

Original Research Article

Prevalence, awareness, treatment and control of hypertension in a rural community of Salem, Tamil Nadu

K. Sathish Kumar*, K. Chellavel Ganapathi, M. Duraimurugan, R. Selvaraj,
K. Kokila, M. Megala

Department of Community Medicine, Government Mohan Kumaramangalam Medical College, Steel plant road, Kollapatty, Salem, Tamil Nadu, India

Received: 01 April 2017

Revised: 26 April 2017

Accepted: 27 April 2017

*Correspondence:

Dr. K. Sathish Kumar,

E-mail: kumarsathish16@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, a global public health issue, is a major risk factor for NCDs like stroke, cardiovascular disease and chronic kidney disease. If Hypertension is detected early it is possible to minimize the risk of cardiovascular diseases, stroke and kidney failure. Objectives: To determine the prevalence of hypertension among the age group of ≥ 18 years in a rural community of Salem iii. To determine the association between hypertension and selected variables like age, sex, tobacco intake, alcohol intake, physical activity, Body mass index (BMI) and waist hip ratio iv. To assess the level of awareness, treatment and control of hypertension

Methods: A Cross-sectional study was done in a rural community of Salem, Tamil Nadu during March-December 2016 among individuals aged ≥ 18 years. The final calculated sample size was 256. Convenience sampling method was used. Participants were interviewed using a structured interview schedule, their BP was measured and anthropometric measurements were taken. Hypertension was defined according to JNC VII criteria. Data entry and analysis was done using IBM SPSS version-21 software.

Results: Out of the 442 eligible persons approached 420 persons consented to participate. Prevalence of hypertension was 34%. About 16% of the respondents had never measured their BP in their life time. Increase in age, male gender, increase in BMI levels, tobacco and alcohol were found to be significant independent predictors of hypertension. Awareness, treatment and control of hypertension were found to be 31%, 23.2% and 11.2% respectively.

Conclusions: Prevalence of hypertension was high but awareness was poor. It is recommended to advice the community about the risk factors of hypertension and regular BP check-up should be done among the community for early detection of hypertension and also for preventing complications.

Keywords: Hypertension, Prevalence, Predictors, Treatment, Control

INTRODUCTION

Hypertension, also known as high or raised blood pressure, is a global public health issue. Globally, the overall prevalence of hypertension in adults aged 25 years & over was around 40% in 2008. The number of people with hypertension rose from 600 million in 1980 to 1 billion in 2008.¹ The increasing prevalence of hypertension is attributed to population growth, ageing

and behavioral risk factors, such as unhealthy diet, harmful use of alcohol, lack of physical activity, excess weight and exposure to persistent stress.² Hypertension is a major risk factor for NCDs like stroke, cardiovascular disease and chronic kidney disease. Complications of hypertension account for 9.4 million deaths worldwide every year.³ Hypertension is responsible for 45% of deaths due to heart disease and 51% of deaths due to

stroke.⁴ In India, 23.10% of men and 22.60% of women over 25 years suffer from hypertension.⁵

The prevalence of hypertension is increasing worldwide but awareness, treatment and control rates are very poor. This is mainly because, initial stages of hypertension can be asymptomatic and 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.⁶ If Hypertension is detected early it is possible to minimize the risk of cardiovascular diseases, stroke and kidney failure. Most of the studies conducted all over the focuses only on the prevalence of hypertension. Hence it is vital to assess the burden of hypertension and associated behavioral risk factors and the behavioral practice of measuring Blood pressure which is a prerequisite for meaningful prevention and control strategies; hence the study is conducted with the following objectives

- To determine the prevalence of hypertension among the age group of ≥ 18 years in a rural community of Salem.
- To assess their practice of measuring BP.
- To determine the association between hypertension and selected variables like age, sex, tobacco intake, alcohol intake, physical activity, body mass index (BMI) and waist hip ratio.
- To assess the level of awareness, treatment and control of hypertension.

