

# Prevalence of hypertension and the associated factors among Sabar and Munda tribes of Eastern India

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## ABSTRACT

**Background:** Hypertension can be attributable to about 10% of all non-communicable diseases (NCDs). There is a steady rise in the prevalence of hypertension among both the urban as well as the rural population and the tribal communities are no exception to this. The present study was done during 2009-10 among two tribes residing in a more developed eastern district of Odisha, but the results can be compared with the studies done in recent times. **Objective:** 1. To find the prevalence of hypertension among the adult tribal population of Tangi-Choudwar block of Cuttack and to trace the associated risk factors of hypertension among them. 2. To assess their perception regarding hypertension. **Materials and Methods:** A cross-sectional study was carried out among the tribals of the Tangi-Chowdwar block of Cuttack district during 2009-2010. Total 832 study subjects aged  $\geq 18$  years were selected through multistage stratified random sampling. Anthropometric measurements and blood pressure were taken with standard instruments and methodology. Statistical tests, such as Chi-square, Logistic Regression, Odds Ratio, percentage, were used to analyze the data. **Result:** The overall prevalence of hypertension was 16.7% and 41% were pre-hypertensive. Bivariate analysis showed that the risk of hypertension was significantly associated with the tribe type, age range, tobacco use, marital status, and stress ( $P < 0.05$ ). Multivariate analysis showed that taking extra salt (OR-1.86; 95%CI-1.03-3.35) was significantly associated with hypertension ( $P < 0.05$ ). **Conclusion:** A large number of study participants (16.7%) were found to be hypertensive and in the majority of them, the common risk factors detected were tobacco usage and extra salt intake. Further epidemiological study needs to be conducted among these tribes to know the exact nature and causes of hypertension.

**Keywords:** Awareness, high blood pressure, risk factors, tribals, tribes of Odisha

## Background

Hypertension is one of the most important risk factors for cardiovascular, cerebrovascular, and renal disease with an overall worldwide prevalence of approximately 26% among the adult

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population in 2002, which may increase to 29% by 2025.<sup>[1]</sup> Nearly 9.4 million deaths each year or 16.5% of all deaths can be attributed to high blood pressure.<sup>[2]</sup> In India, hypertension is the leading Non-Communicable Disease (NCD) risk & estimated to be attributable to nearly 10% of all deaths.<sup>[3]</sup> and in 2016, it was one of the leading risk factors responsible for 8.5% of the disability-adjusted life-years (DALYs)<sup>[4]</sup> The studies done across India have been showing an increasing trend in the prevalence of hypertension.<sup>[5]</sup>

India has the second-largest tribal population in the world with 705 scheduled tribes (STs), which constitute approximately

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8.6% of the nation's population.<sup>[6]</sup> Odisha is home to 62 tribes with 9.9% of the total tribal population of India, but the tribal population constitutes 22% of the state's total population.<sup>[7]</sup> Indian tribals are a heterogeneous group and around 90% of them live in rural areas, predominantly in hilly, forest, and remote areas.<sup>[6]</sup> They have poor health indicators with limited access to health care services. They face the quadruple burden of diseases i.e. communicable diseases (TB, leprosy, HIV, etc); NCDs (cancer, diabetes, hypertension), malnutrition, mental illness, and addiction.<sup>[8]</sup> Most of the indicator of health care coverage or health status among the tribal communities is worse by 10–25% as compared to their non-tribal counterpart.<sup>[9]</sup> But through specific programs and policies, only limited focus is being given to combat communicable diseases among them. The importance of preventing NCDs among different tribes is yet to be realized. For any disease prevention strategy, the first and foremost requisite is to know about the disease and the associated risk factors and the behavior of the community toward the disease. There is a paucity of literature on hypertension and the associated factors among different tribal communities in India. However, from the available studies, it has been observed that hypertension prevalence in the adult tribal population is increasing since 1984 across 2011 and 2019.<sup>[10,11]</sup> Very few studies conducted in Odisha reflect the prevalence of hypertension in the tribal population.<sup>[12,13]</sup> Hence, the present study has attempted to find the prevalence of hypertension, and its associated factors among the tribals and to study the perception of these tribes with respect to hypertension.

