DOI: 10.14260/jemds/2014/3598

ORIGINAL ARTICLE

PREVALENCE AND RISK FACTORS OF HYPERTENSION AMONG ADULTS AGED 30 YEARS AND ABOVE IN A RURAL DWELLING OF KOTTAYAM, KERALA

Anand Sivaprasad[1], Geethadevi M[2], Aravind K. R[3], Sobha A[4], Arjun C[5], Arum M[6], Angela Babu[7], Aswathy T. U[8]

HOW TO CITE THIS ARTICLE:
Anand Sivaprasad, Geethadevi M, Aravind K. R, Sobha A, Arjun C, Arum M, Angela Babu, Aswathy T. U. "Prevalence and Riskfactors of Hypertension among Adults Aged 30 years and above in a Rural Dwelling of Kottayam, Kerala". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 52, October 13; Page: 12100-12108, DOI: 10.14260/jemds/2014/3598

ABSTRACT: INTRODUCTION: Rising prevalence of hypertension is a major public health challenge in India especially in Kerala. This cross sectional study was done to assess the prevalence of hypertension and its determinants in a rural population of Kottayam, Kerala. **MATERIALS AND METHODS:** Community based cross sectional study was carried out among 400 adults aged 30 years and above in a randomly selected ward of Ettumanoor panchayath, which is the field practice area of Govt. Medical college, Kottayam. A pretested semi structured questionnaire was used to collect information regarding socio demographic and behavioral factors. Standardized sphygmomanometric blood pressure measurement was taken by trained team members twice for each individual and the average of the two was taken as blood pressure. Anthropometric measurements were also done. A systolic blood pressure of ≥140mm of Hg and or diastolic BP≥90mm of Hg was regarded as hypertension. Data analysis was done using the software Epi-info version 3.4.3. Chi square test revealed the association between hypertension (dependent variable) and other socio demographic and behavioural factors (independent variable). A p-value of <0.05 was taken as significant. All the significant variables are included in the binary logistic regression to find out Adjusted Odds Ratio (AOR) **RESULTS:** The overall prevalence of hypertension was 35% (males-33.8% females -35.6%). The variables which evolved as significant and remained so in binary logistic regression analysis were single status after marriage/ unmarried (AOR-2.45 95% CI 1.38-4.38), low educational status (AOR- 2.31, 95%CI-1.46-3.64), family history of hypertension (AOR-1.85 95%CI-1.2-2.85) and trunkal obesity in females (AOR-2.41 95%CI-1.37-4.24) **CONCLUSION:** The present study revealed the prevalence (35%) and risk factors for hypertension in the study area. The results of the study can be used to develop messages to make the people aware of the problem of hypertension and its determinants and also the need for early diagnosis.

KEYWORDS: Hypertension, adults aged >30years, Prevalence and Risk factors, Rural Kerala.

INTRODUCTION: Hypertension is a major public health problem of concern across the world because of its association with increased risk of cardiovascular diseases. It is the leading cause of death and disability worldwide and accounted for 9.4 million deaths and 7% of disability adjusted life years (DALYs) in 2010[1]. Hyper tension is increasing rapidly in most low and middle income countries driven by diverse health transition.

In India it is the leading non-communicable disease (NCD) risk and estimated to be attributable for nearly 10% of all deaths.[2] Adult hypertension prevalence has risen dramatically over the past three decades from 5% to between 20-40% in urban areas and 12-17% in rural areas.[3,4]

DOI: 10.14260/jemds/2014/3598

The number of hypertensive individuals is anticipated to nearly double form 118 million in 2000 to 213 million by 2020.[4] It is estimated that 16% of Ischemic heart disease, 21% of peripheral vascular disease, 24% of acute myocardial infarction and 29% of strokes are attributable to hypertension underlining the huge impact of effective hypertension prevention and control can have on reducing the rising burden of cardiovascular disease (CVD).[5]

Two mmHg population wide decreases in Blood pressure can prevent 151000 stroke and 153000 coronary heart disease death in India.[6] Moreover there is strong correlation between changing life style factors and raised blood pressure.[3]

As only very few studies have been undertaken in rural Kerala, it was decided to assess the prevalence and determinants of hypertension among the rural population of ward 11 of Ettumanoor Panchayat in Kottayam district, Kerala State.

