title: Study of hypertension and obesity in elderly in a rural population: cross sectional study **Background:** Hypertension is a major health concern among the elderly population, particularly in rural areas of developing countries. This study aimed to determine the prevalence of hypertension and examine associated risk factors, specifically obesity and waist-to-hip ratio, among elderly individuals in a rural area of Maharashtra, India. **Methods:** A community-based cross-sectional study was conducted from January 2016 to December 2017 in the rural field practice area of a medical college in Maharashtra. The study included 394 individuals aged 60 years and above. Blood pressure measurements, anthropometric data, and demographic information were collected using standardized methods and a semi-structured questionnaire. **Results:** The prevalence of hypertension among the elderly was found to be 32.23%. The mean age of participants was 67.99 ± 6.46 years. A significant association was observed between body mass index (BMI) and hypertension ($p = 0.03$), with prevalence rates of 20.34%, 31.56%, and 40% in underweight, normal weight, and overweight/obese categories, respectively. However, no significant association was found between waist-to-hip ratio and hypertension ($p = 0.9761$). **Conclusion:** This study reveals a high prevalence of hypertension among the rural elderly population. The significant association between BMI and hypertension underscores the importance of maintaining a healthy weight in this age group. Further research and targeted interventions are needed to address the burden of hypertension in rural elderly populations.

KEYWORDS

hypertension, obesity, BMI

Ageing is a natural process. In the words of Seneca "Old age is an incurable disease", but more recently Sir James Sterling Ross commented that "You do not heal old age you protect it; you promote it; you extend it".¹ Giving due importance to the issue of "Ageing and health" WHO has kept it theme for the year 2012 as "Good Health Adds Life to Years".²

Aging has been defined as progressive, generalized impairment of function leading to loss of adaptive response to stress and growing risk of age related diseases, resulting in progressive increase in age specific mortality.³ The ageing elderly can be categorized into three broad groups — the functionally independent, frail, and the functionally dependent. The burden of chronic diseases is heaviest among frail and functionally dependent elderly people.⁴

The term elderly is used to define those 60 years and over of age, who represent the fastest growing segment of the population throughout the world.⁵ Single definition of elderly can't be applied consistently because biological, social, economic and chronological criteria vary from country to country.⁶ It is very common to define young old as 60-69 years, old as 70-79 years and oldest old as 80 years and above.⁷

More than half of the geriatric people are suffering from some type of diseases. Certain health problems develop with increasing age like hypertension, diabetes mellitus, cardiovascular diseases, cerebrovascular accidents, obesity, dyslipidaemia and various malignancies.⁸

Among the above diseases Hypertension is one of the most important disease in elderly. The prevalence of hypertension is rapidly increasing in developing countries. It is said to be one of the leading cause of death and disability. According to 2011 census 8% are of age 60 years and above.⁹ Three fourth of elderly population lives in India.¹⁰

Prevalence of hypertension in India varies from 17% to 21% in all states with marginal rural and urban differences.¹¹ It was estimated that by year 2015 the majority of elderly people worldwide will reside in developing countries.^{12,13} Developing countries are thus likely to face an enormous burden of chronic non-communicable diseases in near future. Of these diseases hypertension is one of the most important treatable causes of mortality and morbidity in elderly population.¹⁴ It accounts for large population of cardiovascular disease in elderly population.^{15,16} Of whom, approximately 9.4 million were due to hypertension which is more than all the deaths from infectious diseases

combined.¹⁷

Hypertension is responsible for 57% of stroke deaths and 24% of coronary heart disease deaths in India.¹⁸ Cardiovascular disease will be the largest cause of death and disability in India by 2020 and HTN is emerging as a major health problem.¹⁹

Many studies have not been carried out to determine the prevalence of hypertension among rural folks and the contributing risk factors if any. In this study we have studied obesity and waist to hip ratio and prevalence of hypertension.

Aim And Objectives:

1. To determine the prevalence of hypertension among elderly in rural field practice area
2. To study the associated risk factors obesity and waist to hip ratio of hypertension in elderly

MATERIAL & METHODS:

The present study was undertaken to find out prevalence and risk factors of hypertension in elderly. The present study was conducted in the rural field practice area attached to Community Medicine Department, Government Medical College of Maharashtra.

Study Design: It was a community based, cross sectional type of study.

Study Area: The area for the study was Field practice area of medical college, which was approximately 1.5 km away from Medical College. By natural landmarks, this community was divided into – six wards.

Ethical Considerations: Ethical committee approval was obtained prior to the start of the study from Institutional Ethics Committee of a Medical College.

Period Of Study:

- **Pilot Study:** 2 months
- **Survey For Detection Of Hypertension:** 8 months
- **Study Period:** January 2016 to December 2017.

