Original Article

PREVALENCE AND CORRELATES OF HYPERTENSION AMONG ADULTS IN THE URBAN AREA OF JAMNAGAR, GUJARAT, INDIA

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Abstract

Introduction: Reliable information on the prevalence of hypertension is crucial in the development of health policies for the prevention, early diagnosis, and control of this condition. This study describes the prevalence of hypertension among the adult population in the urban area of Jamnagar, Gujarat, India, and identifies correlates associated with it.

Methods: This was a cross-sectional study conducted in the Patel colony area of Jamnagar Municipal Corporation. The study included 271 adults who reside in this area and who were 20 years old or older.

The subjects were evaluated through one-hour interviews at their homes. After each subject was interviewed, three consecutive blood pressure measurements were conducted. The data were analyzed by proportions, F-ratios, chi-square tests, odds ratios, and 95% confidence intervals.

Results: Sixty-five of the 271 people (24%) were found to have hypertension. Among the 65 people with hypertension, 54 (83.1%) were aware of their hypertension and were undergoing treatment for the condition. However, among the 54 people being treated, only 31 people (57.4%) had satisfactory control of their hypertension. A higher prevalence of hypertension was found among people who had a BMI greater than 25, were 40 years old or older, had a family history of hypertension, had a history of previous cerebrovascular or cardiovascular events, had diabetes, smoked, drank alcoholic beverages, and consumed excess salt. A comparatively higher prevalence was found among males, people whose diets were non-vegetarian, people with high saturated fat intake, and people who did not engage in physical exercise.

Conclusions: Despite treatment, most of the hypertensives had not achieved satisfactory control of blood pressure. Health education programs are needed to teach the public how to control the various risk factors associated with hypertension.

INTRODUCTION

High blood pressure (hypertension) is still largely ignored as a public health problem in most developing countries, and it is a major risk factor for myocardial infarction, stroke, heart failure, renal failure, and peripheral vascular disease. Hypertension is one of the most important modifiable risk factors for cardiovascular disease. It is commonly found among a significant percentage of people, and it is also one of the most frequent chronic conditions identified in medical consultations. The control of blood pressure is crucial for reducing the adverse outcomes that are associated with the risk factors mentioned above (1). However, hypertension can be asymptomatic; so many people with hypertension do not seek the help of a doctor. Therefore, the detection and control of hypertension is a major public health challenge both developed and developing countries. The prevalence of hypertension has increased worldwide, partially because of a more stringent definition of hypertension.

An epidemiological shift in the prevalence of hypertension in developing countries as compared to developed countries has been observed (2). India is a vast country with a heterogeneous and young population. In the past, the control and prevention of communicable diseases were emphasized, but, recently, attention has shifted to the control and prevention of non-communicable diseases, including stroke, hypertension, and coronary artery disease at the national level in view of the rising incidence of these diseases (3, 4). The prevalence of hypertension has increased by a factor of 30 among the urban population over a period of 55 years and by a factor of approximately 10 among the rural population over a period of 36 years (4). Various hypotheses have been proposed to explain these rising trends, and, among the hypotheses, the consequences of urbanization, such as changes in life style patterns, diet, and stress, has been implicated. The current urbanization rate in India is 35% as compared to 15% in the 1950s (5, 6). With growing urbanization, socio-developmental changes have taken

place over last 40-50 years. Dramatic changes in lifestyle from traditional to modern have led to physical inactivity due to technological advances. Rising affluence has modified the dietary pattern to include the increased consumption of diets rich in fat, sugar, and calories (6).

As the awareness of hypertension has increased, more people have begun treatment, and treatment methods have improved. Even so, there is still much work to be done. The lowering of blood pressure either by using anti-hypertensive medications or changing lifestyles significantly decreases cardiovascular mortality and morbidity, as well as hospitalizations and outpatient consultation costs (7). It has been convincingly shown that the treatment of hypertension reduces the risk of stroke, coronary heart disease, congestive heart failure, and mortality. Primary or essential hypertension is defined as hypertension without a secondary cause. In general, it is said that about 95% of patients who have hypertension have no obvious underlying cause, so they are classified as having essential hypertension (8). Many risk factors for hypertension have been identified. Reliable information on the prevalence of hypertension is crucial for the development of health policies for the prevention, control, and early diagnosis of this condition.

This study describes the prevalence of hypertension among adults who are 20 years old and older, and it identifies the covariates associated with hypertension in a selected urban area in Jamnagar, Gujarat.