## Material and Methods

**Sample size:** A cross-sectional community-based study was carried out in the Tangi-Choudwar block of the Cuttack district. After reviewing the literature related to hypertension studies on the tribal population, the study conducted by Yadlapalli S *et al.*<sup>[13]</sup> for Anugul, Cuttack and Khordha district of Odisha, which showed a prevalence of hypertension among tribals to be 19% (male-24.8% and female-13.4%), was accepted for the present study and the sample size was calculated to be 819, considering maximum allowable error at 20% and design effect of 2. A total of 832 participants were included in the study.

**The design of the study:** Multistage stratified sampling design was adopted for conducting the research.

**Study period:** The study was conducted during August 2009–January 2010.

**Sampling procedure:** Out of 14 blocks in Cuttack districts, Tangi-Choudwar was selected at random. In the Tangi-Choudwar block, there are 155 villages in total. Out of these, four villages were selected by Probability Proportional to Size (PPS) sampling technique. In every selected village, all ST households (HHs) were listed. One ST HH was chosen randomly as the starting point and all the members of the household aged  $\geq 18$  years present during the day of the interview and were included in the

study. Severely ill or bedridden persons, unable to comprehend, pregnant women, lactating mothers (less than 6 months of delivery), and unwilling or non-co-operative persons were excluded from the study. The data were recorded in a structured and pre-tested schedule.

Anthropometric measurements, such as height, weight, waist circumference, and hip circumference, were recorded as per standard guidelines laid down by World Health Organisation (WHO). Blood pressure was measured as per standard guidelines by WHO as well.<sup>[14]</sup> A single investigator measured the blood pressure of all the study population. For diagnosis of hypertension, JNC-VII (The seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure) criteria were followed up.<sup>[15]</sup> Physical activity of subjects was assessed taking into consideration the occupational as well as non-occupational physical activity. Users of all types of tobacco products were included in the category of tobacco users. A current user of tobacco was defined as a person who was consuming tobacco in any form (smoking, chewing, snuff) within the past year. For estimation of alcohol consumption, a person who had taken alcohol in any form within the last 12 months was taken as having exposure to alcohol. The daily dietary salt intake of an individual was calculated from the total dietary salt consumption of the family in a week and the total number of family members. The amount of extra salt intake was recorded by probing questions about the use of adding extra salt to food (excluding the previously added salt to a meal during preparation) while eating and any type of salty food taken (e.g. salted dried fish, pickles, etc.).

**Stress and anxiety:** One questionnaire was developed to assess the factors perceived as stress or anxiety by the tribal population. The questionnaire contained a list of life events experienced by the respondents in the last year. Stress or anxiety was said to be present if any of these factors were present or it was perceived so by the respondent. This questionnaire was incorporated into the main questionnaire for the study.

**Statistical analysis:** The data were analyzed using SPSS (17.0 ver.). Percentage, Chi-square test, odds ratio (with 95% CI), regression analysis were used wherever applicable. A *P* value less than 0.05 was considered significant.

**Ethical and institutional permission:** Permission from the Institute Ethics Committee of S.C.B. Medical College was obtained before initiating the study.

## Results

Total 832 adults of two tribes, i.e. Sabar and Munda, in four villages were examined. The Sabar tribe constituted 48% of the participants, whereas the Munda were 52%. The proportion of female participants (54.3%) was higher than male participants (45.7%). The literacy rate was very low among the participants. Overall, 79% of the participants were illiterate,

but among the female participants, 91.8% were illiterate. Most of the participants were agricultural laborers (79.3%). Among the participants, 73.2% used some form of tobacco and 63.5% consumed alcohol. Extra salt was taken by almost 82% of respondents [Table 1]. Mean dietary salt intake was 13.35 gms (+/-4.07 gms). 31.6% of respondents said to have stress in their life.

