International Journal of Community Medicine and Public Health
Raju J et al. Int J Community Med Public Health. 2022 Dec;9(12):4493-4498
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20223204

Original Research Article

Blood pressure control among hypertensive patients of tribal origin attending a primary care centre in Kerala

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Received: 05 September 2022
Accepted: 02 November 2022

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ABSTRACT

Background: High blood pressure increases the risk for significant health issues including heart attack and stroke. According to studies, the tribal population in India is likewise going through a transformation and has increasing prevalence of high blood pressure. Therefore, this study was done with the objective to determine the proportion of hypertensives with uncontrolled blood pressure among persons of tribal origin attending a primary care centre in Kalpetta, Wayanad, Kerala. To study the factors responsible for the control of hypertension. To assess the adherence to anti-hypertensive medicine using the Morisky Green Levine Scale (MGLS).
Methods: A cross-sectional study was conducted at Amrita Kripa Charitable Hospital, Kalpetta, among 167 adult hypertensives of tribal origin. A semi-structured questionnaire and MGLS were used for data collection. Data analysis was done using SPSS version 21.
Results: The proportion of uncontrolled hypertension among the tribal population was found to be high (70.7%). There was a significant association with uncontrolled hypertension and lower education (p value 0.036) and also with alcohol (p value 0.007). Among participants with uncontrolled blood pressure, poor adherence was found to be 31.7% while 68.3% of participants had good adherence. Alcohol consumption (aOR- 4.10, 95% CI 1.12-14.98) and lower education (aOR-6.74, 95% CI 1.28-35.46) were independent predictors of uncontrolled hypertension on multivariate analysis.
Conclusions: Seven in ten hypertensives attending the primary care centre had uncontrolled hypertension. Larger studies among persons of tribal origin are necessary at the community level through reducing alcohol use is imperative.

Keywords: Adherence, Blood pressure, Tribal population, Uncontrolled hypertension

INTRODUCTION

Hypertension is a condition in which the blood vessels have abnormally high pressure for an extended period.[1] The burden of hypertension is disproportionately felt in low and middle-income countries, which accounts for two-thirds of all case.[2] Hypertension is a primary cause of mortality worldwide, impacting one out of every four men and one out of every five women. The term "silent killer" is commonly used to describe hypertension. The majority of people are unaware that they have hypertension since it generally has no warning signs or symptoms. The reported prevalence of hypertension in tribal populations varies from 10% to 55.5% in different regions and states of India.[3] Two-thirds of older Indian adults had hypertension, with the majority being undiagnosed or diagnosed but not adequately controlled.[4] According to a systematic review and meta-analysis by Rizwan et al the pooled prevalence of primary hypertension among adult tribal populations of India was found to be 16.1%.[5]

"Tribals" are a group of people who live in isolation in natural, unpolluted environments far from civilization, keeping their traditional values, practices, beliefs, and myths, and are considered the land's autochthonous people. The world's second largest concentration of tribal people is found in India. Indian tribes account for approximately 8.3% of the total population of the nation, with a population of 8,17,420, Wayanad is the least inhabited district and has the largest number of tribals at 1,51,443.[6] According to the 2011 Indian census, Kerala's scheduled tribe population was 4,84,839 individuals.[7] Paniyas, Kurumas, Adiyars, Kurichyas, Ooralis, Kattunaikkans, and Uraali Kurumas are among the district's native Adivasis.[8] According to research, with respect to recent changes in social structure and cultural patterns, tribes in India are undergoing a similar transformation. Substantive changes can be marked in their food pattern and intake practices. The incidence of diseases like cardiovascular disease, and others has increased significantly.[9] Hypertension is frequent among Kerala's tribal population, especially among the middle-aged and elderly, men, illiterates, persons from lower socioeconomic classes, people who have sedentary occupations, drink alcohol, and those who are overweight or obese.[10] A study was carried out in a primary tribal care centre in Kainatty, Wayanad, to assess the proportion of uncontrolled hypertension among the hypertensive indigenous people and to determine adherence to medication.

METHODS

A cross-sectional study was planned and carried out from August to October 2021 at a tribal primary care centre in Wayanad. The study was conducted among the adult tribal patients visiting the primary care centre run by a charitable trust.

All persons of tribal origin above the age group of 18 years visiting the health centre were included in the study while excluding pregnant and lactating women. The minimum calculated sample size was 146 ($4pq/d^2$), using the prevalence of a study, conducted among the Kani tribe in Thiruvananthapuram district, Kerala where uncontrolled blood pressure among hypertensives was 40.6%, with a 95% confidence level and relative precision of 20%.[11]

Hypertension is defined as office systolic blood pressure ≥140 mm of Hg and/or diastolic blood pressure values ≥90 mm of Hg.[12] Participants whose hypertension under control are those who were diagnosed as hypertensives and may/may not be on medication with a systolic blood pressure <140 mm of Hg and diastolic blood pressure <90 mm of Hg. Participants with uncontrolled hypertension are those who were diagnosed as hypertensives and are on medication for more than 1 month with a systolic blood pressure ≥140 mm of Hg and/or diastolic blood pressure values <90 mm of Hg on taking an average of two blood pressure readings.

