Prevalence and correlates of hypertension in the rural community of Dakshina Kannada, Karnataka, India

Animesh Gupta[1], Krutarth Brahmbhatt[2], Prasanna Kumar Sharma[2], Annasaheb Basappa Halappanavar[1]

[1]Department of Community Medicine, Srinivas Institute of Medical Sciences and Research Center, Mangalore, Karnataka, India.
[2]Department of Community Medicine, AJ Institute of Medical Sciences and Research Center, Mangalore, Karnataka, India.
Correspondence to: Animesh Gupta, E-mail: animesh245@gmail.com

Abstract

Background: Hypertension is considered a chronic disorder of interest owing to its involvement in the generation of coronary heart disease, stroke, and other vascular complications. It is one of the major risk factors for cardiovascular mortality, which accounts for 20%–50% of all deaths and will be the prime cause of morbidity by 2020 in India.

Objective: To assess the prevalence of hypertension among adults aged 18–59 years residing at rural community of Dakshina Kannada and study the correlates of hypertension among adults.

Materials and Methods: A community-based cross-sectional study was carried out in the age group of 18–59 years to estimate the prevalence of hypertension and its risk factors among the residents of the rural community. A total of 710 study subjects were selected. A pretested questionnaire was used to collect data on sociodemographic profiles and dietary patterns. Anthropometric measurements were taken using the standard methodology. The blood pressure was assessed and classified using JNC 7 criteria

Result: The overall prevalence of hypertension among adults was 43.6%, and it was higher in female subjects. The maximum prevalence of hypertension was found among the age group of 50–59 years (male subjects, 60.2%, and female subjects, 65.4%). The study participants with diabetes showed 1.59 times higher risk than nondiabetic participants.

Conclusion: The rates of hypertension in the rural community under study are similar to those seen in high-income countries and in urban India. Hence, there is a need for primordial prevention efforts on large scale.

KEY WORDS: Hypertension, prevalence, adults, rural India

Introduction

The high prevalence of hypertension and its association in the risks of coronary artery disease, congestive heart failure, stroke, end stage renal disease, dementia, and blindness make it a public health challenge, globally.[1,2] Coronary heart disease (CHD) is estimated to be the most common cause of death, globally, by 2020.[3]

India is experiencing an epidemiological transition, and hypertension has emerged as a major threat to the health of the people. It is a significant public health problem in the both urban and rural areas of India. According to the WHO Statistics 2012, the prevalence of hypertension in India is 23% [urban (23.1%) and rural (22.6%) population].[4] According to the Office of Register General of India, the prevalence of hypertension is 25% and 10% in the urban and rural population, respectively.[5] The number of people with hypertension will rise from 118.2 million in 2000 to 213.5 million by 2025.[5] The prevalence of hypertension in India is estimated to be 10%–30.9%.[6] Hypertension is directly responsible for 42% of CHD deaths and 57% of all stroke deaths in India.[7]

The designing of primary and secondary prevention strategies of hypertension is significant and primarily based on the analysis of the occurrence and the risk factors of the condition in the both urban and rural population. Although several studies have been carried out among the general population in

Access this article online	
Website: http://www.ijmsph.com	Quick Response Code:
DOI: 10.5455/ijmsph.2016.0707201554	

India, very few studies have been conducted among the rural population. Hence, this field-based, cross-sectional study was undertaken.

Materials and Methods

Study Design and the Participants

A community-based, cross-sectional study was conducted among the adults aged 18–59 years residing in Panemangalore, Karnataka, India, which is a rural field practice area of AJ Institute of Medical Sciences to estimate the prevalence of hypertension and associated factors. It is situated around 27 km from the Institute and has adopted 15 different localities (areas). Of the 15 areas, six areas were randomly selected by lottery method. Stratified random sampling and probability proportionate to size technique was used to select the study subjects. Among the population of 3,961 from six areas, the sample size of 710 was selected.

Sample Size Calculation

The sample size was estimated as 710, by taking prevalence as 36.1%[8] and an allowable error of 10%. A total of 710 individuals gave written consent and participated in the study.

Ethical approval for the study was obtained from the institutional ethics committee.

Data Collection

This study was conducted for a period of 6 months from July 2013 to December 2013. A pretested semi-structured questionnaire in local language (Kannada) was used to collect data regarding sociodemographic characteristics (age, gender, religion, and socioeconomic status), dietary practices, and history regarding diagnosis and the treatment of hypertension through personal interviews during house-to-house visits. The first visit was followed by a second one if any nonresponsive participants were present. Anthropometric measurements (height, weight, waist circumference, and hip circumference) were taken. Standard operating procedure for blood pressure (BP) was followed as per JNC 7 guidelines.[9] BP was measured by the first author twice using same calibrated mercury sphygmomanometer in the sitting position with a gap of 15 min between the two readings. The average of the readings was noted. If the first two readings differed by more than 5 mm Hg, additional reading was taken, and an average of the three readings was noted.