MATERIALS AND METHODS

Jamnagar district is in the coastal region of Gujarat state in the westernmost part of India. According to the 2001 census, the total population of Jamnagar district was 1,913,685, of which the urban population was 585,691 (30.6%), and the rural population was 1,327,994 (69.4%). The Corporation area covers 26.9 kilometers. The population of Jamnagar city is 585,691. The study was approved by the Ethics Committee of M.P. Shah Medical College, Jamnagar, Gujarat. A cross-sectional survey of a random sample of the population aged 20 years old and older in an urban setting of the Municipal Corporation area of Jamnagar was conducted from March 2007 to September 2007. The sample size of 246 was calculated by using Epi-Info software, Version 3.3.2, assuming an expected prevalence of hypertension among the urban population in India of 9.7% (1, 6) and the worst acceptable prevalence of 6%, and a confidence level of 95%. Assuming that 10% of the people selected would not complete the questionnaire, we selected a sample size of 271 people.

There are 17 wards in the Jamnagar Municipal Corporation area. Ward no. 3 (Patel colony) was selected, because it is one of the urban field practice areas of the Department of PSM at M.P. Shah Medical College, Jamnagar. From the updated voter list of Ward no. 3, all the members who were permanent residents and were 20 years old or older were selected. By using the systematic random sampling method, a list of 271 members with their names and addresses was prepared. These 271 people were given a pre-tested, semi-structured questionnaire. The necessary data were collected after obtaining informed consent. Each participant was evaluated during a one-

hour visit in her or his home. Most of the home visit was devoted to conducting an interview focused on health conditions and associated risk factors. At the end of the interview, the participant's blood pressure was measured three times. These measurements were taken with the participant in the sitting position after five minutes of rest.

A standard mercury sphygmomanometer was used to measure blood pressure. The cuff was placed on the participant's right arm and inflated in increments of 10 mmHg until the cuff pressure was 30 mmHg above the level at which the radial pulse was no longer detectable. Three blood pressure measurements were obtained with a 60-second interval between each cuff inflation. Hypertension was diagnosed when the systolic blood pressure was 140 mmHg or more and the diastolic blood pressure was 90 mmHg or more, according to the criteria of the 7th Joint National Committee Report (8). For assessing physical activity, a person is considered to have a sedentary behavior if he or she walks less than 14.5 km a week (8). Body mass index (BMI) was calculated as weight in kilograms divided by the square of the person's height in meters. Obesity was defined as a BMI of greater than 27 kg/m2, and overweight was defined as a BMI of greater than 25 kg/m2 (8). The smoking habit was stratified according to the number of cigarettes smoked per day and the duration of smoking. Dietary data were collected through interviews regarding the type of food the person eats (vegetarian or non-vegetarian).The data were analyzed by Proportions, F-ratios, Chi-square tests, Odds ratios, and 95% confidence intervals using statistical software Epi-Info, Version 3.3.2.

RESULTS

Overall, 24% of the people in the sample group had hypertension. The majority of the subjects were in the age range of 30-39 years old (32.1%). The proportion the subjects with hypertension was found to steadily increase with age, with highest proportion (60%) occurring among subjects who were 70 years old and older (Table1, 2).

Table 1: Age and sex distribution

Age group (years)	Gender		
	Male (%)	Female (%)	Total (%)
20-29	27 (17.6)	12 (10.2)	39 (14.4)
30-39	44 (28.8)	43 (36.6)	87 (32.1)
40-49	47 (30.7)	22 (18.6)	69 (25.5)
50-59	13 (8.5)	27 (22.9)	40 (14.8)
60-69	15 (9.8)	11 (9.4)	26 (9.6)
≥70	7 (4.6)	3 (2.5)	10 (3.6)
Total	153 (56.5)	118 (43.5)	271

In males, the proportion of hypertension was slightly higher than it was for females.

According to table 3, the highest prevalence of hypertension was found among subjects in business occupations (38.1%), followed by skilled and semi-skilled workers (33.3%), and professionals (27%). It was found that, out of 65 hypertensives, 54 (83.1%) were aware of their hypertension; all of those who were aware were undergoing treatment, but among those being treated, only 31 (57.4%) had satisfactory control of their hypertension.

The mean systolic and diastolic blood pressures were found to steadily increase with age, to be higher in males, and to be

higher in those employed by businesses. The differences were statistically significant.