METHODS

This was a cross-sectional study conducted in Kollapathy, a village in Salem district, Tamil Nadu which is the rural field practice area of Department of Community Medicine, Government Mohan Kumaramangalam Medical College, Salem from March to December 2016. All persons aged ≥ 18 years were included in the study. Pregnant women and those who refused to participate and those who could not be contacted on the day of data collection were excluded from the study.

Sample size and sampling

Sample size was calculated based on the formula: $n=4P(1-P)/L^2$ where, $P=20$ (prevalence is 20%), $L=5$ (absolute allowable error is 5%) at 95% confidence level.⁷ The calculated sample size was 256. Estimating a non-response rate of 10% the final sample size was 280. Hence 280 adults were targeted for data collection. Convenience sampling method was used to select the study subjects till the sample size is reached.

Data collection

Six teams consisting of MBBS students were formed and areas of data collection assigned to each team. One house hold was selected randomly and then consecutive households were approached and every eligible person

was contacted. After explaining the purpose of the visit and obtaining informed verbal consent they were interviewed using a preformed questionnaire and BP, height, weight, waist circumference and hip circumference were recorded by the students.

Measurement of BP

BP was measured by auscultatory method. Subjects were asked to bare the cuff placement area, seated comfortably and uncrossed legs. Arm was supported at the level of heart. Cuff of sphygmomanometer was wrapped firmly around the upper left arm about 2-3 cm above the cubital fossa. Cuff was inflated 20-30 mmHg above the pressure at which the radial pulse disappeared to palpation and gradually deflated at a constant rate 2-3 mmHg/sec. Systolic BP was noted as the reading at which first Korotkoff sound is heard and Diastolic BP was noted at the point at which the sound disappears. Two BP readings were recorded and mean noted.

Measurement of height

Participants were asked to stand erect against a vertical surface with the heel, buttock, shoulder and occiput touching the surface and facing forward. A marking was made at the level of the vertex of head and height measured using a steel measuring tape up to the nearest 1 cm.

Measurement of weight

Participants were asked to stand erect with minimum clothing and no footwear on the bathroom scale weighing machine and measurement was recorded to the nearest 0.1 kg.

Waist circumference

Midpoint between the lowest costal margin & iliac crest was noted. Waist circumference was measured using a non-stretchable measuring tape which recorded up to the nearest 1 cm.

Hip circumference

Greater trochanter of femur on both sides of the hip noted. Taking these two bony prominences, hip circumference was measured at the most prominent part of the buttock using a non-stretchable measuring tape which measures up to the nearest 1 cm.

Waist Hip ratio (WHR)

Waist circumference (cm) / Hip circumference (cm)

Operational definitions

Grading of Physical activity

Sedentary

Not doing moderate to intensity physical activity for atleast 4 days in a week

Moderate intense physical activity

Doing activities that require moderate physical effort and cause moderate increase in heart rate or breathing for at least 4 days in a week e.g. jogging, swimming, cycling, and volley ball

Vigorous intense physical activity

Doing activities that require hard physical effort and cause large increase in heart rate or breathing for at least 4 days in a week e.g. lifting heavy weights, playing football, digging, construction work, and athletics.

Hypertension

Hypertension is defined as

- Systolic blood pressure equal to or greater than 140 mmHg and/or
- Diastolic blood pressure equal to or greater than 90 mmHg and/or
- Taking anti-hypertensive medications

Classification of Hypertension is done according to JNC-VII criteria.⁸ Body Mass Index (BMI) was calculated and respondents were classified into categories of normal, overweight and obese, based on their BMI.⁹ Men having Waist-Hip ratio (WHR) ≥ 0.90 in men and women having WHR ≥ 0.85 in women were classified as having High Waist-Hip ratio.¹⁰

Data analysis

Data were checked for consistency and completeness and entered in IBM SPSS V21 software. Descriptive statistics like mean, percentages used. Chi-square test is used for bivariate analysis between hypertension and selected variables like age, gender, BMI, diet, educational status, physical activity, tobacco and alcohol consumption. Multivariate analysis for variables significant at P value < 0.05 in bivariate analysis was done using multiple logistic regressions.

