

Prevalence of hypertension and its associated factors among tribal population in Southern Rajasthan



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ABSTRACT

Background: The prevalence of hypertension (HTN) and associated factors across social groups including tribal communities as a major non-communicable disease across world is a topic of very high contemporary relevance, especially when it is misconceived as a cause of morbidity only for the richer strata of the society. **Aims and Objectives:** The present study was conducted to assess the prevalence of HTN and its associated factors among tribal population in South Rajasthan. **Materials and Methods:** The cross-sectional study is based on a sample of 300 adult members living in 160 randomly selected tribal households in Udaipur district. The information collected included systolic and diastolic blood pressure along with a set of associated sociodemographic, behavioral risk factors, level of physical activities, and body mass index. The descriptive statistical measures such as class frequencies, mean, standard deviation, and Chi-square test of significance for association were used. **Results:** The estimated overall prevalence of HTN was 23.33% with 29.05% for male and 17.76% for female tribal adult population. The sex, age, family history of HTN, occupation, socioeconomic class, and landholding size were found significantly associated with HTN. The risk factors such as alcohol consumption, smoking, and additional salt intake emerged with odds ratio of 1.83, 2.94, and 1.14, respectively. **Conclusion:** The health intervention focused to increase physical activity and to reduce alcohol consumption, smoking, and additional salt intake can prove to be effective control measures for emerging problem of HTN in tribal area.

Key words: Hypertension; Non-communicable disease; Tribal

INTRODUCTION

Hypertension (HTN) is a major public health challenge across the world and is a major cause for mortality as well as disability-adjusted life years. The health problems of the people are closely associated with various socioeconomic factors including lifestyle of the people.¹ With 29.8% overall, 33.8% urban and 27.6% rural area prevalence, HTN is a major public health problem and a leading non-communicable disease (NCD) in India. It is a major leading cause for mortality in India for more than 2 decades mainly due to unhealthy diets leading to high blood pressure (BP) as a consequence of atherosclerosis

coupled with obesity, lack of physical work, etc.² There is a widespread misconception that the cardiovascular diseases in the developing countries affect mostly the richer persons.³

India has the second largest concentration of the tribal population in the world with about 8.6% of the total population. The tribal concentration in India is in the northeast and in the Central India covering Madhya Pradesh (14.7%), Maharashtra (10.1%), Odisha (9.2%), Rajasthan (8.9%), Jharkhand (8.3%), and Gujarat (8.6%). Rajasthan has the fourth highest tribal population in India with a share of 13.48% of state's population.³ The

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concentration of tribal population in Rajasthan is more in the southern districts of the state including Udaipur.

The epidemiological transition in the world is more toward NCDs as compared to communicable diseases.⁴ Despite incredible development in health sector in India, there is a large segment of people living in isolation under natural settings and strictly adhering to the traditional values, customs, and beliefs but with the advent of modern information and communication technologies, the tribal population also are gradually changing their lifestyle and studies have shown that the prevalence of different NCDs such as diabetes and HTN is also on a rise among tribal population also.⁵ A large number of NCDs studies have been conducted in India such as malnutrition in tribal areas. However, only a very few studies have been conducted on the prevalence of NCDs in tribal areas. The extensive search reveals that there is paucity in data-based evidence on prevalence of HTN on tribal population in various parts of the country.⁶ HTN is reported as one of the major contributors for avoidable deaths and morbidity in India. India is committed to the Sustainable Development Goals to reduce premature mortality from NCDs by 2030.⁷

There are 635 tribes in India spread over various parts of the country living mostly in hilly and plain forest areas. Health being a primary concern for overall development of the people, research studies assume great significance. With the epidemiological transition and rising burden of NCDs across societies, prevalence and factors associated with NCDs area topic of vital contemporary relevance.⁸ Hence, the present study on the prevalence of HTN and its associated factors has been carried out in a tribal belt of Southern Rajasthan which is dominated by Bhil Mina community.

Aims and objectives

The study was conducted

1. To assess the prevalence of hypertension among tribal population and
2. To assess the associated factors attributed to hypertension among tribal population in Southern Rajasthan.

