

PREVALENCE, DETERMINANTS AND AWARENESS REGARDING HYPERTENSION AMONG ADULTS IN A RURAL AREA OF MANIPUR

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ABSTRACT: AIMS: To find out the prevalence, determinants and awareness regarding hypertension. **SETTING AND DESIGN:** Community based cross-sectional study conducted in Saikot PHC area under Churachandpur district of Manipur. **MATERIALS AND METHODS:** Structured interview schedule was administered to 504 adults selected by multistage sampling during 1st October 2005 to 30th September 2006. **STATISTICAL ANALYSIS:** SPSS 11.5 was used for data entry and analysis, descriptive statistics, χ^2 test, student - t test, binary logistic regression analysis etc. were used for presenting data and $p \leq 0.05$ was considered significant. **RESULTS:** Prevalence of hypertension and pre hypertension were 25% and 14.3% respectively and 11.5% subjects had optimum BP. Awareness regarding hypertension was 7.7%. Prevalence of hypertension was significantly higher among older subjects ($p = 0.000$), females ($p = 0.01$), Meitei ($p = 0.000$), obese subjects ($p = 0.003$), sedentary workers ($p = 0.000$), ex-smokers ($p = 0.000$), regular BP checkers ($p = 0.01$) and subjects, who used to consume chicken and fish in more number of days per week ($p = 0.000$). Age (OR = 1.042, 95% CI = 1.027 - 1.056, $p = 0.000$), BMI (OR = 1.132, 95% CI = 1.050 - 1.220, $p = 0.001$), diet (OR = 7.381, 95% CI = 1.200 - 45.406, $p = 0.031$) etc. were significant determinants of hypertension. Very few subjects were aware about the risk factors of hypertension. Knowledge regarding the preventability and controllability of hypertension was also poor. **CONCLUSIONS:** Prevalence of hypertension was higher and knowledge regarding hypertension was poorer than other areas of India, so behaviour change communication for promotion of healthy lifestyle in order to prevent hypertension in this community is needed.

KEY WORDS: Hypertension, Pre hypertension, Prevalence, Risk factors, Manipur.

INTRODUCTION: Hypertension is a common cardiovascular disorder and a silent killer too. Pooling of Indian epidemiological studies shows that hypertension is present in 25% urban and 10% rural subjects. As an underestimate, India has got 65.5 million hypertensive subjects and out of it 31.5 million live in rural and 34 million in urban area. There are 1 billion hypertensive subjects worldwide & 7.1 million deaths per year may be attributable to it. It is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India.¹ Data collected by various investigators show that there is great increase in the prevalence of hypertension among rural population, who are being exposed to stress of acculturation and modernization. Prevalence of hypertension has scaled up more than double in last 30 years.² So far limited numbers of studies have been conducted in the North Eastern states of India for revealing the prevalence and awareness of hypertension. Manipur differs from rest of the nation regarding geographic condition, climate, food habit, literacy, culture & practice, ethnicity etc. But these factors may play a role on blood

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pressure of the inhabitants of this area. So to reveal the prevalence, correlates and level of awareness regarding hypertension among adults, the present study was conducted in a rural area of Manipur.