## Prevalence of Hypertension

The overall prevalence of hypertension among the tribals was found to be 16.7%; with females the prevalence was 15% and with males 18.6%. A significant increase in the

**Table 1: General characteristics of study population**

Characteristics	Male (%)	Female (%)	Total (%)
<b>Tribe</b>			
Munda	196 (51.3)	234 (52.0)	430 (51.7)
Sabar	186 (48.7)	216 (48.0)	402 (48.2)
<b>Age (In yrs)</b>			
18-29	105 (27.5)	84 (18.7)	189 (22.7)
30-44	92 (24.1)	112 (24.9)	204 (24.5)
45-59	82 (21.5)	123 (27.3)	205 (24.6)
>/=60	103 (27.0)	131 (29.1)	234 (28.1)
<b>Marital Status</b>			
Married	341 (89.3)	406 (90.2)	747 (89.8)
Single	40 (10.5)	29 (6.4)	69 (8.3)
Widow/widower	1 (0.3)	15 (3.3)	16 (1.9)
<b>Literacy Status</b>			
Illiterate	248 (64.9)	413 (91.8)	661 (79.4)
Upto Primary School	77 (20.2)	14 (3.1)	91 (10.9)
Middle class & above	57 (14.9)	23 (5.1)	80 (9.6)
<b>Occupation</b>			
Unskilled worker	334 (87.4)	284 (63.1)	618 (74.3)
Semiskilled/Skilled	22 (5.8)	11 (2.4)	33 (4)
Unemployed/Housewife	26 (6.8)	155 (34.4)	181 (21.8)
<b>BMI</b>			
<18.5 (underweight)	86 (22.5)	158 (35.1)	244 (29.3)
Normal	276 (72.3)	280 (62.2)	556 (66.8)
Overweight/obese	20 (5.2)	12 (2.7)	32 (3.8)
<b>Tobacco use</b>			
No	71 (18.6)	152 (33.8)	223 (26.8)
Yes	311 (81.4)	298 (66.2)	609 (73.2)
<b>Alcohol use</b>			
No	73 (19.1)	231 (51.3)	304 (36.5)
Yes	309 (80.9)	219 (48.7)	528 (63.5)
<b>Worker</b>			
Hard	23 (6)	7 (1.6)	30 (3.6)
Moderate	324 (84.8)	281 (62.4)	605 (72.7)
Sedentary	35 (9.2)	162 (36)	197 (23.7)
<b>Extra salt</b>			
Not Taken	77 (20.2)	72 (16)	149 (17.9)
Taken	305 (79.8)	378 (84)	683 (82.1)
<b>Stress</b>			
Absent	279 (73)	290 (64.4)	569 (68.4)
Present	103 (27)	160 (35.6)	263 (31.6)

prevalence of hypertension with increasing age was observed in females ( $P < 0.05$ ). The prevalence of hypertension among the tribal population was found to be 16.7% [Table 2]. Out of the total study participants, 11.7% had stage-I hypertension and 5% had stage-II hypertension. Sabar tribe had a higher prevalence of hypertension (20.9%) and Munda had a lower prevalence (12.8%), and this difference among the two tribes is statistically significant ( $P < 0.000$ ).

## Risk Factors for Hypertension

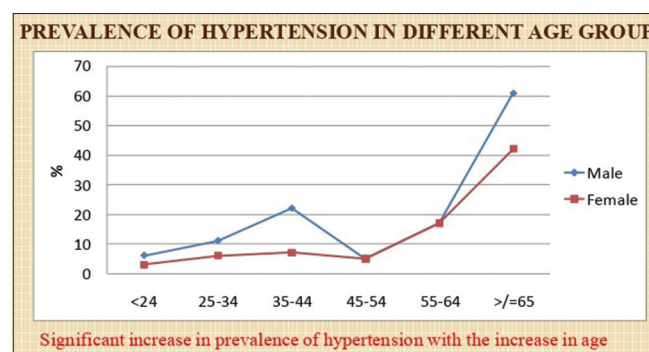
Bivariate analysis showed that the risk of hypertension was significantly associated with the tribe type, age-range, tobacco usage, marital status, and perceived stress ( $P < 0.05$ ) [Table 3]. The prevalence of hypertension increased with age in both males and females [Figure 1]. Multivariate Logistic Regression Analysis by forward conditional method was carried out. Age range (Age 45-59 yrs.: OR-2.8;95%CI-1.17-7.6; Age >/=60 yrs.: OR-9.4;95%CI-4.0-21.9), Sabar tribe (OR-2.2;95%CI-1.4-3.2), male gender (OR-1.56;95%CI-1.02-2.36), marital status (single-OR-0.22;95%CI-0.05-0.97;widow/widower-OR-3.3;95%CI-1.08-10.05), addiction to tobacco (OR-3.18;95%CI-1.67-6.05), taking extra salt (OR-1.86;95%CI-1.03-3.35) and stress (OR-1.77;95%CI-1.15-2.7) were found to be significantly associated with hypertension ( $P < 0.05$ ) [Table 4].

