

Original Research Article

Predictors of hypertension among rural people of western Maharashtra: a multivariate analysis

Anup L. Kharde^{1*}, Rutuja M. Phulambrikar¹, Jayant D. Deshpande¹,
Varsha N. Mahavarkar¹, Amruta A. Kharde²

¹Department of Community Medicine, Rural Medical College PIMS-DU, Loni, ²Department of Medicine, SMFRI's Vamanrao Ithape Homeopathic Medical College, Sangamner, Maharashtra, India

Received: 25 May 2019

Revised: 29 July 2019

Accepted: 01 August 2019

*Correspondence:

Dr. Anup L. Kharde,

E-mail: dranup.kharde@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Hypertension causes morbidity as well as increases mortality either by acting independently or by affecting multiple organ system. Risk factors of hypertension are categorized as modifiable or non-modifiable risk factors. Early identification of these risk factors is not only essential for prediction of hypertension and but also to reduce effect associated with it.

Methods: The present descriptive cross-sectional study was carried out at field practice area of tertiary care teaching hospital of western Maharashtra. Total 1537 sample sized was achieved using systematic random sampling technique. All the village individuals, both male and female, over 18 years of age were included in the study whereas, pregnant women, extremely debilitated persons and subjects who were not willing to give informed consent were excluded. A pre-designed and pre-tested questionnaire was used for data collection.

Results: In present study the prevalence of hypertension and pre-hypertension was 11.49% (117). On regression analysis risk factors like age, BMI, high salt intake, family history of blood pressure etc., were found to be associated with hypertension.

Conclusions: The present study showed a higher prevalence of both hypertension among the rural population and risk factors such as age, obesity, elite social class, high salt intake, family history of blood pressure were the predictors of the hypertension.

Keywords: Hypertension, Prehypertension, Rural area, Risk factors

INTRODUCTION

Hypertension a.k.a. high blood pressure is a lifelong disease, requiring long term adherence to lifestyle changes, repeated assessment and variety of medications, in order to be controlled. Hypertension acts as an important factor for mortality, independently or by affecting multiple organ systems.

An array of factors can be used to predict the risk of this slow progressing disease. While non-modifiable risk

factors like age, gender, family history, race or ethnicity cannot be changed, health awareness can enable an individual to know in advance of their presence. On other hand, modifiable risk factors like obesity, addiction, sedentary life-style, and stress etc., can be altered to reduce the incidence and progression of this disease.

Studies show that affluence, progressive aging, industrialization, and changes in lifestyle have caused an increase in the prevalence of hypertension in India and is also spreading to rural areas. This needs to be

documented to dispel myths that hypertension is a problem of urban areas only. In addition to this problem, a great majority of the rural population in India has suboptimal access to health care and is not conscious enough to seek health care until sickness causes much distress.¹

Early identification of these predictors among the rural population is thus the need of the hour for its effective planning and management. As contrast to various studies conducted among urban population, there is a paucity of data to ascertain various predictors of hypertension among rural population. This study was thus undertaken to determine the predictors of hypertension among rural people of western Maharashtra.

METHODS

The present descriptive cross-sectional study was carried out at Babhaleshwar village of Tal Rahata, District Ahmednagar of Maharashtra. The Institutional Ethical Committee's approval was obtained before commencing the study. The study was conducted for the period of three years from 2015 to 2017. All the village individuals, both male and female, over 18 years of age were included in the study whereas, pregnant women, extremely debilitated persons and subjects who were not willing to give informed consent were excluded. A total of 1537 sample size was obtained using statistical formula;

$$n = \frac{Z^2(1 - \alpha/2)(1 - P)}{\epsilon^2p}$$

where P, i.e., the prevalence of hypertension was taken as 10% from the previous study, Z is 1.96 at 95% confidence interval (CI), and with relative precision is 15%.² The sample size was rounded off to 1540. Systematic random sampling method was used for which a sampling interval "4" was obtained using $\frac{N}{n}$ where "N" was total number of individuals over 18 years of age (6411) and "n" was the calculated sample size (1537). So, by using the sampling frame every 4th individual was included till the entire sample size was accomplished. A pre-designed and pre-tested questionnaire was used for data collection. A pilot study was done for validation, practicality and applicability of questionnaire. The study questionnaire consisted of three parts: part 1 contained

sociodemographic variables; part 2 assessed the risk factors and part 3 included physical examination and blood pressure measurement. WHO recommendations were used for measurement of blood pressure.³ Participants were categorised as hypertensive, pre-hypertensive or normotensive based on blood pressure readings in accordance with Joint National Committee 7 classification.⁴ Participants who showed the previous medical examination reports or antihypertensive medication were labelled as known case of hypertension.⁵