MATERIAL AND METHODS: A community based cross-sectional study was conducted during 1st October 2005 to 30th September 2006 among 504 subjects aged 18 years and more, residing under Saikot Primary Health Centre area, Churachandpur district of Manipur. Minimum sample size requirement for this study at 95% confidence, using 2.5% absolute error and considering the prevalence of hypertension in rural area of India as 10% ¹was 554. Multistage sampling was followed to choose the study subjects. During data collection 4 persons denied to participate in the study, 11 were out of station, 14 were serving outside the village, 4 persons were staying in this area for less than one year, one was suffering from schizophrenia, one from hemiplegia and 15 subjects could not be contacted in spite of best effort. Thus total 50 subjects met exclusion criteria and final sample size was 504 giving a response rate of 89.52%. A pre-tested structured interview schedule, mercury sphygmomanometer, electronic weighing scale and a non-stretchable metallic measuring tape having lowest measuring capacity up to 0.1 cm. were used for data collection. Data were collected by house to house survey. After obtaining informed verbal consent, the subjects were interviewed confidentially in presence of a female medical social worker and then their blood pressure, height, weight, hip circumference, waist circumference etc. were measured and noted down in the pre-tested interview schedule. The interview schedule contained questions regarding age, sex, ethnicity, occupation, education, income, diet, medication, smoking and drinking habits, salt and oil intake, daily activity, physical exercises etc. Blood pressure was measured as per guidelines adopted from Perloff D et al, 1993. ³Hypertension was defined as systolic blood pressure ≥ 140 mm Hg and / or diastolic blood pressure ≥ 90 mm Hg or on anti-hypertensive treatment. Pre-hypertension was defined as systolic blood pressure of 130 to 139 mm Hg and / or diastolic blood pressure of 85 to 89 mm Hg. Optimal blood pressure was defined as systolic blood pressure of 120 to 129 mm Hg and diastolic blood pressure of 80 to 89 mmHg. Awareness regarding hypertension was defined as self reporting of prior diagnosis of hypertension in oneself made by a health professional prior to this study. Data entry and analysis were performed in computer using SPSS 11.5. Descriptive statistics, chi-square test, student - t test and binary logistic regression analysis were used for presenting data and testing the significance. Probability value of ≤ 0.05 was considered as significant. The study was approved by the Ethics Committee of Regional Institute of Medical Sciences, Imphal.

RESULTS: Prevalence of hypertension was found to be 25%, pre-hypertension was 14.3% and only 11.5% subjects had optimum blood pressure. Awareness regarding hypertension among the study subjects was found to be 7.7%. Among the study subjects 39.1% were males and 60.9% were females. Majority i.e. 53.4% belonged to 18 – 40 yr age group, 27.2% to 41 – 60 yr age group and 19.4% belonged to >60 yr age group. Regarding community, 47.2% were Mizo, 47% were Hmar and 5.8% were Meitei. Out of them, 50.8% were moderate workers, 36.1% were heavy workers and 13.1% were sedentary workers. Majority, i.e. 44.4% were primary educated, 30.4%, were secondary educated and 6.9% were either graduate or above. Among the study subjects 22.02% were earning

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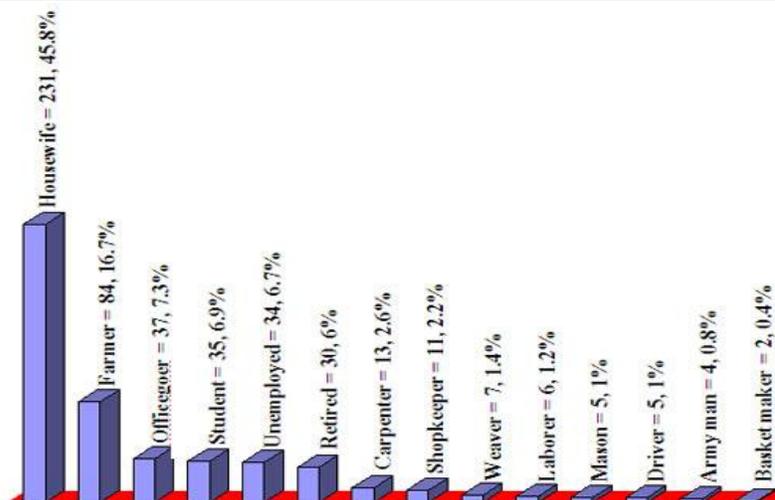
Rs. 500 or less per month, 24.4% were earning Rs. 501 – 750, 26.59% were earning Rs. 751 – 1111.1 and 26.98% were earning Rs. 1111.2 or more per month.

Table 1: Socio-demographic profile of the study subjects

Variables	Subgroups	Number	Percentage
Age (yr)	18 – 40	269	53.4
	41 – 60	137	27.2
	> 60	98	19.4
Sex	Male	197	39.1
	Female	307	60.9
Community	Mizo	238	47.2
	Hmar	237	47
	Meitei	29	5.8
Occupation	Moderate worker	256	50.8
	Heavy worker	182	36.1
	Sedentary worker	66	13.1
Education	Illiterate	92	18.3
	Primary	224	44.4
	Secondary	153	30.4
	Graduate & above	35	6.9
Monthly income (Rs.)	≤ 500	111	22.02
	501 - 750	123	24.4
	751 – 1111.1	134	26.59
	≥1111.2	136	26.98

Majority of the study subjects (45.8%) were housewives, 16.7% were farmers, 7.3% were office goers, 6.9% were students, 6.7% were unemployed, 6% were retired persons, 2.6% were carpenters, 2.2% were shopkeepers, 1.4% were weavers, 1.2% were labourers, Drivers and mason both were 1%, 0.8% were army men and 0.4% were basket makers.