MATERIALS AND METHODS: A community based descriptive cross sectional survey was conducted in ward eleven of Ettumanoor panchayat which is the field practice area of Govt. Medical College, Kottayam, Kerala. There are 22 wards in Ettumanoor panchayath and one ward was selected at random. Using the formula N= 4PQ/ d2, sample size was calculated as 400 (P= 20%, (known prevalence of Hypertension as given by NFHS -3[7]), Q= 80%, d=4(20% of P). Ethical clearance was sought from the institution. Informed consent was taken from each study subject in the written format which is attached with the interview schedule. Houses were visited according to the list of households available which was taken from the village office. Boundaries of ward and houses were identified with the help of Junior public health nurse and ASHA workers.

A team of four fifth semester medical students, who were trained to record blood pressure, weight, height, waist and hip measurements, visited the households. All the available members in the houses at the time of survey above the age of 30 years were interviewed using a pre tested semi structured interview schedule after establishing rapport and obtaining consent. The detailed questionnaire contained age, sex, educational standards, occupation, dietary habits, amount of salt taken, awareness of hypertension, and details of treatment of hypertension when applicable. Blood Pressure (BP) was measured twice, in the right arm in the sitting position, after a resting period of 5 minutes, using a calibrated mercury sphygmomanometer and the average of the two reading was taken as the blood pressure of the individual.

Hypertension was defined as per JNC 7 (Joint National committee) classification with a systolic BP ≥ 140 mm HG and diastolic BP ≥ 90 mm Hg.[8] Waist circumference was measured between the lower border of the ribs, and the iliac crest in a horizontal plane using a measuring tape. Hip circumference was measured at the widest point over the buttocks using measuring tape. Height was measured by asking the patient to stand bare foot against the wall keeping his/her body and head straight and height is marked on the wall and measured with the measuring tape.

Awareness of hypertension was defined as “considered aware” of their disease if they knew the need for measuring BP regularly, the necessity of lifestyle modifications, the need for treatment in stage-I and stage-II hypertension, and the possibility of developing complications such as kidney disease and heart disease if hypertension is not adequately controlled. The amount of salt-intake was semi-quantified based on the use and purchase of salt per month and daily use per family was derived from it. For evaluation of educational status, level of schooling and higher levels were assessed. Groups of physical activity was defined as; sedentary lifestyle - only routine office work;

DOI: 10.14260/jemds/2014/3598

moderate physical activity - home makers, and or daily physical exercise, and heavy work - students, manual laborers and professionals who are active outdoor.

The data was entered in the Microsoft Excel worksheet and further analysis was done using the Epi Info 3.4.3. Summary statistics like frequency and mean were calculated. Descriptive statistics were presented as frequency, percentage, mean, and standard deviation. For inferential statistics, Chi-square test was used to find out association between hypertension (dependent variable) and the selected socio- demographic and behavioral variables (independent variables). A p value of <0.05 is taken as significant. Binary logistic regression was done to find out Adjusted Odds ratio (AOR) for the variables found significant in univariate analysis.

RESULTS: Among the 400 individuals who were interviewed and examined, 136(34%) were males and 264 (66%) were females. Majority of the study sample belong to 30-45 age groups. The overall prevalence of hypertension was 35%. 46 (33.8%) of the males and 94 (35.6%) of the females were hypertensives. The prevalence of hypertension was 15% between 30 - 45 years of age with a male preponderance in this age group (22.3 % in males compared to 11.3% in females). But, beyond this age group, there was steady increase with age in the prevalence of hypertension in both sexes but there existed a clear female preponderance in the prevalence of hypertension beyond 45 years of age. (Table 1).

Age group	Males (136)		Females (264)		All (400)	All hyper tensives
	Total No. (%)	With HTN (%)	Total No. %	With HTN (%)	Number (%)	Number (%)
30-45	45(31.7)	10(22.2)	97(68.3)	11(11.3)	142(35.5)	21(15)
46-55	26(32.1)	8(30.8)	55(67.9)	23(41.8)	81(20.3)	31(22.1)
56-65	29(34.1)	10(34.5)	56(65.9)	25 (44.8)	85(21.2)	35(25)
>65	36(39.1)	18(50)	56(60.9)	35(62.5)	92(23)	53(37.9)
Total	**136(100)**	**46(100)**	**264(100)**	**94(100)**	**400(100)**	**140(100)**

Table 1: The distribution of hypertension between the various age groups in men and women

Category	Frequency	Percentage
Known Hypertensives	105	26.25%
Newly diagnosed (Systolic BP≥140 + diastolic BP ≥90	35	8.75%
Non hypertensives	260	65%
Total	**400**	**100**

Table 2: Prevalence of hypertension among study subjects

105 (26.25%) were known to have hypertension and were aware of hypertension and were already advised some form of treatment. 35(8.75%) were newly diagnosed hypertensives (Table 2). Newly diagnosed hypertensives were referred to the Medical officer, Primary Health centre for starting treatment.