Criteria For Selection Of Cases:

The unit of study is geriatric population i.e. aged 60 years and above living permanently in field practice area of medical college.

Inclusion Criteria:

1. Elderly aged 60 years and above were included in the study.
2. Those elderly who were willing to participate in a study.
3. Those who were living in the area for more than 1 year.

Exclusion Criteria:

1. Those persons who were below 60 years of age
2. Those who were not willing to participate in the study.
3. House of whom were permanently locked or have transferred their residence or elderly who cannot be contacted even after three successive visits to their homes were excluded.

Sample Size: No sampling was done. All elderly according to inclusion criteria, residing in field practice area of medical college were included in study & 394 elderly were enrolled.

Material Used:

Materials used were pretested semi structured questionnaire, mercury sphygmomanometer, stethoscope, standard measuring tape, weighing machine.

Blood pressure was measured with a standard sphygmomanometer which was regularly checked and used same throughout the period of data collection.

A standard microtone stethoscope was used to measure the blood pressure and clinical examination. The weight was taken on portable weighing machine with calibrated scale marked from 0 to 120 kilogram. Initially the pilot study was carried out in the field practice area for pretesting the questionnaire and necessary modification were made in the questionnaire and same was finalized.

For identification of elderly and initial contact, the help of the medical social worker and Anganwadi worker was obtained. A preliminary house to house survey was done to know the number of persons aged 60 years and above. Family members were explained about the purpose of the study and effort was taken for their maximum co-operation in the study. At the start of data collection, the first house was selected by lottery method and thereafter, house to house visits were done. Criteria was taken as systolic blood pressure equal to or more than 140 mm. Hg. together with diastolic pressure equal or more than 90 mm. Hg.

Persons who were already on antihypertension treatment, their blood pressure readings were recorded as 140/90 mm Hg if readings were lower than this. Height was measured in centimetre by drawing metric scale on wall. The individuals were measured in erect standing position with shoes removed.

The weight was taken on portable weighing machine with calibrated scale marked from 0 to 120 kilogram.

- **Body Mass Index:** Body Mass Index was calculated by formula /quetlet's index

$$\text{Body Mass Index} = \frac{\text{Weight (Kg)}}{\text{Height}^2 \text{ (Meter)}}$$

Waist To Hip Ratio: Waist circumference was measured at the level halfway between the iliac crest and the costal margin at the level of umbilicus in midexpiratory position with the subject in standing position. Hip circumference was measured at the level of greater trochanters with the subject in standing position and both feet together. For men >.90 and for women >.85 is considered above cut off

RESULTS:

The mean age was 67.99 with standard deviation 6.46. The mean systolic blood pressure was 136.74 mm of Hg with Standard Deviation 13.70.

The mean diastolic blood pressure was 84.31 mm of Hg with standard deviation 8.41. Out of 394 subjects 127 were hypertensives giving the prevalence of hypertension as 32.23%

Table No.1: Age And Sex Wise Distribution Of Study Subjects

Age in years	Male		Female		Total	
	No.	%	No.	%	No.	%
60-69	108	44.81	133	55.19	241	61.17
70-79	76	54.68	63	45.32	139	35.28
≥ 80	05	35.71	09	64.29	14	3.55

Total	189	47.97	205	52.03	394	100
--------------	-----	-------	-----	-------	-----	-----

As per table no.1 The age of elderly in the present study ranged from 60-95 years. Majority of elderly were in the group 60-69 year's i.e. 241 (61.17%) followed by 70-79 years of age 139 (35.28 %) and least in the age group 80 years and above i.e. 14 (3.55%). Out of 394 189 (47.97%) were males and 205 (52.03%) were females.

In age group 60-69 years, out of 241 elderly; 108 (44.81%) were male and 133 (55.19%) were females, in the age group 70-79 years, out of 139 study subjects; 76 (54.68%) were males and 63 (45.32%) were females and out of 14 who were above 80 years of age 5 (35.71%) were males and 9 (64.29%) were females.

Table No. 2: Distribution Of Hypertensives Subjects According To Body Mass Index

Sr. No.	Body Mass Index	Normotensive		Hypertensive		Total		Prevalence of Hypertension in %
		No.	%	No.	%	No.	%	
1	<18.5	47	17.60	12	9.45	59	14.97	20.34
2	18.5 – 24.9	154	57.68	71	55.99	225	57.11	31.56
3	≥ 25	66	24.72	44	34.65	110	27.92	40
4	Total	267	100	127	100	394	100	32.23

Chi square test: $X^2=6.906$, degree of freedom= 2, P value= **0.03**

Table no. 2 shows distribution of hypertensives Subjects according to Body Mass Index.