## Perception Regarding Hypertension

While assessing the perception regarding hypertension, it was found that only 1.3% of the respondents had any idea about the disease. Less than 1% could comment on the risk factors of hypertension. Only 18% of the respondents had positive health-seeking behavior and another 17% were in favor of consulting a traditional healer in their community if they became hypertensive. Around 4% of the subjects said that they would not seek any treatment as hypertension was not affecting their day-to-day life. This view was expressed mostly by the respondents who were diagnosed to be hypertensive during the research period [Table 5].

## Discussion

The present study was done during 2009–2010, when many studies were being done with urban and rural populations



**Figure 1: Prevalence of Hypertension in different age group**

showing an increasing trend of hypertension.<sup>[16-19]</sup> But very few studies have been done exclusively on the tribal population. Even after a decade, when the authors searched for literature, they found a paucity of data on hypertension among different tribes. As every tribe is very different from each other in terms of lifestyle, cultural practices, and behavior, extensive studies about NCDs, particularly hypertension, is needed in every tribe. In this research, we studied two tribes (Sabar and Munda) residing in Cuttack, a more developed district of Odisha. The overall prevalence of hypertension was found to be 16.7%; with females having a prevalence of 15% and males with 18.6% prevalence. The study done around that time in Gujarat showed similar results.<sup>[20]</sup> But the prevalence of hypertension among the Jenu-kuruba tribe of Mysore was found to be 21.7%, which is

slightly higher than what we found in our study.<sup>[21]</sup> This might be due to the influence of the urban lifestyle of Jenu-kuruba tribe. Other studies also showed higher prevalence. In a study carried out by Sachdev, the prevalence of hypertension among the tribals of Rajasthan ranged from 16% to 30%.<sup>[22]</sup> The prevalence of hypertension was 45% and 36% among adult tribal men and women respectively in Kerala.<sup>[23]</sup> The prevalence of hypertension in the Nicobarese tribe was found to be 50.5%, which is much higher than our finding.<sup>[24]</sup> This high prevalence in Nicobares tribes might be due to the over representation of older study subjects due to the unavailability of younger mass who usually go out for employment. A similar finding was shown by the study done by Kandpal *et al.* in the Bhotia of Uttarakhand, where the prevalence of hypertension was 43.4%.<sup>[25]</sup> A study conducted by Raina *et al.* shows that the tribes living in high altitudes showed a prevalence of 10.7%, which is much lower than our findings.<sup>[26]</sup> This decreased prevalence might be explained by the theory that both SBP and DBP decrease due to the physiological adaptation over several years of stay at a higher altitude. In our study, the male preponderance of hypertension was shown. Likewise, the study done by Yadlapalli S *et al.*<sup>[13]</sup> has documented a prevalence of HTN to be 24.8% among males and 13.4% in females. But the study carried out among that adult Savar tribe

**Table 2: Distribution of blood pressure in the study population**

Blood pressure	Male (%)	Female (%)	Total (%)
Normal	129 (33.8)	219 (48.7)	348 (41.8)
Pre-hypertension	182 (47.6)	163 (36.2)	345 (41.5)
Hypertension stage-I	59 (15.5)	39 (8.7)	98 (11.7)
Hypertension stage-II	12 (3.1)	29 (6.4)	41 (4.9)
Subtotal Hypertension	71 (18.6)	68 (15.1)	139 (16.7)