Statistical analysis

Statistical analysis was done using SPSS version 21. Normality of quantitative variables was assessed using normality Shapiro-Wilk test. Pearson's correlation test was done to see whether the change in a quantitative continuous variable (risk factor) has any effect on systolic (SBP) and diastolic blood (DBP) pressure (dependent) and whether this change is statistically significant. All the variables who showed statistically significant association on univariate analysis were subjected to multivariate analysis. Chi Square (χ^2) test was used to determine the association of in between hypertension and qualitative risk factors measured on nominal and ordinal scale. Those risk factors showed significant association were used in regression analysis.

In this study multiple logistic regression analysis was used to determine the predictors of hypertension. In the multiple logistic regression analysis, quantitative continuous variables were metamorphosed into dichotomous dependent variables; and independent categorical, continuous or discrete variables were used to find predictors. Level of significance at 5% ($p < 0.05$) was considered statistically significant (two-tailed).

RESULTS

In present study, the prevalence of hypertension was 11.49% (177) (95% CI 9.99–12.99) and that of pre-hypertension was 11.42% (176) (95% CI 9.92–12.92). On Pearson's correlation analysis (Table 1) it was observed that systolic blood pressure shows positive significant correlation with BMI ($r=0.53$, $p < 0.001$), waist hip ratio ($r=0.36$, $P < 0.001$) and age ($r=0.16$, $p < 0.001$) and diastolic blood pressure also shows positive significant correlation with BMI ($r=0.48$, $P < 0.001$), waist hip ratio ($r=0.35$, $P < 0.001$) and age ($r=0.11$, $p < 0.001$) (Figure 1 and 2).

Table no 1: Pearson correlation of blood pressure with anthropometric variables.

Blood pressure	Variables		
	BMI	WHR	Age
Systolic blood pressure	0.53 (0.001)	0.36 (0.001)	0.16 (0.001)
Diastolic blood pressure	0.48 (0.001)	0.35 (0.001)	0.11 (0.001)

*actual number is value of correlation coefficient (r). The number in parenthesis denotes P value.