MATERIALS AND METHODS

The community-based cross-sectional study was conducted during October 2021–January 2022 in the vicinity of Rural Health Training Centre (RHTC) of Pacific Institute of Medical Sciences (PIMS) having dominance of tribal households along with other communities. The sample size of 262 was calculated using the formula $4pq/l^2$ where p is taken as 21.7%.⁸ The study was based on simple random sampling technique with a random sample of 160 tribal

households having 300 adult members. Out of the list of tribal households available with RHTC, 160 tribal families were randomly selected to have 300 adults in the sample which is more than the calculated size of 262 adults to estimate the prevalence of HTN in the area. The study population included persons above 18 years of age residing in the selected tribal areas.

Inclusion criteria

Adults above 18 years of age group residing in all the selected households who have given the consent at the time of visit of data collection team consisting of faculty members, interns, and medical social workers were included in the study.

Exclusion criteria

Those adults who have other chronic diseases and pregnant women at the time of data collection were excluded from the study. The study was conducted after obtaining the ethical clearance from the Institutional Ethical Committee of PIMS, Udaipur, dated September 08, 2021, with reference no. STU/IEC/2021/75. The confidentiality of the data was maintained.

The sociodemographic factors for the study included were age, sex, marital status, type of family, number of family members, education level, type of occupation, socioeconomic status, landholding area, and family history of HTN. The various behavioral risk factors included were history of smoking, alcohol consumption, additional salt intake, and information on their level of physical activity. Apart from systolic blood pressure (SBP) and diastolic blood pressure (DBP), height and weight of the selected participants were also measured.

According to JNC VIII criteria, HTN is considered as SBP of 140 mmHg or greater and DBP of 90 mmHg or greater.⁹ Both newly diagnosed HTN, previously diagnosed cases of HTN and those who were taking antihypertensive drugs were included in the number of prevalent cases. The study subjects were examined by taking average of two BP readings of SBP and DBP at an interval of 5 min using Omron sphygmomanometer. BP was measured in sitting position on the left arm, rested at the level of heart. The readings are taken close to 2mm of Hg mark on the scale.

The body weight of the participant was measured (to the nearest 0.5 kg) by standing on the digital weighing scale. Participants were instructed to wear minimum outwear and no footwear while their weight was being measured. Height was measured (to the nearest 0.5 cm) by standing in an erect position in stadiometer. Weight in kilograms was divided by height in meter squared to measure body mass index (BMI). Based on their BMI, individuals were classified into groups, namely, underweight (BMI < 18.5), normal

(BMI=18.5–24.9), Grade 1 overweight (BMI=25.0–29.9), Grade 2 overweight or obese (30–39.9) and Grade 3 overweight or morbid obesity (BMI≥40.0) as per the WHO.^{10,11}

Additional salt takers were those persons who consumed extra salt while eating food or having salty items such as prickles, preserved sauces, and other such food items.¹²

Statistical methods

The complete data were entered into MS Excel sheet with the unique identity for each person included in the study. The estimation of frequencies, mean, standard deviation, and other descriptive statistics was calculated using options for statistical functions in MS Excel. The personal and family-related factors such as age, sex, marital status, type of family, and family size were assessed for having association with HTN. The socioeconomic factors such as occupation, education, household income, and landholding were tested for association with the prevalence of HTN. The association of factors related to lifestyle (alcohol consumption and smoking) and additional salt intake with the HTN among the study population was tested using Chi-square test. $P < 0.05$ was considered to be statistically significant.

RESULTS

A total of 300 tribal participants were interviewed during the study. One 52 (50.7%) were females as compared to 148 (49.3%) males. In the present study, 101 (33.6%) study participants were illiterate and 250 (83.3%) were married. Among 300 tribal adults, 173 (57.6%) of the study participants were alcoholic and 108 (36.0%) were smokers. It was observed that 70 (23.3%) study participants were underweight and 61 (20.3%) were overweight or obese. The mean and standard deviation of SBP were 132 ± 22.1 mm Hg and that for DBP were 90 ± 18.5 mm Hg with coefficient of variation of 16.74% and 20.55%, respectively. Among the 70 identified tribal adults with HTN, more consistency in SBP levels was observed (Table 1).

It was found that sex of the adult person ($P=0.029$), age ($P=0.04$), and family history ($P=0.04$) were significantly

associated with HTN for tribal population. However, factors such as marital status, type of family, and family size were found having no significant association with the prevalence of HTN (Table 2).

The factors such as occupation ($P=0.02$), socioeconomic class ($P=0.001$), and landholding size ($P=0.0001$) were found to have significant association with HTN. Education level was found to have no significant association with HTN (Table 3).