DOI: 10.14260/jemds/2014/3598

Variables	Group	Blood pressure level		Total	Significance
		Normal No %	Hypertensive No %		
Gender	Male	90 66.18	46 33.82	136	
	Female	170 64.39	94 35.61	264	P=0.7
Age group	< 55 years	171 76.68	52 23.32	223	P=0.0001
	>55 years	89 50.28	88 49.72	177	
Marital status	Married	235 67.92	111 32.08	346	
	Widow/widower/ divorce/ separated/ unmarried	25 46.3	29 53.7	54	P=0.001
Educational status	Low	53 50.48	52 49.52	105	P=0.0002
	High	207 70.17	88 29.83	295	
Occupational status	Unemployed/ ML	220 66.07	113 33.93	333	P=0.3
	Skilled/ clerical/ semiprofessional	40 59.7	27 49.3	67	
Per capita income	< 2500	144 68.57	66 31.43	210	P=0.11
	>2500	116 61.05	74 38.95	190	
Family history hypertension	Yes	112 58.64	79 41.36	191	P=0.01
	No/ Don't know	148 70.81	61 29.19	209	
Smoking	Yes	51 63.75	29 36.25	80	P=0.79
	No	209 65.31	111 34.69	320	
Alcohol	Yes	45 70.31	19 29.69	64	P=0.33
	No	215 63.99	121 36.01	336	
Salt consumption	>15 gm/day/family	52 63.41	30 36.59	82	P=0.73
	<15 gm/day/family	208 65.4	110 34.6	318	
Physical activity	Low	75 56.4	58 43.6	133	P=0.01
	High	185 69.29	82 30.71	267	
Nutritional status	Underweight/ normal	109 68.55	50 31.45	159	P=0.22
	Over weight/ obesity	151 62.66	90 37.44	241	
Waist circumference (males-136)	≥90 cm	51 69.86	22 30.14	73	P=0.95
	<90	39 61.9	24 38.1	63	
Waist circumference (females-264)	≥85 cm	99 57.23	74 42.77	173	P=0.0007
	<85cm	71 78.02	20 21.98	91	
WHR males n=136	≥1	12 70.59	5 29.41	17	P=0.68
	<1	78 65.55	41 34.45	119	
WHR females n=264	≥0.85 cm	134 61.19	85 38.81	219(100)	P=0.01
	<0.85	36 80	9 20	45(100)	

Table 3: Distribution of subjects according to Blood Pressure level and variables (N=400)

As shown in Table 3, 33.82% of males (46) and 35.6% of females (94) were hypertensives but the difference was not significant (p=0.7). Among the study subjects aged 55 years and above 49.72% were hypertensive compared to 23.32% in the below 55 years age group and the difference was statistically significant (p=0.0001). Hypertension was significantly higher among widow/widower/ unmarried/ separated group (53.7%) than married subjects (32.08%).

DOI: 10.14260/jemds/2014/3598

Low educational status was evolved as a significant risk factor as 49.52% of study subjects from low educational status were hypertensives compared to 29.83% from high educational status (p=0.0002). Hypertension was found in 41.36% of study subjects with a family history of hypertension while among the subjects without family history only 29.19% were hypertensive the difference was statistically significant(p=0.01).

The prevalence of hypertension was significantly higher among the subjects with low physical activity (43.6%) than those having moderate or vigorous activity (p=0.01). The prevalence of overweight/ obesity as measured by Body Mass Index (BMI) was 60%. Among overweight/ obese subjects 37% were hypertensive compared to 31%in the non-obese group and the difference was not significant (p=0.22). 42.77% of female subjects with abdominal obesity were hypertensive compared to 21.98% hypertensives in the group without abdominal obesity and the difference was significant.

The variables which evolved as significant in the study were age, educational status, marital status, family history of hypertension, physical activity and waist circumference and waist hip ratio among females. The significant variables from univariate analysis were entered into Binary Logistic Regression Model to find out Adjusted Odds Ratio (AOR). Unmarried/widow/widower (AOR-2.45, 95% CI- 1.38-4.38), Low educational status (AOR-2.3, 95%CI- 1.46-3.64), family history of hypertension (AOR-1.85 95% CI-1.2-2.85) and abdominal obesity among females (AOR-2.4 95%CI-1.37-4.4) remained as significant in logistic regression analysis.