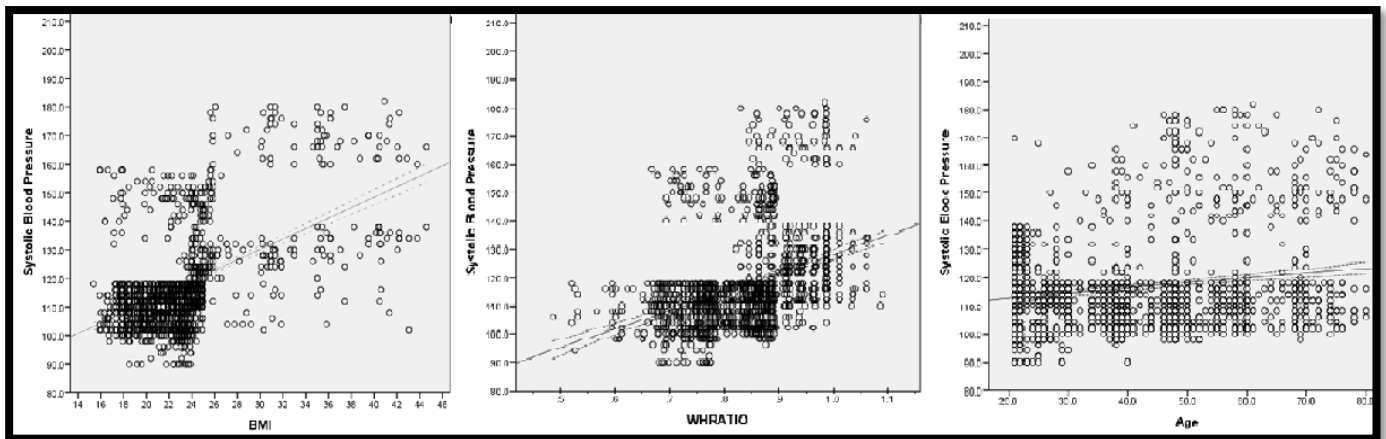


Figure 1: Pearson’s correlation between systolic blood pressure and BMI, WHR and age.

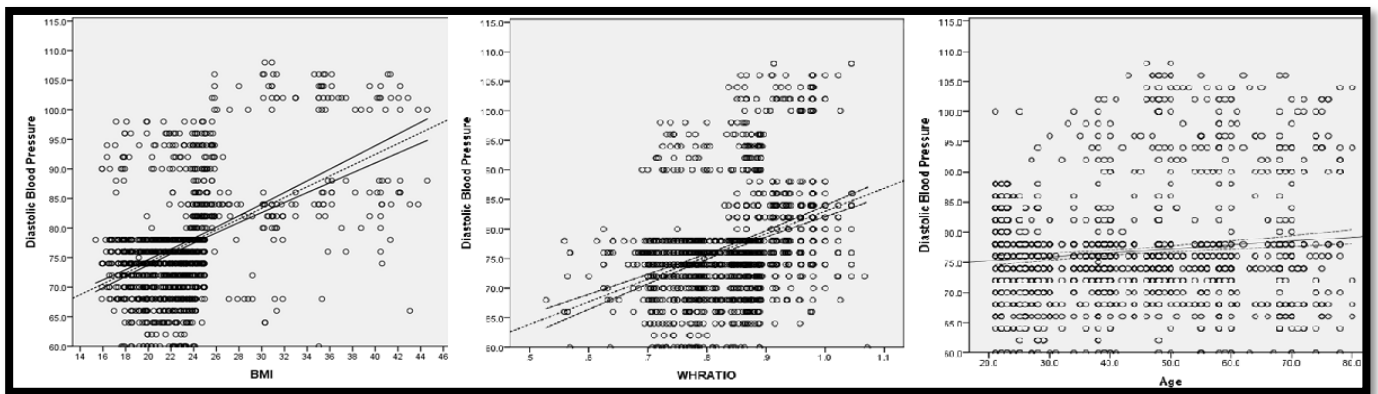


Figure 2: Pearson’s correlation between diastolic blood pressure and BMI, WHR and age.

Table 2: Multiple logistic regression of independent predictors of hypertension.

Predictors	Odd’s ratio	95% Confidence interval		P value
		Lower bound	Upper bound	
Age	1.090	1.075	1.106	0.001
BMI	1.21	1.158	1.282	0.001
Tobacco consumption	0.35	0.222	0.560	0.001
Family H/O HTN*	0.26	0.151	0.446	0.001
Extra Salt	0.25	0.150	0.442	0.001
Socioeconomic Class I	0.21	0.105	0.429	0.001
Sedentary activity	1.03	0.546	1.950	0.92
Moderate activity	0.87	0.522	1.451	0.59
WHR#	0.15	0.008	2.809	0.20
Diet (Mix)	0.73	0.453	1.199	0.21
Alcohol	0.95	0.45	1.97	0.89

*Family H/O HTN : Family history of hypertension; #WHR= Waist hip ratio.

Multiple logistic regression analysis, carried out on various independent risk factors to ascertain the predictors of hypertension showed that, out of all independent risk factors age (OR=1.09, 95% CI 1.07-1.10), BMI (OR=1.21, 95% CI 1.15-1.28), tobacco addiction (smoked or chewed) (OR=0.35, 95% CI 0.22-0.56), family history of hypertension (OR=0.26, 95% CI

0.15-0.44), extra salt intake (OR=0.25, 95% CI 0.15-0.44), socio economic class I (OR=0.21 95% CI 0.10-0.42) were significant predictors of high blood pressure (p<0.001). Other variables like sedentary and moderate physical activity, diet, alcohol and waist hip ratio were found to be non-significant predictors of hypertension. (Table 2).