Statistical Analysis

Data entry was done in Microsoft Excel version 7.0 and was analyzed by using SPSS software, version 16. Tests of significance such as Pearson's χ^2-test were used, and the statistical significance level was fixed at $p < 0.05$.

The following operational definitions were used in this study:

1. Hypertension was defined according to the seventh report of "Joint National Committee" for the detection and evaluation of BP or of already those diagnosed and taking antihypertensive medication.[9]
2. Obesity was defined as body mass index (BMI) ≥ 25 kg/m². [10]
3. Waist circumference cut off was fixed to 90 and 80 cm for male and female subjects, respectively.[11]
4. Current tobacco users were those who used any form of tobacco products at least once in the last 30 days. Among the nonusers, ex-users and never used were combined. Alcohol user was defined those who consumed any amount of alcohol in the last 30days.
5. Physical Exercise[9]
   i. Regular exercise: engagement in regular aerobic physical activity such as brisk walking at least 30 min/day, at least 5 days/week.
   ii. Some exercise: engagement in regular aerobic physical activity such as brisk walking only on some days of the week.
   iii. No exercise: no engagement in aerobic physical activity at all.

Dietary salt intake was calculated by estimating the amount of salt used for cooking and the use of extra salt that is added to the meal apart from what has been already added during cooking (includes table salt) and that consumed via of pickle and papad. Excess salt intake was considered as ≥ 5 g/day.

Result

In the first visit, 653 participants were examined, and 57 participants were not present at the time of first visit.

In the second visit, all the nonresponsive participants were examined. Table 1 shows the sociodemographic profile of the study population. Of the 710 study population, 38.9% were male and 61.1% female subjects. The majority of the participants belonged to the 50–59 years-age group [Table 2].

Gender-wise prevalence of hypertension among different age groups is shown in Table 3. The overall prevalence of hypertension in this study was 43.6%. One hundred and ninety (26.7%) study subjects were existing cases of hypertension, and 120 (16.9%) study subjects were diagnosed first time as showing hypertension during the study. The prevalence was more in female (44.0%) when compared with the male subjects (43.1%).

As the age increased, the prevalence of hypertension also increased in both the sexes, which was statistically significant ($p = 0.000$). The highest prevalence among male (37.3%) and female subjects (46.4%) were found among the age group of 50–59 years. The least prevalence was found in 3.8% subjects among the age group of 18–29 years.

Table 4 shows that, by logistic regression analysis, the risk of hypertension was 2.85 times higher among the age group older than 40 years when compared with younger than 40 years of age group and those with a family history of hypertension showed 1.29 times higher risk than those without a family history of hypertension. Excess salt consumption

Table 1: Sociodemographic characteristics of study population

Variables	Male (μ = 276), ? (%)	Female (μ = 434), ? (%)	Total (μ = 710), ? (%)
Age (years)			
18–29	41 (14.9)	65 (15)	106 (14.9)
30–39	52 (18.8)	106 (24.4)	158 (22.3)
40–49	65 (23.6)	110 (25.3)	175 (24.6)
50–59	118 (42.7)	153 (35.3)	271 (38.2)
Education			
Illiterate	54 (19.6)	118 (27.2)	172 (24.2)
Primary	90 (32.6)	137 (31.6)	227 (32)
Middle	53 (19.2)	98 (22.6)	151 (21.3)
Higher	47 (17.0)	63 (14.5)	110 (15.5)
PUC	13 (4.7)	4 (0.9)	17 (2.4)
Graduate and above	19 (6.9)	14 (3.2)	33 (4.6)
Occupation			
Unemployed	42 (15.2)	128 (29.5)	170 (23.9)
Employed	234 (84.8)	306 (70.5)	540 (76.1)

Table 2: Descriptive characteristics of study population

Variables	Range	Male (n = 276), mean ± SD	Female (n = 434), mean ± SD	Total (n = 710), mean ± SD
Age (years)	18–59	44.4 ± 11.5	42.6 ± 10.9	43.4 ± 11.2
BMI (kg/m²)	11.70–37.20	23.5 ± 3.96	23.9 ± 4.4	23.8 ± 4.2
Waist circumference(cm)	62–130	87.4 ± 10.7	86.4 ± 11.9	—
SBP (mm Hg)	90–190	126.0 ± 15.5	125.3 ± 14.3	125.6 ± 14.8
DBP (mm Hg)	60–106	81.1 ± 9.3	81.3 ± 9.0	81.2 ± 9.1