The adjusted odds ratio for hypertension in the unmarried/ widow/widower group was 2.45 indicating 2.45 times higher risk for hypertension in the unmarried/widow/widower group compared to married subjects.

Similarly subjects with a positive family history of hypertension have 1.85 times higher risk for hypertension than those without a family history. Study subjects with low educational status were having 2.3 times higher risk for hypertension. Moreover abdominally obese females were 2.4 times at higher risk for developing hypertension than thin females. (Table: 4).

Factors	Group	Number	Adjusted OR	95% CI	P value
Marital status	Unmarried/ divorce/ separated/ Married	54 346	2.45	1.38-4.38	0.005
Educational status	Low High	105 295	2.3079	1.46-3.64	0.003
Family history of hypertension	Yes No	191 209	1.85	1.2-2.85	0.01
Waist circumference (females)	≥0.85cm <0.85cm	173 91	2.41	1.37-4.24	0.002
WHR in women	≥0.85 <0.85	219 45	2.53	1.16-3.53	0.01

Table 4: Binary logistic regression analysis of factors associated with hypertension

DOI: 10.14260/jemds/2014/3598

DISCUSSION: The overall prevalence of hypertension of 35% noted in this study is at par with contemporary reports of high prevalence of hypertension in Kerala. High prevalence of hypertension has also been reported by Thankappan et al in a recent survey between 15 – 64 years of age in the urban, rural and slum dwellers (male 33.9%; female 31.6%; total 32.7%) of Trivandrum district in kerala.[9] But a recent study by Satish T et al reported 23.6 % incidence of hypertension in a seven year follow up of rural population in Kerala between 15 – 64 years of age.[10]

Yuvaraj BY et al in a rural population survey above 18 years of age, conducted in Davanagre district of Andhra Pradesh showed 18.3% prevalence of hypertension[11]. Ramankutty etal reported a lower prevalence of hypertension based on WHO criteria in 1993 in a rural field survey in Trivandrum district[12].Higher prevalence of hypertension (40%) was reported earlier in the tribal Kerala population survey above the age of 20 years by Meshram II et al (2012).[13]

Similarly 33.5 % of the respondents were hypertensives in a survey conducted by Prasanth et al (2008) in Trivandrum district of kerala state[14]. In a previous survey, Zacharia et al (2003) reported higher prevalence of hypertension (54.5%) in urban population of Trivandrum[15.] Similar higher prevalence (47%) was also reported in city dwellers of Trivandrum, Kerala by Vimala A et al[16]. 26.3 % of the study subjects were aware of their hypertension and were on some form of treatment and 8.8%were newly detected hypertensives.

High awareness/ knowledge (75%) of their blood pressure level were noted in this population and only 25% of the hypertensives were newly detected. This is a higher awareness than that reported in a survey in a rural population of Davangare by Yuvaraj et al 2010 (33.8%) [10]. This reflects higher literacy in the district as well as the access and the utilization of the available healthcare facilities in the area.

The prevalence of hypertension increases with age in both genders.[3,12,15] The present study also reported similar findings. The male to female ratio in this study was 1:1.9 (males-34% and females- 66%) and the overall prevalence of hypertension among females was higher than males (35.6%, 33.8%) but the difference was not significant. But in the younger age group (30-45 years), the prevalence of hypertension was high among males (22.2%) than females (11.3%). Several studies reported sex differences in blood pressure with males having high blood pressure than females during adolescence and early adulthood.[17,18]

The raised level of blood pressure among young males compared to females is explained on the basis of lack of endogenous oestrogen as evidence suggest that oestrogen may modulate vascular endothelial function causing vasodilatation.[19] But beyond 45 years of age, women showed a marked rise in the prevalence of hypertension and exceeded males (31.43% vs 26.47%) and have more epidemiological importance in women health assays.

In this survey, 23% were beyond 65 years of age, indicating the longer longevity generally seen in Kerala, with higher prevalence of hypertension (50% in men and 62.5% in women). This indicates that the burden of hypertension is going to rise much more than expected as the population ages further.

It was interesting to note that single status after marriage due to any reason or unmarried status had higher prevalence of hypertension. Though exact reason is unknown, this could be due to stress reduction which may occur in family group living.

Other conditions that contributed to higher prevalence of hypertension in the present study included low educational status and family history of hypertension.

