

Hypertension among adults in urban slums, a cross-sectional study in rajamahendravaram, Andhra Pradesh, India

Lavanya K.M¹, Renu Sulakhe^{2*}, V.Nageswara Rao³

^{1,2}Associate Professor, ³Professor, ^{1,2}Dept. of Community Medicine, ³Dept. of Orthopedics, GSL Medical College and General Hospital, Rajahmundry, Andhra Pradesh, India

*Corresponding Author: Renu Sulakhe

Email: renugollapalli@gmail.com

Abstract

Introduction: Hypertension is becoming an increasingly common health problem worldwide. Hypertension is becoming a public health emergency worldwide, especially in developing countries.

Aims and Objectives: To estimate the prevalence of hypertension among adults aged 20 years and above in the urban slums of Rajamahendravaram and to determine the risk factors associated with it.

Materials and Methods: Community based Cross-sectional study conducted among adults in urban slums of Rajamahendravaram for six months from July 2018 to December 2018.

Results: The study included 158 (47.9%) Males and 172(52.1%) Females. The prevalence of hypertension is 96(29.09%) with higher prevalence among women 51 (29.65%) than in men 45(28.48%). Hypertension was most commonly seen in the age group of 40 – 49 years (55.17%) with statistically significant association between hypertension and increasing age (p=0.000). Hypertension was common in people of lower middle class (48%, p=0.0005). Also, people who used palm oil (100%, p=0.0000), common salt >1000 g/month (69.23%, p=0.000), Tobacco users (45.07%, p=0.000), diabetics (41%,p=0.000), obese (59.38%, p=0.000) and people with abdominal obesity (37.20%, p=0.001) showed higher prevalence of hypertension.

Conclusions: The observed high prevalence of hypertension in this study and other studies reiterate the importance of hypertension as a public health problem. It's time to emphasize strict implementation of comprehensive national policy to control hypertension.

Keywords: Cross – sectional study, Hypertension, India, Prevalence, Urban slums.

Introduction

Hypertension is becoming an increasingly common health problem worldwide because of increasing longevity and a higher prevalence of contributing factors, such as obesity, physical inactivity and an unhealthy diet.^{1,2} Developing countries are going through demographic transition with increase in life-expectancy together with epidemiological transition where the infectious diseases have come down while chronic and non-communicable diseases such as Hypertension, Diabetes mellitus, Coronary Heart Diseases and Cancers are coming up and reaching epidemic proportions due to urbanization and changing lifestyles.

Hypertension is becoming a public health emergency worldwide, especially in developing countries, where studies projected an increase by 80% in the number of hypertensives by the year 2025.³ Worldwide hypertension is estimated to cause 7.1 million premature deaths and 4.5% of the disease burden.⁴ Mortality rate per 100,000 persons due to high blood pressure varies from country to country. It is reported that the mortality rate due to hypertension was 15.9 per 100,000 persons in the United States in 2000 and 4.5 in 2002 in Japan. The mortality rate due to high blood pressure in Korea increased slightly, from 10.6 to 11.0 per 100,000 persons, between 2002 and 2007.⁵

Currently, the prevalence of hypertension in many developing countries, particularly in urban areas, is as high as those seen in developed countries.⁶⁻⁹

Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India.¹⁰ Hypertension is a controllable disease and a small

decline of 2mmHg population-wide in BP can prevent 151,000 stroke cases. The prevalence of hypertension has increased by 30 times among the urban population over a period of 55 years and about 10 times among the rural population over a period of 36 years.¹¹

The prevalence of hypertension in India is reported as ranging from 10 to 30.9%.¹² The average prevalence of hypertension in India is 25% in urban and 10% in rural inhabitants.¹³ Recently, a study conducted among labour population of Gujarat reported prevalence of hypertension to be 16.9% as per WHO criteria.¹⁴ Studies carried out in slums have also reported the prevalence of hypertension as high as 14 to 26%.¹⁵⁻¹⁷

In view of the above facts, the present study has been carried out to determine the prevalence of hypertension and factors associated with it in urban slums of Rajamahendravaram, Andhra Pradesh.