Fig. 1: Bar diagram showing occupations of the study subjects.



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Mean systolic and diastolic blood pressures were significantly higher among subjects aged >40 yr than the younger (p = 0.000).

Table 2: Mean blood pressure by age of the study subjects			
Blood pressure	Age (yr)	BP (mm Hg) Mean (SD)	Significance
Systolic	≤ 40	114.24 (14.01)	t = 7.921 p = 0.000
	> 40	127.34 (22.60)	
Diastolic	≤ 40	72.25 (11.04)	t = 6.080 p = 0.000
	>40	78.54 (12.17)	

Prevalence of hypertension was found to be significantly higher among older subjects (p = 0.000), females (p = 0.01), Meitei community (p = 0.000) and obese subjects (p = 0.003). Hypertension was more prevalent among subjects having lower literacy, higher per capita income and higher (≥1) waist hip ratio, but these were not significant.

Table 3: Blood pressure status by age, sex, community, literacy, physical exercise, BMI, WHR, income and physical exercise of the study subjects.				
Variables	Subgroups	Hypertensive Number (%)	Non-hypertensive Number (%)	Significance
Age	18 – 40 yr	35 (13.01)	234 (86.98)	$\chi^2 = 53.542$ p = 0.000
	41 – 60 yr	43 (31.38)	94 (68.61)	
	> 60 yr	48 (48.97)	50 (51.02)	
Sex	Male	61 (30.96)	136 (69.03)	$\chi^2 = 5.63$ P = 0.01
	Female	65 (21.17)	242 (78.82)	
Community	Mizo	56 (23.52)	182 (76.47)	$\chi^2 = 38.39$ p = 0.000
	Hmar	57 (24.05)	180 (75.94)	
	Meitei	13 (44.82)	16 (55.17)	
Literacy	Illiterate & primary	121 (25.79)	348 (74.20)	$\chi^2 = 1.73$ P = 0.188
	Secondary & above	5 (14.28)	30 (85.71)	
Income	≤ 500	21 (18.91)	90 (81.08)	$\chi^2 = 3.21$ p = 0.359
	501 -750	33 (26.82)	90 (73.17)	
	751 – 1111.1	38 (28.35)	96 (71.64)	
	≥ 1111.2	34 (25)	102 (75)	
BMI	Obese subject	4 (100)	0	P = 0.003 †
	Non-obese	122 (24.4)	378 (75.6)	
Waist hip ratio	<1	121 (24.44)	374 (75.55)	$\chi^2 = 3.05$ P = 0.08
	≥1	5 (55.55)	4 (44.44)	

† Fisher's exact test.

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Hypertension was significantly more prevalent among the sedentary workers ($p = 0.000$), ex-smokers ($p = 0.000$), those who used to check their BP regularly ($p = 0.01$) and subjects, who used to consume chicken and fish in more number of days per week ($p = 0.000$). Prevalence of hypertension was higher among regular alcohol consumers, subjects, who were not consuming extra salt other than in the cooked food and those who were not performing physical exercises regularly, but these were not significant.

Table 4: Blood pressure status by smoking, drinking, consumption of extra salt, type of food and physical exercise of the study subjects.