RESULTS

Out of the 442 eligible persons approached 420 persons consented to participate in the study with a response rate of 95.0%. Table 1 shows that about three-fifth (60.7%) of the respondents were females. About half (55.7%) of the respondents were between 18 to 44 years. Table 2 shows that about 16% of the respondents have never measured their BP in their life time. Among those who measured their BP only 31.5% of them have measured in the past one month. Figure 1 shows that out of the 420 respondents, 142 (34%) of them were hypertensives and

65 (15%) were in the prehypertensive range. Table 3 shows that increasing age, male gender, increasing BMI levels, tobacco, alcohol, WHR were found to be significant independent predictors of hypertension and on multivariate analysis of these significant variables age, male gender, increasing BMI levels, were found to be significant after adjusting for other variables (Table 4). Figure 2 shows that only 31.0% of the hypertensives were aware of their hypertensive status, 23.2% of the hypertensives are on treatment and only 11.2% of them are under control.

Table 1: Age and sex distribution of the respondents.

Age (years)	Males (%)	Females (%)	Total* (%)
18 to 30	51(37.2)	86(62.8)	137 (32.6)
31 to 40	40(41.2)	57(58.8)	97 (23.1)
41 to 50	26(37.1)	44(62.9)	70 (16.7)
51 to 60	24(38.1)	39(61.9)	63 (15.0)
> 64	24(45.3)	29(54.7)	53 (12.6)
Total	165(39.3)	255(60.7)	

* Percentages are row wise

Table 2: Practice of measuring BP.

a. Have you ever measured your BP?		
Yes	356	84.0
No	64	16.0
b. When was BP last measured?		
< 1 month	112	26.7
1 to 6 months	97	23.1
6 months to 1 year	59	14.0
1 to 2 years	26	6.2
2 to 5 years	23	5.5
>5 years	7	1.7
Can't remember	32	7.6

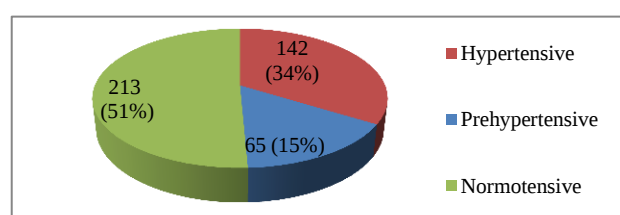


Figure 1: Prevalence of hypertension.

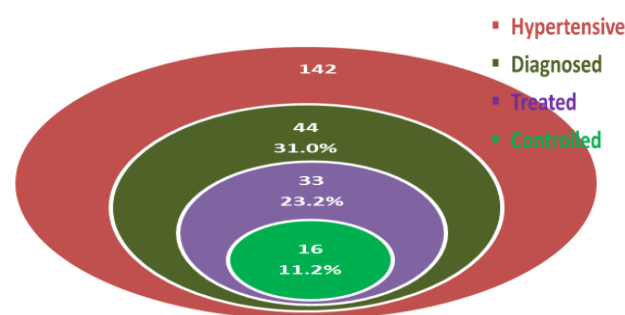


Figure 2: Awareness among hypertensive patients.

Table 3: Bivariate association of hypertension with selected variables.