Aims and Objectives

1. To estimate the prevalence of hypertension among adults aged 20 years and above in the urban slums of Rajamahendravaram.
2. To determine the risk factors associated with it

Materials and Methods

It is a Community based Cross-sectional study conducted in urban slums of Rajamahendravaram, Andhra Pradesh. Three slums (Sharadanagar, Andhranagar and Ambedkarnagar) were randomly selected. Sample size was calculated by $4pq/L^2$ which comes to 330 (p=25% and L=5), including

10% non-response rate. Each slum has 200 to 220 households with an average family size of five, making a population of about one thousand. Starting from the urban health centre in the direction of east, every second house was systematically chosen to include 110 individuals from each of the three slums. All adults aged 20 years and above, available at the time of visit and consented to participate in the study were included. People with self-reports of physician diagnosis of hypertension and self-reports of antihypertensive drug intake were also deemed to be hypertensives. Pregnant females, disabled subjects and acutely ill subjects were excluded. All the participants were informed about the purpose of the study and consent was taken with their voluntary will to participate. The study was carried out for six months from July 2018 to December 2018.

Ethical Clearance

The study protocol was presented before the ethical committee of GSL Medical college, Rajamahendravaram, Andhra Pradesh. After obtaining the ethical clearance from the ethical review board of the institution, the study was conducted.

Data Collection

A detailed questionnaire incorporating demographic profile, socioeconomic data, relevant history and symptoms was used to collect data by face to face interview. Data was collected from 330 adult individuals Blood pressure was recorded in sitting position according to standard guidelines. A mercury sphygmomanometer was used. Average of the three readings five minutes apart was taken. If any-one reading was abnormal, one another reading was taken after ten minutes of rest. SBP and DBP was measured as appearance (phase I) and disappearance (phase V) of Korotkoff sound, respectively.

Anthropometric Measurements

Weight was recorded in Kilograms using a Weighing machine and Height was recorded in centimeters to the nearest 0.1 cm using the height measuring rod. The Body mass index (BMI) was calculated by weight (kg)/ height² (m). Waist circumference was measured midway between iliac crest and lowermost margin of ribs to the nearest 0.1 cm using a reinforced fiber elastic tape.

Definitions

Obesity guidelines based on Western populations markedly underestimate the risk among all Asians because Asians

have greater body fat at a given BMI. For BMI and abdominal obesity cutoff ranges, we referred to consensus guidelines for Asian Indians. A BMI of 20-22.99 is taken as Normal, 23-29.99 as Overweight and ≥ 30 as Obese for both males and females.¹⁸ Central (Abdominal) Obesity is defined as waist circumference above 102 cm in males and above 88 cm in females in Western population. Lower waist circumference cut point (eg, ≥ 90 cm [35 inches] in men and ≥ 80 cm [31 inches] in women) appears to be appropriate for Asian Americans/Indians.¹⁹ Modified Kuppaswamy classification is used for socioeconomic status classification.

Table 1: Definition of hypertension (Based on JNC-VII criteria).²⁰

Stage	Systolic B.P	Diastolic B.P
Normal	< 120	< 80
Pre-Hypertensives	120 - 139	80 - 89
Hypertension Stage-1	140 - 159	90 - 99
Hypertension Stage-2	≥ 160	≥ 100

The participants with history of hypertension and on antihypertensive drugs were also labeled as hypertensives.

Statistical Analysis

Data was entered into an excel spreadsheet and double checked for errors. Analyzed using Epi-info version 3.5.3. Pearson's chi-square test was applied to test the relationship of categorized independent and dependent variables. Independent 't' test was used to analyze continuous variables. A p value (significance) of < 0.05 is deemed statistically significant. A significance of 0.000 should be read as $P < 0.0001$ (very highly significant).