Out of 394 subjects; 59 (14.97%) having BMI less than 18.5 i.e. underweight, 225 (57.11%) subjects having BMI between 18.5 – 24.9 who were normal weighing and 110 (27.92%) having BMI above 25 which included overweight and obese.

Out of 127 hypertensives; 12 (9.45%) had BMI below 18.5, 71 (55.99%) were having BMI between 18.5-24.9 and 44 (34.65%) were having BMI above 25.

The prevalence was 20.34% in underweight subjects, 31.56% in normal range body mass index subjects and 40% in overweight and obese subjects.

There was significant association between high body mass index and hypertension (P value <0.05).

Table No. 2: Distribution Of Hypertensive Subjects According To Waist To Hip Ratio

Sr. No.	Waist to hip ratio	Normotensive		Hypertensive		Total		Prevalence of Hypertension in %
		No.	%	No.	%	No.	%	
1	< Cut off	156	58.43	74	58.27	230	58.38	32.17
2	>cut off	111	41.57	53	41.73	164	41.62	32.32
3	Total	267	100	127	100	394	100	32.23

Chi square test $X^2=0.00089$, degree of freedom= 1, P value= 0.9761

Table No. 17 shows distribution of hypertensives Subjects according to waist to hip ratio.

Out of 394 subjects; 230 (58.38%) were having waist to hip ratio less than cut off and 164 (41.62%) had waist to hip ratio more than cut off.

Out of 127 hypertensives; 74 (58.27%) were having less than cut off waist to hip ratio and 53 (41.73%) were having high waist to hip ratio.

The prevalence of hypertension was 32.17% and 32.32% in people having less than cut off waist to hip ratio and elderly having more than cut off waist to hip ratio respectively. There was no significant association between waist to hip ratio and hypertension as p value >0.05.

DISCUSSION:

The prevalence was 20.34% in underweight subjects, 31.56% in normal range body mass index subjects and 40% in overweight and obese subjects. There was significant association between high body mass index and hypertension. ($X^2=6.906$, degree of freedom= 2, P value= **0.03**)

Group HS²⁰ et al 2001 study declared higher BMI associated with

hypertension in rural India. **Wang F.²¹ et al (2014)** study observed prevalence of hypertension in overweight or obese group was 36 per cent and it was 5.8 per cent who had a normal BMI. **Reddy N.²² et al 2014** observed out of 47 hypertensive 38 were having BMI more than 25 and it was statistically significant ($P < 0.001$). **Verma M.²³ et al 2015** showed obese people with BMI more than 30 having higher prevalence of hypertension than other and it was statistically significant. **Gupta J.⁶⁴ et al 2016²⁴** There was a statistically significant increase in the systolic blood pressure with increasing BMI (R value 0.2214, $P < 0.05$.)

All above studies showed that as BMI increases blood pressure also rises which was similar to the present study.

In the present, out of 127 hypertensives 74 were having normal waist to hip ratio and 53 were having high waist to hip ratio. The prevalence of hypertension was 32.17% and 32.32% in people having normal range waist to hip ratio and elderly having high waist to hip ratio. There was no significant association between waist to hip ratio and hypertension. (Chi square test $X^2 = 0.0089$, degree of freedom= 1, P value= 0.9761)

Deshmukh P.R.²⁵ (2006) study showed partially similar results as the systolic blood pressure was associated with waist to hip ratio but diastolic blood pressure was not significantly associated with high waist to hip ratio. **Agrawal V.K.²⁶ (2011) and Ismail²⁷ et a (2016)** study showed similar results as there was no significant association between waist to hip ratio and hypertension. **Hazarika N.C.²⁸ et al (2003) and Vazhudavur²⁹ et al** studies showed different results as there was significant association between waist to hip ratio and hypertension. As the high waist to hip ratio is a causative factor for hypertension, this difference in findings may be due to presence of other factors which reduces blood pressure like no stress, low salt intake and others.