Variable	Presence of Hypertension		
	Yes (%)	No (%)	P-value
Age			
25 to 34 years	25 (18.2)	112 (81.8)	0.00
35 to 44 years	30 (30.9)	67 (69.1)	
45 to 54 years	25 (35.7)	45 (64.3)	
55 to 64 years	34 (54.0)	29 (46.0)	
More than 64 years	28 (52.8)	25 (47.2)	
Gender			
Male	68 (41.2)	97 (58.8)	0.01
Female	97 (29.0)	181 (71.0)	
Educational status			
Illiterate	27 (38.6)	43 (61.4)	0.42
Below primary	7 (35.0)	13 (65.0)	
Primary	21 (30.9)	47 (69.1)	
High school	22 (25.3)	65 (74.7)	
Higher secondary	23 (41.8)	32 (58.2)	
Graduate	38 (36.2)	67 (63.8)	
Post graduate	4 (26.7)	11 (73.3)	
Marital status			
Single	20 (29.0)	49 (71.0)	0.28
Married	115 (34.8)	215 (65.2)	
Divorced, widowed or separated	7 (33.3)	14 (66.6)	
Diet			
Veg	6 (28.6)	15 (71.1)	0.60
Non veg (34.4)	136	263 (65.9)	
Physical activity			
Sedentary	44 (34.9)	82 (65.1)	0.93
Moderate	82 (33.6)	162 (66.4)	
Vigorous	16 (33.8)	34 (66.2)	
BMI			
<18.5	2 (10.5)	17 (89.5)	0.00
18.5 to 22.9	27 (20.5)	105 (79.5)	
23 to 24.9	28 (32.2)	59 (67.8)	
≥ 25	75 (41.2)	107 (58.8)	
Tobacco consumption			
Daily and few times a week	64 (44.3)	65 (55.7)	0.00
Few times a month and occasionally	6 (24.7)	11 (75.3)	
Never users	42 (24.7)	128 (75.3)	
Past users	2 (25.0)	6 (75.0)	
Alcohol consumption			
Daily and few times a week	14 (58.3)	10 (41.7)	0.02
Few times a month and Occasionally	18 (29.0)	6 (71.0)	
Never users (33.0)	108	219 (67.0)	
Past users	2 (28.6)	5 (71.4)	
WHR for males			
< 0.90	15 (31.2)	33 (68.8)	0.07
≥ 0.90	50 (46.7)	105 (53.3)	
WHR for females			
< 0.85	10 (20.8)	38 (79.2)	0.16
≥ 0.85	60 (31.2)	132 (68.8)	

Table 4: Multivariate association of hypertension with significant variables.

Variable	Adjusted OR	(95% CI)	P-value
Age in years			
18 to 34 years	1.00	1.00	
35 to 44 years	1.83	(0.95-3.52)	0.07
45 to 54 years	1.95	(0.96-3.94)	0.06
55 to 64 years	6.11	(2.97- 12.55)	0.00
>64 years	5.55	(2.60- 11.86)	0.00
Gender			
Male	1.82	(1.10-3.02)	0.02
Female	1.00	1.00	
BMI			
<23.00	1.00	1.00	
23.00-24.99	1.68	(0.88-3.22)	0.12
≥25.00	2.47	(1.45-4.20)	0.00
Tobacco consumption			
Daily and few times a week	2.14	(0.32-14.4)	0.44
Few times a month and occasionally	0.89	(0.13-6.12)	0.90
Never	1.00	1.00	
Alcohol consumption			
Daily and few times a week	2.85	(0.39-20.5)	0.30
Few times a month and occasionally	1.12	(0.17-7.37)	0.90
Never	1.00	1.00	

* Analysis done by multiple logistic regression.

DISCUSSION

The prevalence of hypertension is 34%. Studies done all over the world in different setting among adults showed widely varying prevalence rates (7.24-60.8).¹¹⁻²² Among the studies done in rural India, higher prevalence rates were seen in Assam and Karnataka while studies in Karnataka and Kerala showed lower prevalence rates.^{11,14,16,18} Among the studies done in urban setting in India including all the adults, the study done in Mumbai and Gujarat lesser prevalence.^{6,13} The other Indian studies done in Urban setting in Jharkand, Kerala, and Manipur showed higher prevalence rates.^{17,21,22} In studies done outside India, except one study in Tunisia²⁰ where the prevalence was 52%, all the others had lower prevalence rates as compared to our study (11.6-27.2).^{15,19} The varying prevalence rates might be due to differing age groups constituting the study population.