Alcohol consumption ($P=0.004$), smoking ($P=0.0002$), and additional salt intake ($P=0.02$) were found to have significant association with HTN. The exposure to risk factor such as addiction to alcohol, smoking and additional salt intake was found with odds ratio of 1.83, 2.94 and 1.14, respectively, indicating that exposure to these risk factors contributes to HTN (Table 4). The factor like type of physical activities was having association with HTN in the tribal population under study (Table 5).

Out of sample of 300 adults, only 70 tribal adults emerged with HTN of varied levels. Only 20 persons (6.6%) could be identified with Stage II level of HTN. In the study, 38 persons (12.7%) were in Stage I and 12 persons (4.0%) were in pre-HTN stage (Figure 1).

DISCUSSION

The major studies on tribal groups in various parts of the country were focused on malnutrition and related factors. There are large number of studies on general communities to ascertain the prevalence and associated factors of HTN. However, only very few studies have been done on the problem of HTN among tribal communities. The present study aimed to study the prevalence of HTN and its associated factors among the tribal population residing in Udaipur, Rajasthan. The prevalence of HTN was 23.33% in tribal community in the present study. Similar finding was observed in the study done by Meshram II et al., among the tribal population of Maharashtra.¹³ The study done by Raina et al., revealed that the prevalence of HTN was 10.5%.⁶ Another study done by Tripathi et al., found that reported prevalence of HTN ranged from 10% to 55.5% among the tribal population in different regions and states of India.²

The prevalence of HTN among adult tribal male was 29.05% and that for female was 17.76% in the present study. Another study by Meshram II et al., also revealed that significantly higher prevalence rate found among men (28%) as compared to women (19%).¹³ Similar findings were reported by various studies^{1,2,6,12,14-16} but few studies

Table 1: Mean and variability in hypertension among tribal population with prevalence (n=70)

Type of blood pressure	Mean (mmHg)	Standard deviation (mmHg)	Coefficient of variation (%)
Systolic (mmHg)	132	22.1	16.74
Diastolic (mmHg)	90	18.5	20.55

Table 2: Association of family and environmental factors with the hypertension (n=300)

Particulars	Characteristics (n)	Hypertension		Chi-square value	P-value
		Yes (n=70) n(%)	No (n=230) n(%)		
Sex	Male (n=148)	43 (29.1)	105 (70.9)	4.73	0.029*
	Female (n=152)	27 (17.8)	125 (82.2)		
Age	<20 (n=33)	02 (6.1)	31 (93.9)	11.28	0.04*
	21-30 (n=42)	08 (19.1)	34 (80.9)		
	31-40(n=48)	10 (20.8)	38 (79.2)		
	41-50 (n=50)	10 (20.0)	40 (80.0)		
	51-60 (n=60)	18 (30.0)	42 (70.0)		
	>60 years (n=67)	22 (32.8)	45 (67.2)		
Marital status	Married (n=250)	61 (24.4)	189 (75.6)	0.63	0.427
	Unmarried (n=50)	09 (18.0)	41 (82.0)		
Type of family	Nuclear (n=260)	61 (23.5)	199 (76.5)	0.004	0.94
	Joint/three generation (n=40)	09 (22.5)	31 (77.5)		
Number of family members	1-2 (n=29)	07 (24.1)	22 (75.9)	0.02	0.98
	3-5 (n=123)	29 (23.6)	94 (76.4)		
	>5 (n=148)	34 (23.0)	114 (77.0)		
Family history of hypertension	Yes (n=186)	51 (27.4)	135 (72.6)	3.98	0.04*
	No (n=114)	19 (16.7)	95 (83.33)		

*Statistically significant with P<0.05

Table 3: Association of socioeconomic factors with the hypertension among the study population (n=300)

Particulars	Characteristics (n)	Hypertension		Chi-square value	P-value
		Yes (n=70) n(%)	No (n=230) n(%)		
Occupation	Agriculture (n=114)	22 (19.3)	92 (80.7)	9.59	0.022*
	Labor (n=65)	11 (16.9)	54 (83.1)		
	Service (n=39)	16 (41.0)	23 (59.0)		
Education	Housewife and others (n=82)	21 (25.6)	61 (74.4)	3.46	0.1777
	Illiterates (n=101)	20 (19.8)	81 (80.1)		
	Primary education (n=129)	28 (21.7)	101 (78.3)		
Socioeconomic status	High school and above (n=70)	22 (31.4)	48 (68.6)	24.30	0.001*
	Class I (n=29)	12 (41.4)	17 (58.6)		
	Class II (n=38)	18 (47.4)	20 (52.6)		
	Class III (n=53)	15 (28.3)	38 (71.7)		
	Class IV (n=96)	13 (13.5)	83 (86.5)		
Landholdings	Class V (n=84)	12 (14.3)	72 (85.7)	28.30	0.0001*
	Landless (n=51)	03 (5.9)	48 (94.1)		
	<2.5acres (n=134)	22 (16.4)	112 (83.6)		
	>2.5 acres (n=115)	45 (39.1)	70 (60.9)		