Sampling technique

All the patients of tribal origin visiting the primary care outpatient department diagnosed with hypertension for more than 1 month were included in the study. Pregnant and breastfeeding women were excluded from the study.

Study tool

A semi-structured questionnaire was used for data collection. Each study participant was interviewed for collecting information regarding demographic details like age, sex, tribe, education, marital status, occupation, ration card colour, type of family, alcohol use and tobacco use. The questionnaire was administered through interview technique in the local language Malayalam after explaining regarding study and obtaining written informed consent. Ethical clearance was obtained from the institutional ethics committee, Amrita Institute of Medical Sciences (ECASM-AIMS 2021-386). Physical examination was carried out to measure the height, weight, and body mass index (BMI-weight in kg/height in m^2). BMI was classified based on WHO Asian Pacific classification.[13] A mercury sphygmomanometer was used to check blood pressure. Along with the blood pressure recorded on the day of the visit, the last recorded blood pressure written in the patient's outpatient case sheet was taken as the past reading. The average of these two readings was taken to assess control of blood pressure. The measurement of weight (kg) was taken using an analogue weighing machine. Measurement of height (cm) was taken using roll ruler wall mounted growth stature meter, the reading parallel to the red line in the vertical measuring bar was taken as a measurement for height. The Four-item Morisky Green Levine scale (MGLS) was used to evaluate the adherence to the medical regimen of patients with hypertension treated with drugs.[14]

Statistical analysis

The data collected from the study was entered into Microsoft excel and the analysis was done using IBM SPSS statistics for windows, version 21. Descriptive statistics for continuous variables were summarized as mean and standard deviation. The prevalence of uncontrolled hypertension in the hypertensive tribal population was summarized as percentages with 95% CI. A Chi-square test was used to assess the association between sociodemographic profile and uncontrolled hypertension. The p value <0.05 was considered as statistically significant. Bivariable and multivariable logistic analysis were used to identify the independent predictors for uncontrolled blood pressure.

RESULTS

The mean age of the study population was 56.8±12.01 years, with the majority being females (64.7%). The majority of the participants were married (95.8%), about 41% of people belonged to the Paniyas community, and

nearly half of the study participants had no formal schooling. The majority of the study participants (92.8%) belonged to the below poverty line (BPL) category. About a half of the respondents (46.1%) used some form of tobacco. Among the study participants, 65.9% never consumed alcohol while 34.1% had a history of alcohol consumption. Among 34.1% who had a history of alcohol consumption, 16.2 % were former drinkers, 8.4% were social drinkers and 9.6% were current drinkers (Table 1).

Table 1: Distribution of the study population based on socio-demographic characteristics and other factors (n=167).

Variable		Frequency	Percentage
Age (years)	25-40	15	9.0
	41-60	97	58.1
	61 above	55	32.9
Gender	Male	59	35.3
	Female	108	64.7
Tribal group	Paniyas	69	41.3
	Kurumas	61	36.5
	Others	37	22.2
Marital status	Unmarried	7	4.2
	Married	160	95.8
Education	No formal education	79	47.3
	Primary	27	16.2
	Middle	33	19.7
	High school and higher education	28	16.8
Occupation	Skilled and unskilled	108	64.7
	Home maker	32	19.1
	Unemployed	27	16.2
Socio economic status	APL	12	7.2
	BPL	155	92.8
Tobacco in any form	Yes	77	46.1
	No	90	53.9
Smoking	Yes	6	3.6
	No	161	96.4
History of alcohol consumption	Yes	57	34.1
	No	110	65.9
Type of family	Nuclear family	70	41.9
	Joint family	86	51.5
	Third generation family	11	6.6
Caffeinated drinks	Tea	46	27.5
	Coffee	13	7.8
	Tea and coffee	102	61.1
	None	6	3.6
Duration of hypertension	≤10 years	154	92.2
	>10 years	13	7.8
Family history of hypertension	Yes	66	39.5
	No	101	60.5
Modification of diet after diagnosis	Yes	130	77.8
	No	37	22.2
Salt intake after diagnosis of hypertension	Limited	136	81.4
	Not limited	31	18.6
Regular monitoring of blood pressure	Yes	151	90.4
	No	16	9.6
BMI (Asian)	Underweight (<18.5)	36	21.6
	Normal (18.5-22.9)	77	46.1
	Overweight at risk (23-24.9)	27	16.1
	Obese I (25-29.9)	24	14.4
	Obese II (≥30)	3	1.8
Complications of hypertension	With complication	20	12
	Without complication	147	88

Table 2: Univariate analysis for association of uncontrolled hypertension with socio-demographic factors and personal habits (n=167).