About 16% of the respondents have never measured their BP in their lifetime and only 26.7% of the respondents have measured their BP within past one month. In a study done on hypertensives in Mumbai about 40 % of the

respondents measured their BP every month.²³ Prevalence of hypertension increases with age which is a consistent finding in all the studies.¹¹⁻²² Prevalence of hypertension is significantly higher among males as seen in most of the studies and in contrast to some other studies, where females have higher prevalence.^{6,12-19,22} Tobacco and alcohol consumption are known significant risk factors of hypertension from many studies and is also proved in this study.^{6,15,18,22} Increasing BMI level is significantly associated with hypertension which is also a known risk factor found in other studies.^{6,15,17-22}

As seen in studies all over the world awareness, treatment and control of hypertension were poor except in few studies done in US, Canada and Brazil, where it was higher.^{14-16,20-25} In this study they were 31.0, 23.2 and 11.2 percent respectively. In a study in Manipur, they were 42.5, 30.5 and 11.4 percent, while they were 33, 32 and 12.5 percent in Karnataka.^{18,22} Strength of the study was that response rate was good (95.0%). Limitation was that data collection done during working hours, hence large fraction of the respondents were females.

CONCLUSION

Prevalence of hypertension was high but awareness was poor. It is recommended to advice the community about the risk factors of hypertension and regular BP checkup should be done among the community for early detection of hypertension and also for preventing complications.

ACKNOWLEDGEMENTS

The authors wish to thank the NCD cell, Tamil Nadu Health Systems Project for funding the research project. The authors wish to thank all the participants for their co-operation. The authors also acknowledge the commitment of the MBBS students in doing the door to door survey.

Funding: This research project was funded by the NCD cell, Tamil Nadu Health Systems Project

Conflict of interest: None declared

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

REFERENCES

1. WHO. A global brief on hypertension 2013. Geneva: World Health Organization; 2013. Available at: http://apps.who.int/iris/bitstream/10665/79059/1/WHO_DCO_WHD_2013.2_eng.pdf. Accessed on 16 February 2017.
2. World Health Organization. Global status report on noncommunicable diseases 2010. Geneva, World Health Organization, 2011. Available at http://www.who.int/nmh/publications/ncd_report_full_en.pdf. Accessed on 16 February 2017.
3. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010 : a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2224-60.
4. Causes of Death 2008 [online database]. Geneva, World Health Organization. Available at: http://www.who.int/healthinfo/global_burden_disease/cod_2008_sources_methods.pdf. Accessed on 19 February 2017.
5. WHO. World Health Statistics. Geneva: World Health Organization; 2013. Available at http://www.who.int/gho/publications/world_health_statistics/EN_WHS2012.pdf. Accessed on 6 February 2017.
6. Chandwani H, Pandor J, Jivarajani P, Jivarajani H. Prevalence and correlates of hypertension among adults in the urban area of Jamnagar, Gujarat, India. *Electron Physician*. 2010;2:52-9.
7. Rekha G, Singh RR, Dolly, Basha ISG, Kumar R, Kumar V. Prevalence of Pre-hypertension and hypertension in rural Tamil Nadu population – A pilot study report from Manampathy village of Thiruporur Tehsil, Kancheepuram District of Tamil Nadu, India. *Int J Med Pharm Sci*. 2003;3(3):1-8.
8. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of joint national committee on prevention, detection, evaluation and treatment of high blood pressure. *Hypertension*. 2003;42:1206-52.
9. Misra A, Chowbey P, Makkar BM, Vikram NK, Wasir JS, Chadha D, et al. Consensus Statement for Diagnosis of Obesity, Abdominal Obesity and the Metabolic Syndrome for Asian Indians and Recommendations for Physical Activity, Medical and Surgical Management. *J Assoc Physicians India*. 2009;57:163-70.
10. Waist Circumference and Waist-Hip Ratio: Report of a WHO Expert Consultation. Geneva, 8–11 December 2008. Available at http://whqlibdoc.who.int/publications/2011/9789241501491_eng.pdf. Accessed on June 16, 2013.
11. 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.
12. Bharucha NE, Kuruvilla T. Hypertension in the Parsi community of Bombay: a study on prevalence, awareness and compliance to treatment. *BMC Public Health*. 2003;3:1.
13. Joshi SV, Patel JC, Dhar HL. Prevalence of hypertension in Mumbai. *Indian J Med Sci*. 2000;54(9):380-3.
14. Yuvaraj BY, Gowda NMR, Umakantha AG. Prevalence, awareness, treatment and control of hypertension in rural areas of Davanagere. *J postgrad Med*. 2010;35(1):138-41.
15. Chataut J, Adhikari RK, Sinha NP. Prevalence and risk factors for hypertension in adults living in central development region of Nepal. *Kathmandu Univ Med J*. 2011;1(33):13-8.