*Statistically significant with P<0.05

Table 4: Association of risk factors with the hypertension among the study population (n=300)

Particulars	Characteristics (n)	Hypertension		Chi-square value	Odds ratio	P-value
		Yes (n=70) n(%)	No (n=230) n(%)			
Alcohol	Yes (n=173)	48 (27.8)	125 (72.2)	3.88	1.83	0.004*
	No (n=127)	22 (17.3)	105 (82.7)			
Smoking	Yes (n=108)	39 (36.1)	69 (63.9)	14.30	2.94	0.0002*
	No (n=192)	31 (16.1)	161 (83.9)			
Additional salt intake (gram/day)	>5 (n=217)	52 (24.0)	165 (76.0)	4.87	1.14	0.02*
	<5 (n=83)	18 (21.7)	65 (78.3)			

*Statistically significant with P<0.05

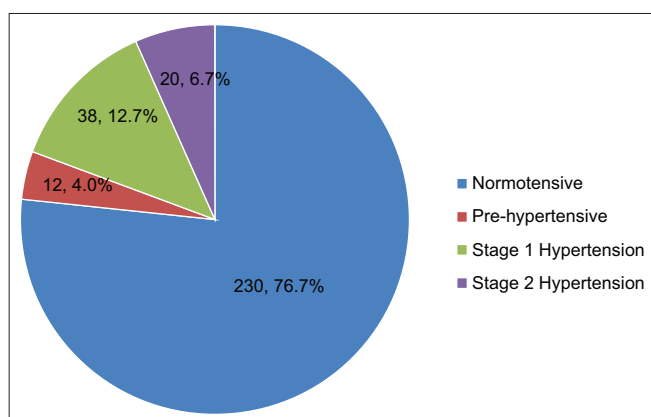
showed higher prevalence of HTN in females as compared with males.¹⁷⁻¹⁹ The study done by Kakhkashan A et al.,

showed that gender was not found to be associated with HTN significantly.²⁰

Table 5: Association of physical activities with the hypertension (n=300)

Particulars	Characteristics (n)	Hypertension		Chi-square value	P-value
		Yes (n=70) n(%)	No (n=230) n(%)		
Physical activity	Sedentary (n=95)	45 (47.4)	50 (52.6)	57.26	0.0001*
	Moderate (n=86)	21 (24.4)	65 (75.6)		
	Heavy (n=119)	04 (3.4)	115 (96.6)		
Body mass index (kg/m ²)	Underweight <18.50(n=70)	09 (12.9)	61 (87.2)	7.3	0.06
	Normal (18.50–24.99) (n=169)	48 (28.4)	121 (71.6)		
	Overweight and pre-obese (25.00–29.99) (n=47)	11 (23.4)	36 (76.6)		
	Obese (≥30) (n=14)	02 (14.3)	12 (85.7)		

*Statistically significant with P<0.05

**Figure 1:** Distribution of blood pressure levels among the study subjects (n=300)

The present study showed that HTN was significantly associated with the age. The various studies done among tribal population also revealed that as the age increases, the prevalence of HTN trend also increases.^{8,12,16,20-22} Age probably represents an accumulation of environmental influences and the effect of genetically programmed senescence in body systems.²³

The present study revealed that the prevalence of HTN is not significantly associated with literacy level. The study done by Sathiyarayanan S et al., showed that 140 (17.9%) participants who were illiterate had HTN compared to 19 (11.2%) participants who were literate.¹⁹ This difference was also statistically significant which is contrary to the finding in the present study. The present study revealed that the prevalence of HTN is significantly associated with socioeconomic class. The study done by Bhar et al., in tribal area of West Bengal reported that majority of the participants 54.1% were belonged to socioeconomic Class IV (modified BG Prasad scale), 26.7% belonged to Class III, 12.2% to Class II, and 4.1% and 2.9% to Class V and I, respectively.²⁴ The study done by Kakhkashan A et al., among the tribal population of Kerala showed that socioeconomic class was not found to be significant for high BP.²⁰

The average BP among the tribal population with the prevalence of HTN is not very high which may be due to relatively small number of persons (28.6%) in Stage II HTN. However, the prevalence of 23.33% could be seen as 70 out of 300 tribal persons included in the study came out with HTN of varying level including pre-HTN stage in the study area. Those identified with pre-HTN cases were advised to be more regular in physical activities including daily walking and occasional check up with doctors. The Stage I and Stage II patients were advised for regular monitoring of BP and regular checkup at nearby hospital.