Variables	Subgroups	Hypertensive Number (%)	Non-hypertensive Number (%)	Significance
Smoking habit	Occasional	3 (11.53)	23 (88.46)	$\chi^2 = 20.61$ $p = 0.000$
	Regular	47 (30.51)	107 (69.48)	
	Never	64 (21.05)	240 (78.94)	
	Quitter	12 (60.00)	8 (40)	
Drinking habit	Occasional	10 (33.33)	20 (66.66)	$\chi^2 4.44$ $p = 0.217$
	Regular	8 (38.09)	13 (61.9)	
	Never	103 (23.46)	336 (76.53)	
	Quitter	5 (35.71)	9 (64.28)	
Extra salt consumption	Occasional	12 (30.0)	28 (70.0)	$\chi^2 = 4.67$ $p = 0.096$
	Regular	72 (22.0)	256 (78.0)	
	Never	42 (30.9)	94 (69.1)	
Practice of BP check up	Regular	73 (29.67)	173 (70.32)	$\chi^2 = 5.60$ $P = 0.01$
	Irregular	53 (20.54)	205 (79.45)	
Type of food	Egg & Red meat	114 (23.51)	371 (76.49)	$\chi^2 = 13.29$ $P = 0.000$
	Chicken & Fish	12 (63.16)	7 (36.84)	
Physical activity	Sedentary workers	28 (42.42)	38 (57.57)	$\chi^2 = 99.47$ $p = 0.000$
	Moderate workers	56 (21.87)	200 (78.12)	
	Heavy workers	42 (23.07)	140 (76.92)	
Physical exercise	Regularly	4 (20.0)	16 (80.0)	$\chi^2 = 0.07$ $P = 0.79$
	Not regularly	122 (25.2)	362 (74.8)	

Binary logistic regression analysis revealed that a subject had 4.2% more chance of having hypertension for every year of advancement in age ($OR = 1.042$, 95% CI = 1.027 – 1.056, $p = 0.000$). Likewise a person had 13.2% more chance of getting hypertension with every unit increase in his BMI ($OR = 1.132$, 95% CI = 1.050 – 1.220, $p = 0.001$). Subjects consuming chicken and fish in more number of days per week were at 7.381 fold higher risk of developing hypertension than those who were consuming egg and red-meat in more number of days per week ($OR = 7.381$, 95% CI = 1.200 – 45.406, $p = 0.031$). But the effects of other variables in determining the hypertensive status of a subject did not attain the level of statistical significance.

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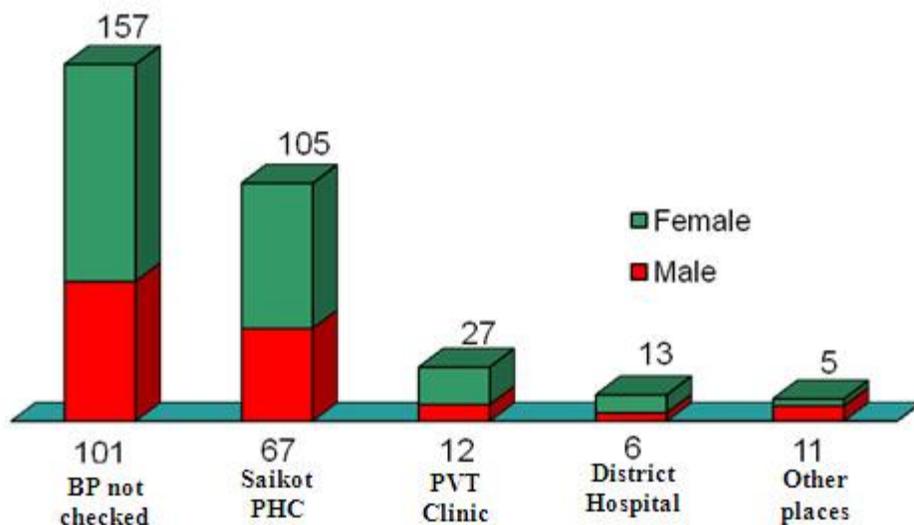
Table 5: Binary logistic regression analysis showing the predictors of hypertension.