Table 3: Age- and sex-wise prevalence of hypertension

Age group (years)	Male				Female			
	Screened	Hypertension present			Screened	Hypertension present		
		Old, ? (%)	New, ? (%)	Total, ? (%)		Old, ? (%)	New, ? (%)	Total, ? (%)
18–29	41	0 (0)	6 (14.6)	6 (14.6)	65	0 (0)	7 (10.8)	7 (10.8)
30–39	52	7 (13.5)	12 (23.1)	19 (36.5)	106	11 (10.4)	23 (21.7)	34 (32.1)
40–49	65	17 (26.2)	6 (9.2)	23 (35.4)	110	26 (23.6)	24 (21.8)	50 (45.5)
50–59	118	53 (44.9)	18 (15.2)	71 (60.2)	153	76 (49.7)	24 (15.7)	100 (65.4)
Total	276	77 (27.9)	42 (15.2)	119 (43.1)	434	113 (26.0)	78 (18.0)	191 (44.0)

revealed 1.36 times higher risk in the development of hypertension. The study subjects with diabetes showed 1.59 times higher risk when compared with those without diabetes. Subjects with BMI more than 25 kg/m² showed 1.29 times higher risk of developing hypertension than those of BMI less than 25 kg/m².

Discussion

Using the JNC 7 criteria and the WHO definition of hypertension among the age group of 18–59 years, the prevalence of hypertension in this study was 43.6%. The prevalence among male and female subjects was 43.1% and 44.0%,

respectively. The highest prevalence of hypertension was seen in the age group of 50–59 years, with the prevalence of 60.2% in male subjects and 65.4% in female subjects. It was significantly associated with the increase in age and was slightly higher among female subjects. The risk of developing hypertension was higher by 1.36 times among excess salt consumption, 1.59 times among patients with diabetes, 2.35 times among alcohol consumption, 1.29 times among BMI more than 25 kg/m², and 1.12 times among increased waist circumference (obese).

The findings of the study are comparable with a study done by Bartwal et al.[12] in rural Haldwani, which gives a 41.7% prevalence of hypertension. In a study done by Rao et al.[13] and Vijayakumar et al.,[8] the prevalence of hypertension was

Table 4: Prevalence of risk factors of hypertension by logistic regression

Variables	Total	Normotensive	Hypertensive	Univariate OR (95%CI)	Adjusted OR (95%CI)
Age (years)					
<40	290	211	79	1	1
>41	420	189	231	3.264 (2.365–4.505)	2.858 (2.026–4.031)
Gender					
Male	276	157	119	1	1
Female	434	243	191	1.037 (0.765–1.406)	1.181 (0.828–1.684)
Family history of hypertension					
No	537	310	227	1	1
Yes	173	90	83	1.259 (0.893–1.776)	1.297 (0.899–1.871)
Excess salt intake					
No	389	240	149	1	1
Yes	321	160	161	1.621 (1.201–2.187)	1.369 (0.993–1.887)
Tobacco consumption					
No	629	360	269	1	1
Yes	81	40	41	1.372 (0.863–2.180)	0.972 (0.572–1.653)
Alcohol consumption					
No	686	391	295	1	1
Yes	24	9	15	2.209 (0.954–5.117)	2.351 (0.904–6.118)
Physical activity					
No	352	192	160	1	1
Some	264	160	104	0.780 (0.564–1.078)	0.776 (0.550–1.094)
Regular	94	48	46	1.150 (0.729–1.814)	1.206 (0.745–1.953)
BMI (kg/m^2)					
<25	451	267	184	1	1
>25	259	133	126	1.375 (1.011–1.870)	1.297 (0.906–1.857)
Waist circumference					
Nonobese	310	188	122	1	1
Obese	400	212	188	1.367 (1.012–1.846)	1.128 (0.781–1.629)
Diabetes					
No	562	340	222	1	1
Yes	148	40	88	2.246 (1.553–3.249)	1.597 (1.076–2.371)

43.3% and 36.1%, respectively, which was similar to the findings of this study. The prevalence of hypertension was significantly higher in female than that in male subjects, and similar findings were reported by Hazarika et al.[14] and Malhotra et al.[15] Hypertension was significantly associated with the increase in age and the highest among those aged older than 50 years in this study. The finding was found similar to the results obtained in the study done by Kadu et al.[16] and Yuvaraj et al.[17] The increase of BP with age is owing to atherosclerotic changes in the blood vessel. The risk of hypertension was high with family history of hypertension and increasing BMI, and similar findings were observed by Jajoo et al.,[18] Bansal et al.,[19] and Rajasekar et al.[20] Increased waist circumference (90 cm for male subjects and 80 cm for female subjects) was found to be significant risk factors for hypertension, and a similar observation was reported by Rao et al.[13] and Rajasekar et al.[20]

House-to-house visit for anthropometric and clinical examinations of the study subjects and blood investigation (blood sugar and lipid profiles) were the main strength of this study. The limitation of this study was the role of information bias, which cannot be ruled out for risk factors such as tobacco consumption, unhealthy diet, and physical activity.