The significant association of socioeconomic factors such as occupation, income levels, and landholding size with the prevalence of HTN also is in conformity that HTN is more associated with lifestyle of people which are again associated with socioeconomic factors. The significant association of food and habit factors such as consumption of alcohol, smoking and additional intake of salt with the prevalence of HTN is in conformity with the findings in other studies.

The odds ratio greater than one for exposure such as alcohol consumption, smoking, and additional intake of salt revealed that the tribal people in the study area are prone to HTN because of changing lifestyle. The various studies done by Kumar et al., in Madhya Pradesh, Kaipu B et al., and Reddy in Andhra Pradesh, and Kakhkashan A et al., in Kerala state showed alcohol intake to be significant factor responsible for high BP.^{1,12,20} Another study done by Anand and Hussain found that odds of having HTN are 4.09 times greater in alcohol drinkers.¹⁶ The study done by Sathiyarayanan S et al., showed that alcohol did not show any association with HTN.¹⁹

The study done by Tripathi N et al., revealed that HTN was significantly associated with smoking.² In a study done by Anand N et al., it was found that the odds of having hypertension was 10.9 times greater among smokers when compared to non-smokers. Another study done by Sathiyarayanan S et al., observed that smoking did not had association with HTN.¹⁹

The study done by Tripathi N et al., Chakma T et al., Kaipu B et al., and Anand N et al., found that HTN was significantly associated with those who consumes additional salt.^{2,3,12,16} In a study done by Anand N et al., it was found that the odds of having hypertension was 2.3 times greater among those who consume additional salt.¹⁶ Another study by Meshram II et al., found that there was no association of HTN with salt consumption.¹³

The low rate of the prevalence of HTN in the study area revealed that the tribal population is relatively less prone to the disease. However, among those having the problem of HTN, there are persons in pre, Stage I, and Stage II which indicate the need to educate tribal population to take adequate preventive measures from normal situation to different stages of HTN.

The dominance of more people in sedentary and moderate physical activity and its significant association with the prevalence of HTN is indicative of the fact that the shift in physical activity from heavy to lower types may be compensated so as to remain disease free by the tribal population. The study done by Kaipu B et al., Anand N et al., and Kakhkashan A et al., showed that obesity was found to be significant factor responsible for high BP.^{12,16,20} Meshram II et al., revealed that overweight/obesity had 2 times higher risk of HTN (BMI \geq 23, CI=1.38–2.60).¹³ The study done by Sathiyarayanan S et al., showed that the high BMI was statistically significant (P=0.05) with 23.8% of participants with a BMI \geq 25.00 having HTN compared to 15% of participants with normal BMI having HTN.¹⁹ Kumar RK et al., in Narayanganj block of Mandla District, Madhya Pradesh, showed that the association of HTN with BMI was not significant in the study subjects.¹

Limitations of the study

Since it is a cross-sectional study, it is difficult to establish the cause-effect relationship with certainty. To ascertain the disease and outcome association, further research is required among various tribal populations in different geographical location throughout the country.

CONCLUSION

The prevalence of HTN was higher in males compared to females in the study group. The factors significantly associated with HTN included sex, age, family history of HTN, occupation, education, socioeconomic status of family, and landholding. The risk factors such as alcohol, smoking, and additional salt intake were having significant association with HTN. Increased physical activity, reduced alcohol consumption, reduced smoking, and reduced salt intake can prove to be effective control measures for HTN in tribal area.

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Authors Contribution:

NM, MS- Concept and design of study or acquisition of data, coordination of project activities or analysis and interpretation of data; **MP, DKL**- Review of Literature, Interpretation of data, Manuscript preparation and revising it critically for important intellectual content; **VKA**- Interpretation of data and statistical analysis; **MS**- Manuscript preparation and revising of manuscript

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