**Table 3: Association of hypertension with various risk factors: Bi-variate analysis**

Variables	Odds Ratio	95% CI	P	
Tribe	Munda	Reference	-	
	Sabar	1.80	1.24-2.61	0.002
Age in years	18-29	Reference	-	
	30-44	3.14	1.31-7.53	0.010
	45-59	3.45	1.45-8.20	0.005
	>/=60	15.10	6.78-33.63	0.000
Sex	Female	Reference	-	
	Male	1.28	0.89-1.85	0.181
Marital status	Married	Reference	-	
	Unmarried/single	0.143	0.035-0.59	0.007
	Widow/widower	4.8	1.76-12.99	0.002
Education	Illiterate	Reference	-	
	Upto primary school	1.25	0.717-2.176	0.433
	Middle school & above	0.894	0.468-1.707	0.734
Occupation	Unskilled labourer	Reference	-	
	Semiskilled & skilled labourer	1.36	0.57-3.22	0.482
	Unemployed/House wives	1.005	0.65-1.57	0.982
BMI	Underweight	Reference	-	
	Normal	1.262	0.83-1.92	0.277
	Overweight& obese	1.67	0.67-4.16	0.269
Tobacco addiction	No	Reference	-	
	Yes	4.63	2.51-8.56	0.000
Alcohol addiction	No	Reference	-	
	Yes	0.956	0.656-1.394	0.815
Taking Extra salt	No	Reference	-	
	Yes	1.67	0.98-2.90	0.058
Type of worker	Hard worker	Reference	-	
	Moderate worker	2.84	0.67-12.10	0.158
	Sedentary worker	3.03	0.688-13.3	0.143
Stress	Absent	Reference	-	
	Present	2.72	1.87-3.95	0.000

**Table 4: Multivariate logistic regression Analysis (Method-Forward conditional)**

Variable	OR	CI	P
Tribe			
Munda	1	-	-
Sabar	2.216	1.397-3.234	0.000
Age (in yrs)			
18-29	1	-	-
30-44	2.252	0.916-5.538	0.077
45-59	2.876	1.175-7.641	0.021
>/=60	9.43	4.054-21.933	0.000
Sex			
Female	1	-	-
Male	1.560	1.029-2.366	0.036
Marital status			
Married	1	-	-
Single	0.222	0.051-0.970	0.045
Widow/widower	3.296	1.081-10.053	0.036
Tobacco			
No	1	-	-
Addiction			
Yes	3.18	1.671-6.053	0.000
Extra salt			
No	1	-	-
Yes	1.860	1.032-3.351	0.039
Stress			
No	1	-	-
Yes	1.774	1.153-2.731	0.009

Other variable entered were- education, occupation, BMI, Alcohol addiction, Type of worker, but were not significant

**Table 5: Perception regarding hypertension and its management**

Response	No	%
I Perception regarding hypertension		
Ia Knew about hypertension	11	1.3
Ib Had idea about risk factors of hypertension	07	0.84
Ic Had knowledge about prevention of hypertension	05	0.60
II Perception regarding management of hypertension		
IIa Would Consult a doctor and take medicine (by purchasing)	08	0.96
IIb Would like to come to a Govt. Hospital and get medicine free of cost	152	18.2
IIc Would consult a traditional healer in the locality.	143	17.1
IId Would not like to seek any treatment.	36	4.32
IIe Could not suggest any solution	493	59.2

of Vishakhapatnam, Andhra Pradesh showed a prevalence of stage-I hypertension among males to be 1.1% and that in females was 9.4%.<sup>[27]</sup> In our study, the Sabar, a more educated and acculturating tribe had a prevalence of hypertension to be 20.9%, and that in Mundas, which is a more backward tribe, was 12.8%. Similar findings were recorded in a study from Andhra Pradesh with a high prevalence of hypertension among the acculturating tribe, the Valmiki, than among the Khondh, a primitive tribal group, which denoted acculturation as a cause for increased BP levels and increased prevalence of hypertension.<sup>[28]</sup> The prevalence of hypertension increased with increasing age, which is depicted in Figure 1. A phenomenon of increased blood pressure level with increasing age is well-established by many studies, which was reflected in our study also.<sup>[29]</sup>