Continuous variables		Odds ratio (95% C.I.)	p - value
Age		1.042 (1.027 - 1.056)	0.000
BMI		1.132 (1.050 - 1.220)	0.001
Waist hip ratio		14.167 (0.436 -459.839)	0.135
Per-capita income / m (Rs.)		1.000 (1.000 - 1.000)	0.511
Discrete variables		Odds ratio (95% C.I.)	p - value
Gender	Male	1.242 (0.733 - 2.103)	0.421
	Female	1	
Community	Meitei	0.796 (0.154 - 4.123)	0.786
	Mizo& Hmar	1	
Literacy	Undergraduate & above	0.509 (0.165 - 1.573)	0.241
	Illiterate & primary	1	
Diet	Fish & chicken	7.381 (1.200 - 45.406)	0.031
	Egg & red meat	1	
Smoking	Regular smoking	1.173 (0.707 - 1.947)	0.536
	Occasional & never	1	
Alcohol intake	Regular consumption	1.019 (0.284 - 3.654)	0.966
	Occasional & never	1	
Physical activity	Sedentary workers	1.173 (0.585 - 2.352)	0.654
	Moderate & heavy workers	1	
Extra salt consumption	Never consumers	0.987 (0.570 - 1.710)	0.963
	Occasional & regular	1	

Out of 258 subjects, who did not check their BP earlier, 101 were males and 157 were females. Out of 172 subjects who checked their BP at the Saikot PHC, 67 were males and 105 were females. Out of 19 subjects who went to Churachandpur district hospital for BP checkup, 6 were males and 13 were females. 39 subjects visited private clinics for BP check up and out of them 12 were males. 16 subjects had their BP checkup from places other than the above places and out of them 11 were males

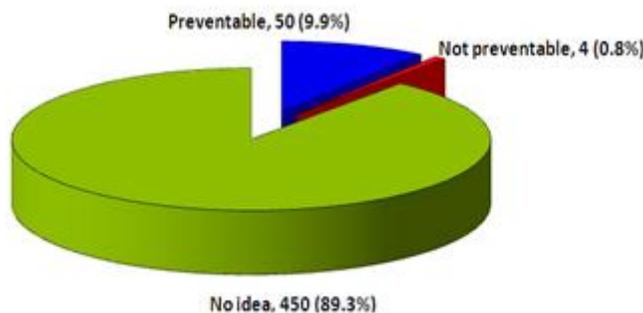
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Fig. 2: Component bar diagram showing gender wise frequency distribution of study subjects according to the places of their previous BP check up.



Higher educated subjects ever checked their BP in the past than the rest, though it was not significant ($p = 0.14$). Subjects having secondary or higher level of education had higher level of awareness regarding hypertension (14.2%) than those who were either illiterate or primary educated (7.3%). But it was statistically insignificant ($p = 0.219$). Among the self-reported hypertensive subjects, 61.53% were not on treatment, 66.66% were not taking medicine regularly and 76.92% were not checking their BP regularly. Regarding the risk factors of hypertension, 1.6% of the subjects knew fatty food intake, 0.6% knew excess meat intake, 0.4% knew excess salt intake, another 0.4% knew alcohol consumption and 0.2% knew lack of physical exercise, but 96.8% of the subjects had no idea about it. Regarding the consequences of untreated hypertension, 1.8% of the study subjects knew brain stroke, 0.6% knew vertigo & headache, 0.2% knew fainting, another 0.2% knew heart attack, but 97.2% subjects had no idea about it. Only 2.8% had correct knowledge about the consequences of untreated hypertension. Among the study subjects, 50 (9.9%) opined hypertension as a preventable disease, 4 (0.8%) as not preventable, whereas 450 (89.3%) subjects did not have any idea whether hypertension was a preventable disease or not.

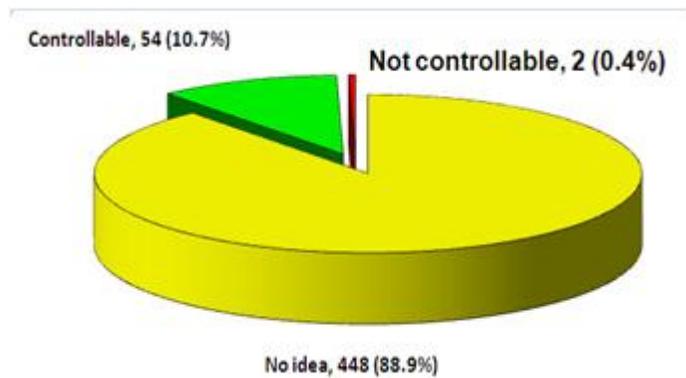
Fig. 3: Pie chart showing knowledge of the study subjects regarding preventability of hypertension.