Socio-demographic characteristics		Blood pressure (n=167)		Chi-square value	P value
		Controlled N (%)	Uncontrolled N (%)		
Age (years)	25-40	2 (13.3)	13 (86.7)	2.037	0.361
	41-60	30 (30.9)	67 (69.1)		
	61 and above	17 (30.9)	38 (69.1)		
Gender	Male	13 (22.0)	46 (78.0)	2.35	0.156
	Female	36 (33.3)	72 (66.7)		
Community	Paniyas	22 (31.9)	47 (68.1)	0.375	0.829
	Kurumas	17 (27.9)	44 (72.1)		
	Others	10 (27.0)	27 (73.0)		
Marital status	Unmarried	1 (14.3)	6 (85.7)	0.799	0.675
	Married	48 (30.0)	112 (70.0)		
Education	No formal education	27 (34.2)	52 (65.8)	8.560	0.036
	Primary	2 (7.4)	25 (92.6)		
	Middle	9 (27.3)	24 (72.7)		
	High school and higher education	11 (39.3)	17 (60.7)		
Occupation	Skilled and unskilled	30 (27.8)	78 (72.2)	4.857	0.088
	Homemaker	14 (43.7)	18 (56.3)		
	Unemployed	5 (18.5)	22 (81.5)		
Type of family	Nuclear family	16 (22.9)	54 (77.1)	2.717	0.257
	Joint family	30 (34.9)	56 (65.1)		
	Third generation family	3 (27.3)	8 (72.7)		
Socioeconomic status	APL	4 (33.3)	8 (66.7)		**0.749
	BPL	45 (29.0)	110 (71.0)		
Smoking	Yes	1 (16.7)	5 (83.3)		**0.672
	No	48 (29.8)	113 (70.2)		
Alcohol	No	40 (36.4)	70 (63.6)		**0.007
	Yes	9 (15.8)	48 (84.2)		
Caffeinated drinks	Tea	11 (23.9)	35 (76.1)	4.608	0.203
	Coffee	3 (23.1)	10 (76.9)		
	Tea and coffee	35 (34.3)	67 (65.7)		
	None	0 (0.0)	6 (100.0)		
MGLS score	Good adherence	38 (33.3)	76 (66.7)		**0.104
	Poor adherence	11 (20.8)	42 (79.2)		

**Fisher's exact test.

Table 3: Independent determinants of uncontrolled blood pressure among patients visiting primary care centre (n=167).

Variables		Unadjusted odds ratio	P value	Adjusted odds ratio	P value
Gender	Male	1		1	0.240
	Female	0.565 (0.271-1.178)	0.128	2.166 (0.597-7.857)	
Education	No formal education	1.246 (0.512-3.033)	0.628	1.438 (0.542-3.811)	0.466
	Primary	8.088 (1.588-41.189)	0.012	6.746 (1.283-35.462)	0.024
	Middle	1.725 (0.587-5.071)	0.321	1.698 (0.546-5.281)	0.361
	High school and higher education	1		1	
Occupation	Skilled and unskilled	0.591 (0.205-1.703)	0.330	0.500 (0.154-1.621)	0.248
	Homemaker	0.292 (0.088-0.966)	0.044	0.331 (0.085-1.294)	0.112
	Unemployed	1		1	
Alcohol	No	1	0.007	1	0.032
	Yes	0.328 (0.146-0.739)		4.108 (1.127-14.982)	
MGLS score	Good adherence	1	0.100	1	0.198
	Poor adherence	0.524 (0.243-1.131)		1.735 (0.750-4.013)	

*Adjusted for gender, education, occupation, alcohol, MGLS Score.

The proportion of uncontrolled blood pressure among the hypertensive tribal population was high at 70.7% (95% CI 63.79-77.60).

The vast majority of the participants had a history of hypertension ≤10 years. Among the study participants, one-third of them had a family history of hypertension, a large portion of study participants had modified their diet and limited their salt intake after diagnosis of hypertension (81.4%) (Table 1).

Tobacco users in any form among the tribal population were high (46.1%), which included smoking (3.6%) and in chewable form (42.5%). Most of the study participants had regular monitoring of blood pressure (90.4%), a small portion (12%) of them had complications of hypertension such as heart attack, stroke, kidney, and vision impairment. The proportion of underweight was higher at 21.6% than obese, 16.2%. Among the study population, 32.9% had other specific diseases like gastritis, gastroesophageal reflex disease (GERD), hypothyroidism, hyperthyroidism, and gout. Among the study participants, 22.8% had coexisting diabetes mellitus.