Out of 832 studied populations, 41% of people were pre-hypertensive. The prevalence of pre-hypertension was 45% and 39% in tribal males and females respectively of Maharashtra.<sup>[30]</sup> But the prevalence of pre-hypertension in a

rural area of Central India was 18.8%<sup>[31]</sup> and that in Himachal Pradesh ranged between 21–25%,<sup>[32]</sup> which is much less than our study population. Though the concept of pre-hypertension is no more used by the scientific community it can be a good predictor of hypertension and more studies are needed to be conducted to establish this.

The use of tobacco and alcohol among the study population was about 73% and 63% respectively. In our study, tobacco addiction was found to have a significant association with hypertension ( $P < 0.0001$ ), whereas the association of alcohol addiction with the risk of hypertension was non-significant. But among the Nicoberes tribe<sup>[24]</sup> both tobacco and alcohol addiction did not add to the risk of hypertension, whereas the tribals of Maharashtra<sup>[30]</sup> showed a significant association of alcohol and tobacco addiction to the risk of hypertension.

Dietary salt consumption can influence the BP independent of other risk factors.<sup>[33]</sup> The use of extra salt in the diet was prevalent among this study population (82% of the population took extra salt), and this could be established as a risk factor for hypertension.

Stress was a significant risk factor for hypertension among the study population. The high prevalence of essential hypertension and the rise in BP with age observed in westernized society has been attributed to psychosocial stress, which may be related to the type of social economy.<sup>[34]</sup> In our study, we find hypertension among those who were perceived to have some kind of stress in their life and it was significantly associated with hypertension. As a general belief prevails among the non-tribal population that the tribal people are happier and lead a stress-free life may be a wrong notion. Due to the change in lifestyle, they may be leading a stressful life and more in-depth studies are needed to explore this aspect of the tribal community.

In the present study, the awareness about hypertension, its risk factors, and perception about treatment is very low as compared to other studies done in India and outside India.<sup>[35,36]</sup> This may be due to a high level of illiteracy among the present tribal population.

One of the interesting findings in our study is that many tribal people rely upon the traditional healer for their health issues. A few studies in India also showed similar results.<sup>[37,38]</sup> Hence, these traditional healers can be involved in the ongoing National Programme for Prevention and Control of Cancers, Diabetes, Cardiovascular diseases and Stroke (NPCDCS)<sup>[39]</sup> for motivating and mobilizing the tribal community for better care for chronic diseases.

An increasing trend of chronic diseases and the associated factors, such as unhealthy diet, tobacco consumption, physical inactivity, etc., are being experienced by the tribal communities residing in different parts of our country.<sup>[40-42]</sup> Similar findings were obtained in our study and indicate that tribal communities

are at the transition phase of communicable disease to chronic disease or NCD epidemic. In the wake of this chronic disease epidemic, the role of primary care physicians is vital. With a glaring shortage of specialists in tribal areas,<sup>[9]</sup> the primary care physicians with proper training in chronic disease management in the tribal population would be pivotal in reversing the trend.

## Conclusion

Despite this study being conducted a decade ago, its findings hold true for the current situation of tribal people in India. The present study shows that the prevalence of hypertension among the Sabar and Munda tribes is at par with other tribal populations in different parts of India. The common modifiable risk factors detected in this study were tobacco consumption, extra salt intake, and stress. The tribal population needs to be made aware of the role of these risk factors in causing hypertension so that in long run the prevalence of hypertension can be reduced. Though the tribal communities are considered to have stress-free life, but our study found that many of them perceived to have stress in their life and this is significantly associated with the presence of hypertension. Hence, further epidemiological study needs to be conducted among these tribes to explore different factors that may be playing any role in causing hypertension, the silent killer.

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## Conflicts of interest

There are no conflicts of interest.

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