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On the other hand, 54, (10.7%) of the study subjects knew hypertension as a controllable disease, 2, (0.4%) as not controllable and 448, (88.9%) subjects had no idea whether hypertension was a controllable disease or not.

Fig. 4: Pie chart showing knowledge of the study subjects regarding controllability of hypertension.



DISCUSSION: In the present study prevalence of hypertension was 25%, which was at par with Ronald DD et al, 1985⁴ (26%), Amad S et al, 1996⁵ (26.7%) and Zdrojewski T et al, 2001⁶ (25.9%). But Goel NK and Kaur P, 1996⁷ found the prevalence of hypertension to be 7.19%, N. Sarraf-Zadegan et al, 1999⁸ found 18.0% and Gilberts EC et al, 1994⁹ found 1.5%. Lower prevalence of hypertension found in these studies may be due to using the older WHO definition of hypertension ($\geq 160/90$ mmHg). Sarafidis PA et al, 2004¹⁰ found the prevalence of hypertension to be 30.5%. This higher value may be due to predominant urban, sedentary lifestyle and ethnicity of that study population. In the present study, mean systolic and mean diastolic BP among ≤ 40 yr age group subjects was found to be 114.25 & 72.25 mmHg respectively. Similarly Kim JS et al, 2001¹¹ also found these to be 121 ± 15.7 mm Hg and 79.5 ± 11.6 mmHg respectively. In the present study men had significantly higher prevalence of hypertension than women. Perez Fernandez R et al, 2007¹² also had similar finding. Present study detected significant differences in prevalence of hypertension among various ethnic communities which was at par with Nadir EB and Thomas K, 2003¹³, Ruixing Y et al, 2006¹⁴ and Agyemang C et al, 2006¹⁵. In this study significantly lower prevalence of hypertension was found among the moderate workers. Zachariah MG et al, 2003¹⁶, Reddy SS and Prabhu GR, 2005¹⁷, Iftexhar Q et al, 2001¹⁸ and Amad S et al, 1996⁵ also had similar finding. Like Iftexhar Q et al, 2001¹⁸, Aggarwal OP et al, 2000¹⁹, Rao PSS et al, 1984²⁰, Amad S et al, 1996⁵ and Zachariah MG et al, 2003¹⁶ this study also detected significant association of hypertension with higher body mass index of subjects. Smoking habit was found to be directly related to hypertension in this study which was also found by other authors like Reddy SS and Prabhu GR, 2005¹⁷, Kalavathy MC and Thankappan KR, 2000²¹ and Amad S et al, 1996⁵ also. In this study quitters had highest prevalence of hypertension, which may be due to the fact that previously they were heavy smokers and were compelled to quit because of adverse effects. In this study regular alcoholics showed higher prevalence of hypertension. Reddy SS & Prabhu GR, 2005¹⁷, Ruixing Y et al, 2006¹⁴ and Hazarika NC, 2003²² also found the same. Present study did not find significant association of hypertension with income of the subjects. This supports the findings of Kalavathy MC and Thankappan KR, 2000²¹, Rao PSS et al, 1984

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²⁰ and Srivastava RN et al, 1979 ²³. Present study detected higher prevalence of hypertension among subjects having higher waist hip ratio. Al Riyami AA and Afifi MM 2002 ²⁴ also had similar finding. In the present study prevalence of hypertension did not differ with literacy of the subjects. Sarafidis PA et al, 2004 ¹⁰ also had such finding. In this study older age, Obesity, intake of fish and chicken in more number of day per week etc were identified as significant predictors of hypertension. Similarly Iseu Gus et al, 2004²⁵ also identified age, obesity etc as the significant predictors. Addo J et al, 2006 ²⁶ also found age and obesity as significant predictors of hypertension. In this study awareness regarding hypertension was found to be 7.7%. Amad S et al, 1996 ⁵ found it to be 9.7%.

CONCLUSION: Prevalence of hypertension detected in this population was higher as compared to other areas of India and only less than one third of the hypertensive subjects were aware about their disease condition. Adherence to treatment was also poor among the hypertensive subjects. Majority had no idea about the risk factors and consequences of untreated hypertension, which was alarming. In this context awareness campaign and behavior change communication for promoting healthy lifestyle in this community is required for prevention of hypertension in this community.

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