Table 2: Hypertension by age, sex and occupation

	Yes (%)	No (%)	Total (%)
Age group (years)			
20-29	0 (0)	39 (100)	39 (100)
30-39	4 (4.6)	83 (95.4)	87 (100)
40-49	26 (37.7)	43 (62.3)	69 (100)
50-59	17 (42.5)	23 (57.5)	40 (100)
60-69	12 (46.1)	24 (53.9)	26 (100)
≥70	6 (60.0)	4 (40.0)	10 (100)
Gender			
Male	39 (25.5)	114 (74.5)	153(100)
Female	26 (22.0)	92 (78.0)	118(100)
Occupation			
Professional	7 (27.0)	19 (73.0)	26 (100)
Business	16 (38.1)	26 (61.9)	42 (100)
Employee	6 (18.7)	26 (81.3)	32 (100)
Skilled or semiskilled	12 (33.3)	24 (66.7)	36 (100)
Housewife	18 (17.8)	83 (82.2)	101(100)
Student	5 (20.8)	19 (79.2)	24(100)
Unemployed	2 (20.0)	8 (80.0)	10(100)

Table 3: Mean blood pressure by age, sex & occupation

	Number of individuals	Mean BP (mmhg±SD)	
		Systolic	Diastolic
Age group (years)			
20-29	39	120.3±4.5	81.4±4.4
30-39	87	122.5±5.6	81.9±4.0
40-49	69	124.3±6.6	83.7±7.7
50-59	40	127.3±8.6	84.2±6.5
60-69	26	131.3±13.4	86.8±6.9
≥70	10	130.7±10.3	87.2±7.3
Gender			
Male	153	128±8.4	83.7±5.7
Female	118	123±8.4	81.5±5.6
Occupation			
Professional	26	127.4±10.5	82.5±5.6
Business	42	129.3±12.7	84.6±8.7
Employee	32	126.8±7.2	84.3±4.2
Skilled or semiskilled	36	128.5±5.9	83.9±5.3
Housewife	101	123.4±8.5	81.6±5.6
Student	24	122.9±6.2	82.7±3.1
Unemployed	10	121.6±4.8	81.7±6.2
Total	271	125.6±8.6	82.7±2.3
F-ratio (P<0.001)		**18.07**	**18.54**

A significantly higher proportion of hypertension was found with many of the proven risk factors, such as age (more than 40 years), BMI more than 25, family history of hypertension, history of previous cerebrovascular or cardiovascular events, diabetes, smoking, alcohol intake, and excess salt intake (Table 4).

A comparatively higher prevalence was found among males, those with a non-vegetarian diet, high saturated fat intake, and a lack of physical exercise.

Table 4: Prevalence of hypertension by various risk factors

Risk Factor	Number of individuals	Number of hypertensives	Odds Ratio (95% CI)
Age>40 yrs.	82	49	8.2 P<0.001
Male	153	51	2.29 P<0.01
BMI>25	83	39	4.1 P<0.001
Positive family history	146	61	5.9 P<0.001
History of previous events	10	4	10.1 P<0.001
Diabetes mellitus	97	42	6.9 P<0.001
Non-veg. diet	43	8	1.2 P<0.01
Smoking	35	823	4.8 P<0.001
Alcohol intake	11	5	5.1 P<0.001
No regular exercise	206	42	2.4 P<0.01
Saturated fat intake	143	35	2.1 P<0.01
Excess salt intake	111	47	4.5 P<0.001

DISCUSSION

The present study found the prevalence of hypertension among the study group to be 24%. Comparable results have been reported in other studies (7, 9, and 10). A lower prevalence was reported in some studies (1, 6, 13), while a few studies reported a higher prevalence (14, 15). However differential rates are due to different cut-off points in determining the level of hypertension and

also to the differing age groups constituting the study population. The current study revealed that 54 (83.1%) of the subjects were aware of their hypertension, that all those who were aware were being treated, and that, among those being treated, only 31 (57.4%) had satisfactory control of their hypertension. Similar findings were also reported in other studies (10, 13, and 15). In the present study, the prevalence of hypertension was found to steadily increase with age, and the mean blood pressure levels were also significantly higher in higher age groups. Similar observations were found in other studies (7, 11, 12, 13, and 14). Age-related increase of hypertension is a common, but not a universal, phenomenon. This is predominantly influenced by environmental factors since certain non-migrant or tribal people, who have primitive lifestyles, do not develop an age-related increase in the prevalence of hypertension (16, 17, and 18).