Results

The study included 158(47.9%) Males and 172(52.1%) Females. The prevalence of hypertension is 96(29.09%) with higher prevalence among women 51(29.65%) than in men 45(28.48%). Hypertension was most commonly seen in the age group of 40-49 years (55.17%) with statistically significant association between hypertension and increasing age ($p=0.000$). Hypertension was common in people of lower middle class (48%, $p=0.0005$). Also, people who used palm oil (100%, $p=0.0000$), common salt >1000 g/month (69.23%, $p=0.000$), Tobacco users (45.07%, $p=0.000$), diabetics (41%, $p=0.000$), obese (59.38%, $p=0.000$) and people with abdominal obesity (37.20%, $p=0.001$) showed higher prevalence of hypertension.

Table 1: Socio-Demographic profile of the study population

Factor	Number (n = 330)	Percentage
Sex		
Males	158	47.9
Females	172	52.1
Age distribution		
20-29 years	76	23.0
30-39 years	84	25.5

40-49 years	58	17.6
50-64 years	69	20.9
>64 years	43	13.0
Socioeconomic status		
Upper middle	100	30.3
Lower middle	75	22.7
Upper lower	73	22.2
Lower	82	24.8
Type of family		
Nuclear	136	41.2
Joint	52	15.8
Three generation	142	43.0
Literacy status		
Literates	254	77.0
Illiterates	76	23.0
Occupation		
Professional	0	0
Semiprofessional	44	13.3
Clerical/Shop Owner	49	14.8
Skilled worker	48	14.6
Semi-skilled worker	52	15.8
Unskilled worker	42	12.7
Unemployed	95	28.8

Table 2: Factors affecting Hypertension

Factor	Hypertensives (n=96)	Non-Hypertensives (n=234)	Chi square value	p value
Sex				
Males	45 (28.48)	113 (71.52)	0.054	0.8151
Females	51 (29.65)	121 (70.35)		
Age in years			28.35	0.00001
20-29	12 (15.79)	64 (84.21)		
30-39	19 (22.62)	65 (77.38)		
40-49	32 (55.17)	26 (44.83)		
50-64	18 (26.09)	51 (73.91)		
>64	15 (34.88)	28 (65.12)		
Socio-economic status			17.68	0.0005
Upper middle	23 (23.00)	77 (77.00)		
Lower middle	36 (48.00)	39 (52.00)		
Upper lower	20 (27.40)	53 (72.60)		
Lower	17 (20.73)	65 (79.27)		
Type of cooking oil			72.6	0.0000
Groundnut oil	28 (37.33)	47 (62.67)		
Sunflower oil	43 (23.00)	144 (77.00)		
Palm oil	22 (100.0)	00 (00.0)		
Mustard oil	00 (0)	30 (100.0)		
Others	03 (18.75)	13 (81.25)		
Common salt (grams/month)			101.6	0.0000
< 150	09 (09.68)	84 (90.32)		
150-250	14(11.48)	108 (88.52)		
250-500	37 (61.67)	23 (38.33)		
500-1000	27 (64.29)	15 (35.71)		
>1000	09 (69.23)	04 (30.77)		
Tobacco use			30.85	0.0000
Yes	64 (45.07)	78 (54.93)		
No	32 (17.02)	156 (82.98)		

HTN with DM				
Diabetic	57 (41.00)	82 (59.00)	16.53	0.00002
Non-diabetic	39 (20.42)	152 (79.58)		
Obesity				
Normal	23 (12.17)	166 (87.83)	97.92	0.00000
Overweight	19 (27.94)	49 (72.06)		
Obesity I	27 (71.05)	11 (28.95)		
Obesity II	21 (77.78)	06 (22.22)		
Obesity III	06 (75.00)	02 (25.00)		
Abdominal obesity				
Present	61 (37.20)	103(62.80)	10.38	0.001
Absent	35(21.08)	131 (78.92)		