Recent case control studies from India reported that being illiterate and belonging to low socioeconomic group are independent risk factors for cardiovascular diseases.[20-23]

The possible reason may be the role of education which make individuals more aware of the ill effects of risk behaviours and risk factors of diseases and also health seeking behavior may be higher among upper socioeconomic class. Several studies reported the association between positive family history of hypertension and high blood pressure.[24-27] In the current study also positive family history of hypertension was emerged as a significant risk factor. The possible explanation is family members share genes, behaviours, lifestyles and environments that can influence their health and risk for diseases.

Surprisingly, in this study the prevalence of hypertension did not differ significantly between those who consume lower or higher levels of salt daily. This could be a biased observation due to the fact that those who are now regarded as not consuming high salt, might have adopted to a low salt diet currently after being advised to reduce their salt intake on detection of higher blood pressure values. Overweight/obesity did not evolve as a significant risk factor in this study. But the prevalence of overweight/ obesity was high (60%) which was a proven risk factor for many chronic non-communicable diseases.

Physical activity though evolved as a significant variable in univariate analysis it didn't remain as significant in regression analysis. Abdominal obesity as measured by Waist circumference and waist hip ratio (WHR) emerged as a significant risk factor of hypertension in women but not in men. This has important public health implication in that we should implement strategies to reduce the incidence of hypertension by interventions aimed at reducing the trunkal obesity by promoting physical activity.

CONCLUSION: The results of the study provide an insight into the prevalence of hypertension and the association between age, gender, socioeconomic status, marital status, abdominal obesity and raised blood pressure among rural adults aged 30 years and above. The results may be used to develop messages to raise awareness about the risk factors, dangers of raised blood pressure, the need for lifestyle modification and its early detection. Measures should be taken to improve the educational and social background and also should propagate the message of united happy family which buffers effectively the stressors of modern life.

LIMITATIONS: The results may not be representative of the whole rural population in Kerala as the study included only one ward in a panchayath. Inherent in the design was the absenteeism of many male members of the same family as they were outdoors for work. A large sized random sampled cohort will give more information on the highlighted observations of this survey.

REFERENCES:

1. Lim SS, Vos T, Flaxman AD, Danaei G, et al. A comparative risk assessment of burden of disease and injury attributable to67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease study 2010. Lancet.2013; 380: 2224-60.
2. Patel V, Chatterji S, Chisholm D, Ebrahim S, Gopalakrishna G, Mathers C, et al. Chronic diseases and injuries in India. Lancet. 2011; 377: 413-28.
3. Gupta R. Trends in hypertension epidemiology in India. JHum Hypertens.2004; 18:73-8.

4. Reddy KS, Shah B, Varghese C, Ramdoss A. Responding to the threat of chronic diseases in India. Lancet. 2005; 366: 1744-9.
5. Mohan S, Reddy KS, Prabhakaran D. Reversing the tide. New Delhi: Public Health Foundation of India; 2011. Chronic non-communicable diseases in India
6. Rodgers A, Lawes C, MacMahon S. Reducing the global burden of blood pressure related cardiovascular disease. J Hypertens 2000; 18 (Suppl 1): S3–S6.
7. National Family Health Survey- III- India. Report Ministry of Health and Family Welfare, GOI, International Institute of Population Sciences, Mumbai, Available at http://www.nfhsindia.org, http://www.mohfw.nic.in accessed on 28-12-2013
8. Joint National Committee (JNC) on Prevention, Detection, evaluation and Treatment of High Blood Pressure. The seventh report of JNC. JAMA 2003; 289: 2560-2572
9. Thankappan K.R., Shah B., Mathur P. Risk factor profile for chronic non-communicable diseases: results of a community-based study in Kerala, India. Indian J Med Res. 2010; 131: 53–63.
10. Satish T, kannan S, Sarma PS, Razum O, Thankappan KR. Incidence of hypertension and its risk factors in rural Kerala, India: a community-based cohort study. Public Health; 2012 Jan 126 (1): 25-32
11. Yuvaraj BY, Nagendra Gowda MR, and Umakantha AG. Prevalence, Awareness, Treatment, and Control of Hypertension in Rural Areas of Davanagere; Indian J Community Med. Jan 2010; 35 (1): 138–141**.**
12. Raman Kutty V., Balakrishnan K. G., Jayasree A.K., Thomas Jessy. Prevalence of coronary heart disease in the rural population of Thiruvananthapuram district, Kerala, India. Int J Cardiol. 1993; 39: 59–70.
13. Meshram, 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) 255-261.
14. Prasanth TS, Vijayakumar K, Prevalence of systemic hypertension among rural residents of kerala; Calicut Medical Journal; vol.6, no.3, article e4, 2008.
15. Zachariah MG, Thankappan KR, Alex SC, Sarma PS, Vasan RS. Prevalence, correlates, awareness, treatment, and control of hypertension in a middle aged urban population in Kerala. Indian Heart J 2003; 55: 245-51.
16. Vimala A, The prevalence, risk factors and awareness of hypertension in an urban population of Kerala (South India) Saudi J Kidney Dis Transpl 2009; 20 (4): 685-689.
17. PercyC, Freedman DS, Gilbert TJ, White L, Ballew C, Mokhad A. Prevalence of Hypertension among Navajo Indians: finding from the Navajo and Nutritional survey. J Nutr 1997; 127 (10):2114S-19S.
18. Sugarman JR, White LL, Gilbert TJ. Evidence for a secular change among Navajo Indian School Children. Am J Clin Nutr 1990; 52 (6): 960-6.
19. Mendelsohn ME, Karas RH. The protective effect of estrogen on the cardiovascular system. N Eng J Med. 1999; 340 (23): 180-11.
20. Pais P, Pogue J, Gerstein H, Zachariah E, Savitha D, Jayaprakash S, etal. Risk factor for acute myocardial infarction in Indians: a case control study. Lancet 1996; 348: 358-363.
21. Rastogi T, Reddy KS, Vaz M, Spiegalman D, Prabhakaran D, Willet WC, et al. Diet and Risk of Ischaemic Heart disease in India. Am J Clin Nutr 2004; 79: 582-592.