16. Rao CR, Kamath VG, Shetty A, Kamath A, High blood pressure prevalence and significant correlates: A quantitative analysis from coastal Karnataka. *ISRN Preventive Medicine*, 2013. Available at: <http://www.hindawi.com/isrn/preventive.medicine/2013/574973/>. Accessed on June 19, 2013.
17. Pooja, Yashoda M. Prevalence of Hypertension and its Determinants in an Urban Area of Uttarakhand. *Asian J Biomed Pharm Sci*. 2013;3(21):12-16.
18. Meshram II, Arlappa N, Balkrishna N, Rao KM, Laxmaiah A, Brahmam GNV. Prevalence of hypertension, its correlates and awareness among adult tribal population of Kerala state, India. *J postgrad Med*. 2012;58(4):255-61.
19. Rampal L, Rampal S, Azhar MZ, Rahman AR. Prevalence, awareness, treatment and control of hypertension in Malaysia: A national study of 16,440 subjects. *J Royal Institute Public Health*. 2008;122:11-8.
20. Hammami S, Mehri S, Hajem S, Koubaa N, Kammoun S, Hammami M, et al. Awareness, treatment and control of hypertension among the elderly living in their home in Tunisia. *BMC Cardiovasc Disord*. 2011;11:65.
21. Zachariah MG, Thankappan KR, Alex SC, Sarma PS, Vasana RS. Prevalence, correlates, awareness, treatment, and control of hypertension in a middle-aged urban population in Kerala. *Indian Heart J*. 2003;55(3):245-51.
22. KS, Akoijam BS, Asem P. Prevalence, awareness, treatment and control of hypertension in urban communities of Imphal, Manipur. *Int J Interdisciplinary Multidisciplinary Studies (IJIMS)*. 2015;2(3):61-70.
23. Olives C, Myerson R, Mokda AH, Christopher J, Murray S, Lim SS. Prevalence, Awareness, Treatment, and Control of Hypertension in United States Counties, 2001–2009 *PLoS One*. 2013;8(4):e60308.
24. Wilkins K, Campbell NRC, Joffres MR, McAlister FA, Nichol M, Quach S, et al. Blood Pressure in Canadian adults. *Health Rep*. 2010;21:37–46.
25. Martin JF, Ciorlia LA, Godoy MR, Cação JC, Loureiro AA, Cesarino CB, et al. Hypertension prevalence and risk factors in a Brazilian Urban Population. *Arq Bras Cardiol*. 2010;94:519–26.

Cite this article as: Kumar KS, Ganapathi KC, Duraimurugan M, Selvaraj R, Kokila K, Megala M. Prevalence, awareness, treatment and control of hypertension in a rural community of Salem, Tamil Nadu. *Int J Community Med Public Health* 2017;4:1976-81.