REFERENCES

1. Prakash, R., Chowdary, S. K., & Singh, U. S. (2004). Study of morbidity pattern among geriatric population in an urban area of Udaipur, Rajasthan. *Indian Journal of Community Medicine*, 29(1), 35-40.
2. World Health Organization. (2012). World Health Day 2012 - Ageing and health. Retrieved October 20, 2016, from WHO website.
3. Ashok, T., Sowmiya, K., & G. R. (2012). Morbidity pattern among the elderly people living in a southern rural India - A cross-sectional study. *National Journal of Research in Community Medicine*, 1(1), 15-19.
4. Pendyala, G., & Joshi, S. C. S. (2014). The ageing nation. *Indian Journal of Community Medicine*, 39(1), 3-7.
5. World Health Organization. (1995). Physical status: The use and interpretation of anthropometry. Report of a WHO Expert Committee (Technical Report Series No. 854). Geneva: WHO.
6. World Health Organization. (1993). Ageing and working capacity (Technical Report Series No. 835). Geneva: WHO.
7. Detels, R., McEwen, J., Beaglehole, R., & Tanaka, H. (2002). *Oxford Textbook of Public Health* (4th ed.). Oxford: Oxford University Press.
8. Pratim, D. P., Sengupta, B., Gangopadhyay, N., Ashique, F. K., & Subhasis, C. (2012). Hypertension and related morbidity among geriatric population of Eastern India. *Journal of the Indian Medical Association*, 24(1), 29-33.
9. Government of India. (2012). Census of India: SRS Statistical Report 2012. Retrieved from Census India website.
10. Centre for Ageing Research and Development in India (CARDI). (2006). Ageing in India in the 21st Century: A Research Agenda.
11. Park, K. (2015). *Park's Textbook of Preventive and Social Medicine* (23rd ed.). Jabalpur: M.S Banarasidas Bhanot Publishers.
12. Kannan, L., & Satyamoorthy, T. S. (2009). An epidemiological study of hypertension in rural household community. *Sri Ramachandra Journal of Medicine*, 11(2).
13. Kumar, V. (1997). Ageing in India—an overview. *The Indian Journal of Medical Research*, 106, 257-264.
14. National High Blood Pressure Education Program Working Group Report on Hypertension in the Elderly. (1994). *Hypertension*, 23(3), 275-285.
15. Burt, V.L., Whelton, P.K., Roccella, E.J., Brown, C., Cutler, J.A., Higgins, M., et al. (1995). Prevalence of hypertension in the US adult population: Results from the Third National Health and Nutrition Examination Survey, 1988-1991. *Hypertension*, 25(3), 305-313.
16. World Health Organization. (2012). Major causes of death.
17. World Health Organization. (2013). A global brief on hypertension - World Health Day.
18. Gupta, R. (2004). Trends in hypertension epidemiology in India. *Journal of Human Hypertension*, 18(2), 73-78.
19. Rodgers, A., Lawes, C.M.M., & MacMahon, S. (2000). Reducing the global burden of blood pressure-related cardiovascular disease: A review of the evidence and recommendations for action based on a systematic review of the literature on hypertension and cardiovascular disease prevention strategies worldwide. *Journal of Hypertension*, Supplement: Official Journal of the International Society of Hypertension, 18(Suppl), S3-S6.
20. Hypertension Study Group. (2001). Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India: A multicentre study. *Bulletin of the World Health Organization*, 79(6), 490-500.
21. Wang, F., Tiwari, V.K., & Wang, H. (2014). Risk factors for hypertension in India and China: A comparative study. *Health Population Perspectives Issue*, 37(1 & 2), 40-49.
22. Reddy, N.B., Reddy L.K.V., Pallavi M., Nagarjuna R., & Sireesha P. (2014). Study on nutritional status and prevalence of non-communicable diseases among the rural elderly of Tamil Nadu: A community-based cross-sectional study. *International Journal of Research in Health Sciences*, 122(2), 604-609.
23. Verma M., Rajput M., Sahoo S.S., Kaur N., Rohilla R., Sharma R., et al. (2015). Prevalence of hypertension and its association with different anthropometric variables among adults in rural areas of north India. *International Journal of Research Development in Pharmacy Life Sciences*, 4(5), 1775-1783.

24. Gupta J., Kumar S., & Agrawal S. (2016). Study of association between body mass index and hypertension in elderly in a rural teaching hospital. *World Journal of Pharmacy and Medical Research*, 2(3), 107-109.
25. Deshmukh P.R., Gupta S.S., Dongre A.R., Bharambe M.S., Maliye C., Kaur S. et al. (2006). Relationship of anthropometric indicators with blood pressure levels in rural Wardha. *Indian Journal of Medical Research*, 123(5), 657-664.
26. Agrawal V.K., Bhalwar R.D. & Basannar. (2008) Prevalence and determinants of hypertension in a rural community. *MJAFI*, 64:21-25.
27. Ismail, Kulkarni A.G., Meundi A.D. & Amruth M. (2016) A community-based comparative study of prevalence and risk factors of hypertension among urban and rural populations in a coastal town of South India. *Sifa Medical Journal*, 3:41-46.
28. Hazarika N.C. & Biswas D. (2003) Hypertension in the elderly population of Assam. *Journal Association Physicians India*, 51(March):567-573.
29. Vazhudavur Neelakantan A. Bhawan S. & Command N. (2016) An epidemiological study of diabetes & hypertension and its risk factor amongst geriatric population in a rural area of Maharashtra , India. *Asia Pacific Journal Research ISSN*