Discussion

The prevalence of hypertension is 96 (29.09%) with higher prevalence among women 51(29.65%) than in men 45 (28.48%). Hypertension was most commonly seen in the age group of 40 – 49 years (55.17%) with statistically significant association between hypertension and increasing age ($p=0.000$). Hypertension was common in people of lower middle class (48%, $p=0.0005$). Also, people who used palm oil (100%, $p=0.0000$), common salt >1000 g/month (69.23%, $p=0.000$), Tobacco users (45.07%, $p=0.000$), diabetics (41%, $p=0.000$), obese (59.38%, $p=0.000$) and people with abdominal obesity (37.20%, $p=0.001$) showed higher prevalence of hypertension. It is well known that increased BMI raises the risk of hypertension.²¹⁻²⁵ This study also demonstrated that higher BMI was related to higher risk of hypertension significantly. Overweight was an important risk factor, accounting for 11-25% Population Attributable Risk in the human population.^{8,9,26-28} Hypertension was more common in subjects with higher salt intake similar to a study of NHANES III data which showed that subjects in the higher quartile of sodium intake were more likely to have a higher DBP.²⁹ Similar results were found in a study by Shyamal Kumar Das et al,³⁰ which showed pre-hypertensive levels of blood pressures among 35.8% of the participants in systolic group (120-139mm of Hg) and 47.7% in diastolic group (80-89 mm of Hg). Systolic hypertension (140 mm of Hg) was present in 40.9% and diastolic hypertension (90 mm of Hg) in 29.3% of the participants. Age and sex-specific prevalence of hypertension showed progressive rise of systolic and diastolic hypertension in women when compared to men. Men showed progressive rise in systolic hypertension beyond fifth decade of life. Bivariate analysis showed significant relationship of hypertension with age, sedentary occupation, body mass index (BMI), diet, ischemic heart disease, and smoking. Multivariate analysis revealed age and BMI as risk factors, and non-vegetarian diet as protective factor with respect to hypertension..

In a study by Supriya Dwivedi et al,³¹ among 423 adults recruited, 48.2% and 51.7% were males and females, respectively, and 76.4% and 23.6%, respectively, were in the age group 18-45 and 46-59 years. The overall prevalence of hypertension was 25.3%. The prevalence was higher (27.9%) in males than females (22.8%) and also in

the age group 46-59 years (43.0%) as compared to years (19.8%). The prevalence of Stage I and Stage II hypertension, respectively, was 16.1% and 9.2%.³¹ The Studies carried out in different parts of the country have also reported the prevalence of hypertension around 20%. A study carried out by Dhikale PT et al,³² in an urban slum of Mumbai reported the prevalence of hypertension among ≥ 18 years population ($n=1089$) as 23.59%.

Similarly, a community-based study conducted by Ismail IM et al,³³ in 2016 in south India among urban and rural population covering 600 adults showed an overall prevalence of hypertension as 21.0% with 23.7% and 18.3% in urban and rural population, respectively. A study carried out by Premkumar R et al,³⁴ in 2016 among 556 rural adult population of central India also reported the overall prevalence of hypertension as 21.6%. A cross-sectional study conducted Panesar S et al,³⁵ among 310 residents (aged 20-59 years)of a slum resettlement colony in Delhi reported the overall prevalence of hypertension as 17.4%. However, as per National Family Health Survey (NFHS) 4 carried out during 2015-16 by Ministry of Health and Family Welfare, Government of India, the prevalence of hypertension in the country was reported as 13.6% and 10.8% among men and women aged 15-45 years of age, respectively.³⁶

Conclusions

The observed high prevalence of hypertension in this study and other studies reiterate the importance of hypertension as a public health problem, despite the efforts made so far. More studies may be conducted to identify the factors associated with hypertension. It's time to emphasize strict implementation of comprehensive national policy to control hypertension in India and in other similar developing countries, which contribute maximum to the burden of disease globally. Health education to the people through the workers at grass root level, such as ASHA and USHA may have great impact in reducing/preventing the burden of hypertension.