DOI: 10.14260/jemds/2014/3598

22. Joshi PP, Islam S, Pais P, Reddy KS, Prabhakaran D, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. JAMA 2007; 297: 286-294.
23. Gupta R, Gupta VP, Ahluvalia NS. Educational status, Coronary Heart disease and coronary risk factor prevalence in a rural population of India. BMJ 1994; 309: 1332-1336.
24. Yadav S, R. Boddula, G. Genitta, V. Bhatia, B. Bansal, S. Kongara, S. Julka, A. Kumar, H.K. Singh, V. Ramesh and E. Bhatia. Prevalence & risk factors of pre-hypertension & hypertension in an affluent north Indian population. Indian J Med Res 128, December 2008, pp 712-720.
25. Chockalingam A, Ganesan N, Venkatesan S, Gnanavelu G, Subramaniam T, JaganathanV, et al. Patterns and predictors of pre-hypertension among "healthy'' urban adults in India. Angiology 2005; 56: 557-63.
26. Goldstein IB, Shapiro D, Guthrie D. Ambulatory blood pressure and family history of hypertension in healthy men and women. Am J Hypertens 2006; 19: 486-91.
27. Carretero OA, Oparil S. Essential hypertension. Part I: definition and etiology. Circulation 2000; 101: 329-35.

AUTHORS:

1. Anand Sivaprasad
2. Geethadevi M.
3. Aravind K. R.
4. Sobha A.
5. Arjun C.
6. Arum M.
7. Angela Babu
8. Aswathy T. U.

PARTICULARS OF CONTRIBUTORS:

1. 8th Semester MBBS Student, Department of Community Medicine, Government Medical College, Kottayam, Kerala.
2. Assistant Professor, Department of Community Medicine, Government Medical College, Kottayam, Kerala.
3. 8th Semester MBBS Student, Department of Community Medicine, Government Medical College, Kottayam, Kerala.
4. Professor and HOD, Department of Community Medicine, Government Medical College, Kottayam, Kerala.
5. 8th Semester MBBS Student, Department of Community Medicine, Government Medical College, Kottayam, Kerala.
6. 8th Semester MBBS Student, Department of Community Medicine, Government Medical College, Kottayam, Kerala.
7. 8th Semester MBBS Student, Department of Community Medicine, Government Medical College, Kottayam, Kerala.
8. 8th Semester MBBS Student, Department of Community Medicine, Government Medical College, Kottayam, Kerala.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Geethadevi M,
Panchavadi, Mathilbhagom,
Thiruvalla, Pathanamthitta-689101,
Kerala.
Email: geethadevi22@gmail.com

Date of Submission: 23/09/2014.
Date of Peer Review: 24/09/2014.
Date of Acceptance: 07/10/2014.
Date of Publishing: 10/10/2014.