DISCUSSION

In present study the prevalence of hypertension and prehypertension was 11.49% (117) and 11.42% (176) respectively. A study conducted by Kadu et al reported 12% prevalence of hypertension in his study; which was somewhat similar to present study findings. Gupta et al reported 18% and 57.9% of prevalence of hypertension and prehypertension respectively, which were higher as compare to present study.^{6,7} Higher prevalence of prehypertension (30%) as compared to hypertension (07.75%) was reported in the study conducted by Srinivas et al.⁸

In present study systolic and diastolic blood pressure has shown significant positive correlation with BMI (body mass index), waist hip ratio, and age; because when these risk factors had increased; systolic and diastolic blood pressure also increased. Sharma et al reported similar positive significant correlation of systolic and diastolic blood pressure with age variable only.⁹ In this study variables which have shown statistical significant association on univariate analysis were considered for multiple logistic regression analysis. Age, BMI, addiction of tobacco, positive family history of hypertension, use of extra salt, socioeconomic class I and sedentary physical activity were found to be statistical significant predictors of hypertension. The predictors of hypertension identified as non-modifiable risk factors were age and family history of hypertension while all the other predictors were modifiable. Control of these modifiable risk factors is possible through lifestyle modification. Though checks against tobacco and alcohol consumption are already in place through legal measures and mass awareness campaigns, they need to be enforced. People need to be made aware of small dietary modification of reducing salt intake that can help prevent hypertension. Also some form of physical activity in leisure time should be adopted by the people to maintain a healthy BMI and to control obesity.

CONCLUSION

The present study concludes that rural areas also has high burden of hypertension and risk factors such as age, obesity, elite social class, high salt intake, family history of blood pressure were the predictors of the hypertension.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kharde AL, Deshpande J, Phulambrikar R, Mahavarakar V. Prevalence of hypertension and its risk factors in a field practice area of tertiary care teaching hospital in rural area of Western Maharashtra. Int J Med Sci Public Health. 2018;7(2):76-9.
2. Gupta R. Rethinking diseases of affluence; Coronary heart disease in developing countries. S Asian J Prev Cardiol. 2006;10:65-78.
3. Bhalwar R. Text Book of Public Health and Community Medicine: Systemic Arterial Hypertension and Stroke. 1st ed. Pune, India: Armed Force Medical College; 2009: 1216-1220.
4. The Seventh Report of the joint National Committee on Prevention, detection, evaluation, treatment of high blood pressure, 2004 Available at www.nhlbi.nih.gov/files/docs/guidelines/jnc7full.pdf. Accessed 15 June 2016.
5. Gupta R. Trends in hypertension, epidemiological metanalysis of prevalence rates and blood pressure. J Hum Hypertens. 2004;18(2):73-8.
6. Kadu AV, Mane SS, Ladke RN, Vedpathak VL, Gaikwad AE, Choudhari SG. Prevalence of hypertension in the rural community of central Maharashtra, India. Int J Med Public Health. 2012;2(2):39-45.
7. Gupta M, Parashar P, Nath B, Basal R. An epidemiological study on hypertension and its dietary correlates in a rural population of Meerut. J Community Health. 2012;24:161-5.
8. Srinivas S, Satyavaraprasad K, Ramdas, Krishna CP, Rao RP. Prevalence of Prehypertension in adult population of rural Andhra Pradesh. AJBPS. 2013;3(23):45-8.
9. Sharma AK, Gupta VP, Prakash H, Bhardwaj H, Gupta R. High prevalence of hypertension in the desert based rural population of Rajasthan. J Preventive Cardiol. 2010;7(2):1-6.

Cite this article as: Kharde AL, Phulambrikar RM, Deshpande JD, Mahavarkar VN, Kharde AA. Predictors of hypertension among rural people of western Maharashtra: a multivariate analysis. Int J Community Med Public Health 2019;6:3825-8.