Acknowledgements

The authors acknowledge the people in the community for their kind co-operation. Also we acknowledge the editor and publishers of the journal.

Source of Funding: None.

Conflict of Interest: None.

References

- Singh RB, Suh IL, Singh VP, Chaithiraphan S, Laothavorn P, Sy RG, Babilonia NA, Rahman AR, Sheikh S, Tomlinson B, Sarraf-Zadigan N. Hypertension and stroke in Asia: prevalence, control and strategies in developing countries for prevention. *J Hum Hypertens* 2000;14:749–763. [PubMed]
- Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases: part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. *Circ* 2001;104:2746–2753. [PubMed]
- Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet* 2005;365:217–23.
- Whitworth JA. World Health Organization, International Society of Hypertension Writing Group. 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension. *J Hypertens* 2003;21:1983–1992. [PubMed]
- Death cause statistical data. KOSIS [Internet] 2009. [cited 2009, 6 May]. Available from: www.kosis.kr/OLAP/Analysis/stat_olap.
- Khor GL. Cardiovascular epidemiology in the Asia-Pacific region. *Asia Pac J Clin Nutr* 2001;10:76–80. [PubMed]
- Vorster HH. The emergence of cardiovascular disease during urbanisation of Africans. *Public Health Nutr* 2002;5:239–43. [PubMed]
- Wu Y, Huxley R, Li L, Anna V, Xie G, Yao C, Woodward M, Li X, Chalmers J, Gao R, Kong L, Yang X. China NNHS Steering Committee; China NNHS Working Group. Prevalence, awareness, treatment, and control of hypertension in China: data from the China National Nutrition and Health Survey 2002. *Circ* 2008;118:2679–2686. [PubMed]
- Geleijnse JM, Kok FJ, Grobbee DE. Impact of dietary and lifestyle factors on the prevalence of hypertension in Western populations. *Eur J Public Health* 2004;14:235–39. [PubMed]
- Rodgers A, Lawes C, MacMahon S. Reducing the global burden of blood pressure related cardiovascular disease. *J Hypertens* 2000;18(1):S3–S6.
- Gupta R. Meta-analysis of prevalence of hypertension in India. *Indian Heart J* 1997;49:43–48
- Padmavati S. A meta-analysis-National Heart Institute, New Delhi. *Ind Heart J* 2002;54:99–102
- Gupta R. Trends in hypertension epidemiology in India. *J Human Hyperten* 2004;18:73–8
- Tiwari RR. Hypertension and epidemiological factors among tribal labour population in Gujarat. *Indian J Public Health* 2008;52(3):144–6
- Ahmad S. Prevalence and risk factors of hypertension, among adults residing in an urban area of North India. *Int J Pure Appl Biosci* 2015;3(2):338–44.
- Bendhari ML, Karode RS, Haralkar SJ. Study of prevalence and risk factors of hypertension in adults in an urban slum area of Western Maharashtra, India. *Int J Community Med Public Health* 2016;3(10):2812–6.
- Das OP, Naik VA, Narasannavar AB, Sah RK. Prevalence of hypertension among adults residing in urban slums of Ramnagar, Belgaum City-A Cross-Sectional Study. *IOSR J Dent Med Sci* 2014;13(5):102–4.
- World Health Organization (WHO 2000). Obesity: Preventing managing the global epidemic, WHO Technical Report Series 894, Report of a WHO Expert Committee, WHO, Geneva.
- International Diabetes Federation. Worldwide definition of the metabolic syndrome. Available at: http://www.idf.org/webdata/docs/IDFMetasynndrome_definition.pdf
- The Joint National Committee (JNC II) on Prevention, Detection, Evaluation and Treatment of high blood pressure (1997); The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of high blood pressure. *Ach Intern Med* 157:2413–46.