The current study also revealed a higher proportion of hypertension with many of the proven risk factors, such as age (more than 40 years), BMI greater than 25, family history of hypertension, history of previous cerebrovascular or cardiovascular events, diabetes, smoking, alcohol intake, and excess salt intake. It was found in East Delhi (9) that 44.8% of adults exercise regularly and a relatively lower prevalence of hypertension was found among them. In the genetically homogeneous caste population in Andhra Pradesh (12), it was found that urban residence and alcohol intake and age in men and obesity in women were important correlates of hypertension.

The current study found a lower proportion of hypertension among those with saturated fat intake and lack of physical exercise. This could be explained by the fact that almost all

hypertensives had changed their dietary practices and lifestyle. Progressive urbanization, lifestyle modification, and sedentary habits are probably some of the important factors considered to be responsible for the higher prevalence of hypertension.

CONCLUSION

Those modifiable factors identified to be associated with prevalence and awareness could be used in educational programs aimed at the detection and treatment of those who are unaware of their condition. This is especially important because hypertension is a major modifiable risk factor for cardiovascular and kidney diseases. A public health strategy that includes primary prevention via changes in the lifestyles of the general population, such as weight reduction, restriction of smoking, increased physical activity, proper treatment for diabetes mellitus, and the restriction of saturated fats and dietary sodium, would result in a lower prevalence of hypertension. But still, the possibility of behavior changes should definitely be considered in their social context.

REFERENCES

1. Joshi SV, Patel JC and Dhar HL. Prevalence of hypertension in Mumbai. Indian Journal of Medical Sciences. 2000; 54 (9): 380-383.

2. Nissien A, Bothig S, Grenroth H, Lopez AD. Hypertension in developing countries. World Health Stat Q. 1988;41: 141–154.

3. Reddy KS. Hypertension control in developing countries: generic issues. J Hum Hypertension. 1996;10: S33–38.

4. Hypertension study group. Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India: a multicentre study. Bull World Health Organ. 2001;79: 490–500.

5. Gupta R. Meta analysis of prevalence of hypertension in India. Indian Heart Journal. 1997;49: 43–48.

6. Shyamal Kumar Das, Kalyan Sanyal, and Arindam Basu. Study of urban community survey in India: growing trend of prevalence of hypertension in a developing country. Int J Med Sci. 2005; 2(2): 70–78.

7. Hazarika NC, Biswas D, Narain K, Kavita HC and Mahanta J. Hypertension and its risk factors in tea garden workers of Assam. National Medical Journal of India. 2002; 15 (2): 63-68.

8. Chobanion AV, Bakris GL, Black HR. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure- The JNC 7 report. JAMA. 2003 ;289:2560-2572

9. Bhasin SK, Chaturvedi S, Gupta P and Aggarwal P. Status of physical exercise and its association with obesity and hypertension in two urban assembly constituencies of East Delhi. Journal of Indian Medical Association. 2001; 99 (11): 631-633.

10. Kalavanthy MC, Thankappan KR, Sharma PS and Vasan RS. Prevalence, awareness, treatment and control of hypertension in an elderly community based sample in Kerala, India. National Medical Journal of India. 2000; 13 (1): 9-15.

11. Kasuma YS, Babu BV and Naidu JM. Group and sex effects of age, body composition and pulse rate on blood pressure variability in some cross cultural populations of Visakhpatnam district, South India. Journal of Cardiovascualr Risk. 2001; 8 (6): 337-347.

12. Nirmala A. Age variation in blood pressure: effect of sex and urbanization in a genetically homogeneous caste population of Andhra Pradesh. American Journal of Human Biology. 2001; 13 (6): 744-752.

13. Reddy SS and Prabhu GR. Prevalence and risk factors of hypertension in Adults in an urban slum, Tirupati, A.P. Indian Journal of Community Medicine. 2005; 30 (3): 84-86.

14. Shanthirani CS, Pradeepa R, Deepa R, Premalatha G, Saroja R, Mohan V. Prevalence and risk factors of hypertension in a selected South Indian Population- the Chennai Urban Population study. Journal of Associated Physician of India. 2003; 51: 20–27.

15. Hypertension study group. Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India: a multicentre study. Bull World Health Organ. 2001; 79: 490–500.

16. Whelton PK. Epidemiology of hypertension. Lancet. 1994;344: 101–106.

17. Roberts J, Maurer K. Blood pressure levels of persons 6-74 years, United States, 1971-74. Vital and health statistics series 11, no-203. DHEW Publ No (HRA) 78-1648. Washington DC: US Government printing office; 1977.

18. Dash SC, Swain PK, Sunderam KR, Malhotra KK. Hypertension epidemiology in an Indian Tribal population. Journal of Associated Physician Of India. 1986;34: 567–570.