Conclusion

Although it is a common belief that hypertension is a disease of affluence, still, this study showed significantly higher prevalence in the rural community of India. The rates of hypertension in the rural community under study are similar to those seen in high-income countries and in urban India. There is a need for primordial prevention efforts and strengthening

health education programs promoting awareness of hypertension on large scale. Hence, extensive and effective efforts directed toward raising the awareness level regarding lifestyle modifications among rural population would be helpful in reducing the burden of hypertension.

References

1. World Health Report 2002. *Reducing Risks, Promoting Healthy life*. Geneva: World Health Organization, 2002.
2. WHO. *Integrated Management of Cardiovascular Risk: Report of A Who Meeting*. Geneva: World Health Organization, 2002. pp. 9–12.
3. Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases. Part II. Variations in cardiovascular disease by specific ethnic groups and geographic regions and prevention strategies. Circulation 2001;104(23):2855–64.
4. World Health Organization. *World Health Statistics 2012*. Geneva: WHO, 2012. Available at: http://www.who.int/gho/publications/world_health_statistics/2012/en/ (last accessed on June 24, 2015)
5. Government of India. *Report on Causes of Deaths in India 2001–2003*. New Delhi, India: Office of the Registrar General of India, Ministry of Home Affairs, 2010.
6. Padmavati S. Prevention of heart disease in India in the 21st century: need for a concerted effort. Indian Heart J 2002;54(1):99–102.
7. Gupta R. Rethinking diseases of affluence; coronary heart disease in developing countries. South Asian J Prev Cardiol 2006;10(2):65–78.
8. Vijayakumar G, Arun R, Kutty VR. High prevalence of type 2 diabetes mellitus and other metabolic disorders in rural Central Kerala. J Assoc Physicians India 2009;57:563–7.
9. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW et al. The seventh report of the Joint National committee on prevention, detection, evaluation and treatment of high blood pressure: the JNC7 report. JAMA 2003;289(19):2560–72.
10. Ministry of Health and Family Welfare, India. *Consensus Guidelines for the Prevention and Management of Obesity and Metabolic Syndrome*. New Delhi, India: Ministry of Health and Family Welfare, 2008.
11. ICMR, National Institute of Nutrition. *A Manual on Dietary Guidelines for Indians*, 2nd edn. Hyderabad, India: ICMR, National Institute of Nutrition, 2011.
12. Bartwal J, Awasthi S, Rawat CMS, Singh RK. Prevalence of hypertension and its risk factors among individuals attending outpatient department of rural health training centre, Haldwani. Indian J Community Health 2014;26(1):76–81.
13. Rao CR, Kamath VG, Shetty A, Kamath A. High blood pressure prevalence and significant correlates: a quantitative analysis from coastal Karnataska, India. ISRN Prev Med 2012;2013:574973.
14. Hazarika NC, Narain K, Biswas D, Kalita HC, Mahanta J. Hypertension in the native rural population of Assam. Natl Med J India 2004;17(6):300–4.
15. Malhotra P, Kumari S, Kumar R, Jain S, Sharma BK. Prevalence and determinants of hypertension in an un-industrialised rural population of North India. J Hum Hypertens 1999;13(7):467–72.
16. Kadu VA, Mane SS, Lakde 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.
17. Yuvaraj BY, Nagendra Gowda MR, Umakantha AG. Prevalence, awareness, treatment, and control of hypertension in rural areas of Davanagere. Indian J Community Med 2010;35(1):138–41.
18. Jajoo UN, Kalantri SP, Gupta OP, Jain AP, Gupta K. The prevalence of hypertension in rural population around Sewagram. J Assoc Physicians India 1993;41(7):422–4.
19. Bansal SK, Saxena V, Kandpal SD, Gray WK, Walker RW, Goel D. The prevalence of hypertension and hypertension risk factors in a rural Indian community: a prospective door-to-door study. J Cardiovasc Dis Res 2012;3(2):117–23.
20. Rajasekar VD, Krishnagopal L, Mittal A, Singh Z, Purty AJ, Binu VS. Prevalence and risk factors for hypertension in a rural area of Tamil Nadu, South India. Indian J Med Specialties 2012;3(1):12–7.