- Ruixing Y, Shangling P, Shuquan L, Dezhai Y, Weixiong L, Qiming F et al, Comparison of hypertension and its risk factors between the Guangxi Bai Ku Yao and Han populations. *Blood Press* 2008;17:306–316. [PubMed]
- Mellen PB, Gao SK, Vitolins MZ, Goff DC., Jr Deteriorating dietary habits among adults with hypertension: DASH dietary concordance, NHANES 1988-1994 and 1999-2004. *Arch Intern Med* 2008;168:308–314. [PubMed]
- Lin SJ, Lee KT, Lin KC, Cheng KH, Tsai WC, Sheu SH et al, Prevalence of prehypertension and associated risk factors in a rural Taiwanese adult population. *Int J Cardiol* 2010;144:269–73. [PubMed]
- Schröder H, Schmelz E, Marrugat J. Relationship between diet and blood pressure in a representative Mediterranean population. *Eur J Nutr* 2002;41:161–7. [PubMed]
- Yadav S, Boddula R, Genitta G, Bhatia V, Bansal B, Kongara S et al, Prevalence & risk factors of pre-hypertension & hypertension in an affluent north Indian population. *Indian J Med Res* 2008;128:712–720. [PubMed]
- Sugiyama T, Xie D, Graham-Maar RC, Inoue K, Kobayashi Y, Stettler N. Dietary and lifestyle factors associated with blood pressure among U.S. adolescents. *J Adolesc Health* 2007;40:166–72. [PubMed]
- Ikedo N, Gakidou E, Hasegawa T, Murray CJ. Understanding the decline of mean systolic blood pressure in Japan: an analysis of pooled data from the National Nutrition Survey, 1986-2002. *Bull World Health Organ.* 2008;86:978–88. [PMC free article] [PubMed]
- Drøyvold WB, Midthjell K, Nilsen TI, Holmen J. Change in body mass index and its impact on blood pressure: a prospective population study. *Int J Obes (Lond)* 2005;29: 650–655. [PubMed]
- Cohen HW, Hailpern SM, Alderman MH. Sodium intake and mortality follow-up in the Third National Health and Nutrition Examination Survey (NHANES III) *J Gen Intern Med* 2008;23:1297–1302. [PMC free article] [PubMed]
- Das SK, Sanyal K, Basu A. Study of urban community survey in India: growing trend of high prevalence of hypertension in a developing country. *Int J Med Sci* 2005; 2:70–78. Available from <http://www.medsci.org/v02p0070.htm>
- Dwivedi S, Gonmei Z, Singh G toteja et.al. Prevalence of Hypertension Among Adult Population In Slums Of West Delhi. *Asian J Pharm Clin Res* 2017;10:12.
- Dhikale PT, Solanki MJ, Shrivastava SR. A study of epidemiology of hypertension in an urban slum community of Mumbai. *Biol Med* 2015;S3:3.
- Ismail IM, Kulkarni AG, Meundi AD, Amruth M. 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 Med J* 2016;3:41–7.
- Premkumar R, Pothan J, Rima J, Arole S. Prevalence of hypertension and prehypertension in a community-based primary health care program villages at central India. *Indian Heart J* 2016;68(3):270–7.
- Panesar S, Chaturvedi S, Saini NK, Avasthi R, Singh A. Prevalence and predictors of hypertension among residents aged 20-59 years of a slum-resettlement colony in Delhi, India. *WHO South east Asia J Public Health* 2013;2(2):83–7.

36. National Family Health Survey-4 (2015-2016), India Factsheet. Available from: http://rchiips.org/NFHS/factsheet_NFHS-4.shtml. [Last accessed on 2017 Apr 26]

How to cite this article: Lavanya KM, Sulakhe R, Rao VN. Hypertension among adults in urban slums, a cross-sectional study in rajamahendravaram, Andhra Pradesh, India. *Indian J Forensic Community Med* 2019;6(2):75-80.