A vast proportion of the study population reported that they did not forget to take medication (84.4%). Most of the study participants were not careless about taking anti-hypertensive medications (77.8%). The greater part of the study population didn't stop the medication when feeling better (89.22%). Most of the study participants (99.4%) didn't stop medicines when felt worse. The MGLS score ranged from 0-4, and the three levels of medication adherence based on this score; high, medium, and low adherence were 0, 1-2, 3-4 points, respectively.[14] According to MGLS, adherence was found to be high among 68.3%, medium among 26.9% and low among 4.8% of study participants. For the statistical analysis, the mean value of the MGLS score (0.491) was taken as cut-off value: good adherence ≤0.49, poor adherence >0.49. Among participants with uncontrolled blood pressure, poor adherence was found to be 31.7% while 68.3% of participants had good adherence.

Among the study population, 67.7% of study participants had a systolic BP≥140 mmHg and 65.9% of the study participants had diastolic BP≤90 mmHg. A total of 70.7% of the study participants had uncontrolled blood pressure when satisfying the condition of systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg.

Based on the univariate analysis for the association of controlled hypertension with sociodemographic characters and personal habits, the association of education was found to be significant (p value=0.036). The association of alcohol was also found to be significant (p value =0.007) (Table 2).

Bivariable and multivariable logistic analyses were done to identify independent predictors associated with uncontrolled blood pressure. All variables with p values <0.2 during chi-square analysis were entered together to do the multivariate model. Accordingly, variables such as gender, education, occupation, alcohol and MGLS score were entered. Alcohol, education, occupation had statistically significant association with the uncontrolled blood pressure. Accordingly, the multivariate analysis showed alcohol consumption (aOR- 4.303, 95% CI 1.194, 15.50) and lower education (aOR- 6.746, 95% CI 1.283, 35.46) as an independent predictor of uncontrolled blood pressure with p value <0.05 (Table 3).

DISCUSSION

The proportion of uncontrolled blood pressure among the hypertensive tribal population was high at 70.7% (95% 63.79-77.60). The association of uncontrolled hypertension with education was found to be significant (p value 0.036) with those with a lower education having poor control. Uncontrolled blood pressure was found to be significantly higher among the regular alcohol users (p=0.007). A majority (68.3%) of the study participants had a high adherence according to the MGLS score. On multivariate analysis, alcohol consumption and lower education status were the independent predictors of uncontrolled blood pressure.

The prevalence of uncontrolled hypertension among the hypertensive tribal population attending the primary care centre in Kainatty was much higher than the Kani tribes of Kerala (40.6%).[11] The increased prevalence of uncontrolled hypertension may be because it was a hospital-based study where more sick people are likely to congregate. Tobacco use among study participants was high (46.1%). The high prevalence of uncontrolled hypertension may also be due to the reluctance to make lifestyle changes such as stopping tobacco and alcohol use.

The association of uncontrolled hypertension with education was found to be significant (p value 0.036). In a study among hypertensives in tribals, higher education was found to be significantly protective.[10] However there were no similar studies on blood pressure control among tribal hypertensives. In a population-based study among the Kani tribe in Thiruvananthapuram, 13.1% did not have formal education whereas in this hospital-based study 47.3% of the tribal participants did not have any formal education and 16.8% of them had high school education while 11.4% of the Kani tribe had high school education. Because the majority of the participants were poor, they decided to work to supplement their family's income rather than attend school.

The alcohol users had 4 times higher odds of having uncontrolled hypertension. A similar association was found between alcohol use and hypertension among the adult tribal population of Kerala.[10] The current alcohol consumption is lower than the national prevalence (32%). The pathophysiology underlying the link between alcohol

consumption and blood pressure is complex, and several mechanisms have been hypothesised. Endothelial dysfunction, intracellular calcium build-up, activation of the renin-angiotensin-aldosterone system, heightened sympathetic activity, vasoconstriction, and elevated oxidative stress are all probable explanations for the increased blood pressure.[15]

The study was done at a tribal primary care centre, the findings cannot be applied to the broader tribal community. The majority of the risk variables were self-reported, which might have been prone to recall bias.

CONCLUSION

The proportion of uncontrolled blood pressure among the hypertensive tribal population was high at 70.7%. Limiting alcohol and improving education appear to be key to attaining target levels of blood pressure control. However, large scale population-based studies are necessary to corroborate these findings.

ACKNOWLEDGEMENTS

We would like to acknowledge all the staff at department of community medicine and public health at Amrita Institute of Medical Sciences, Kochi and also like to extend our gratitude to the study participants and all the staff working at Amrita Kripa Charitable Hospital, Kainatty, Kerala.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Raju J, Sreedevi A, Sasidharan N, Vasudevan S. Blood pressure control among hypertensive patients of tribal origin attending a primary care centre in Kerala. Int J Community Med Public Health 2022;9:4493-8.