Prevalence and Determinants of Hypertension among Tribal Adults in Sambalpur, Odisha: A Cross-Sectional Study

Jitendra Kumar Bhuyan[1], Subrat Kumar Pradhan[2], Smita Kumari Panda[2], Jyotirmayee Behera[3], Mrinalini Sai[4], Ranjan Kumar Jena[5]

[1]Senior Resident, Department of Community Medicine, PRM Medical College & Hospital, Baripada, Odisha
[2]Professor, Department of Community Medicine, Vimsar, Burla, Odisha
[3]Senior Resident, Department of Community Medicine, SJ Medical College & Hospital, puri, Odisha
[4]Senior Resident, Department of Community Medicine, BB Medical College & Hospital, Bolangir, Odisha
[5]Senior Resident, Department of Community Medicine, PRM Medical College & Hospital, Baripada, Odisha

Correspondence: Dr. Jitendra Kumar Bhuyan, Email: jitupsm22@gmail.com

Abstract:

Introduction: Hypertension is a major non-communicable disease and a leading contributor to cardiovascular morbidity and mortality worldwide. Tribal populations in India, despite their distinct socio-cultural characteristics, are increasingly exposed to lifestyle transitions that may increase their risk of hypertension. However, there is limited evidence on the prevalence and determinants of hypertension among tribal communities in Odisha. **Objectives:** To estimate the prevalence of hypertension and identify associated risk factors among the adult tribal population of Sambalpur district, Odisha. **Methods:** A community-based cross-sectional study was conducted among 360 adult tribal individuals aged 18–60 years in Sambalpur district. Participants were selected using a multistage sampling technique. Data were collected through face-to-face interviews using a pretested structured questionnaire, and Blood pressure was measured using standard WHO protocol, and the average of three readings was taken for analysis as per JNC-8 recommendations. Data were analysed using descriptive statistics, chi-square test, and logistic regression to identify factors associated with hypertension. **Results:** The mean age of participants was 41.5 ± 11.6 years, and males constituted 54.4% of the study population. The overall prevalence of hypertension was 13.6%. Among hypertensive individuals, 40.8% were newly diagnosed during the survey. Only 20.6% of known hypertensive cases had their blood pressure under control. Multivariable logistic regression showed that age 41–60 years (AOR = 2.578; p = 0.016), family history of hypertension (AOR = 4.288; p < 0.001), and alcohol consumption (AOR = 2.825; p = 0.010) were significant predictors. **Conclusion**: Hypertension is prevalent among the tribal population of Sambalpur. Strengthening early detection, lifestyle modification, and primary healthcare services is essential to address this public health concern.

Keywords: Alcohol Drinking, Hypertension, Odisha, Risk Factors, Tribal Population.

Introduction:

Hypertension is one of the most important preventable causes of premature morbidity and mortality worldwide. According to the World Health Organization (WHO), approximately 1.28 billion adults globally live with hypertension, with nearly 2/3rd residing in low- and

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Bhuyan J, Pradhan S, Panda S, Behera J, Sai M, Jena R. Prevalence and Determinants of Hypertension among Adult Tribal Population of Sambalpur District, Odisha: A Community-Based Cross-Sectional Study Healthline. 2026;17(2): 108-117
	DOI : 10.51957/Healthline_829_2026	

Received : 14-03-2026 **Accepted** : 23-06-2026 **Published :** 23-07-2026

middle-income countries.[1] It is a major risk factor for cardiovascular diseases (CVDs) such as coronary heart disease, stroke, heart failure, and chronic kidney disease, contributing to more than 10 million deaths each year.[2]

In India, the burden of non-communicable diseases (NCDs) has been rising steadily due to rapid urbanization, demographic transition, and lifestyle changes. Estimates from the Global Burden of Disease (GBD) study indicate that hypertension accounts for about 8.5% of the total disability-adjusted life years (DALYs) in India.[3] The prevalence of hypertension has increased from 19% to 24% among men and from 17% to 21% among women aged over 15 years.[4,5] Overall, NCDs account for nearly 53% of total deaths in the country, with hypertension being one of the leading contributors.[6] Recognizing the growing burden, the Government of India has prioritized hypertension under the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD).[7]

The state of Odisha, located in eastern India, reflects a similar trend. According to NP-NCD Odisha data (2022), hypertension is a major contributor to the NCD burden in the state, accounting for more than half of the disability-adjusted life years and a substantial proportion of premature deaths.[8] Limited access to healthcare services, poverty, and lack of awareness further aggravate the problem, particularly among marginalized populations.

Odisha has a large tribal population, accounting for nearly 22% of the state's population compared to 8.6% nationally as per the 2011 Census.[9] Tribal communities often face several barriers to healthcare access, including geographic isolation, lower literacy levels, reliance on traditional healing practices, and inadequate health infrastructure, which may lead to delayed diagnosis and poor control of hypertension.[10] Tribal health research has focused mainly on malnutrition and communicable diseases. However, India is currently undergoing an epidemiological transition, with non-communicable diseases increasingly affecting even remote tribal populations.[11] Factors such as changing life styles and socio-economic transitions have contributed to the rising prevalence of hypertension among these communities.[12] Community-based studies have reported hypertension prevalence among tribal adults ranging from 15% to 20%, often accompanied by low awareness and poor treatment adherence.[13,14]

Sambalpur district in western Odisha is home to several tribal communities with distinct socio-cultural and economic characteristics that may influence the distribution and determinants of hypertension. Despite the implementation of NP-NCD programs at the state and national levels, district-specific data on hypertension among tribal populations in Sambalpur remain limited. Therefore, the present study was undertaken to estimate the prevalence of hypertension and identify associated risk factors among the adult tribal population of Sambalpur district, Odisha.

Methods:

Study Design and Setting:

A community-based cross-sectional study was conducted among the tribal population of Sambalpur district, Odisha. The study was designed and planned in the Department of Community Medicine, Veer Surendra Sai Institute of Medical Science & Research (VIMSAR), Burla, Sambalpur. The overall thesis work period was from May 2023 to May 2025; however, the actual data collection was carried out from November 2024 to January 2025. The eligibility criteria for the study included all individuals belonging to the tribal population, aged between 18 to 60 years, who had given their consent to participate. The study excluded individuals who were bedridden or pregnant at the time of data collection.

Sample size estimation:

Sample size was estimated using the formula

$$n = \frac{Z_{1-\alpha/2}^{2} P(1-P)\, DEFF.}{d^2}$$

Where, n = sample size, p = prevalence of hypertension d = allowable error, 5%

$Z_{1-\alpha/2}^{2}$ = standard normal variate ($p<0.05$) = 1.96, p = 17%, based on previous study.[15] DEFF = design effect (1.5), Allowing for a 10% non-response rate, the final sample size was calculated to be 357, H" 360.

Sampling Methods:

Participants were selected using a multistage sampling method conducted in a tribal block of Sambalpur district. Sambalpur district comprises three tribal blocks: Jamankira, Kuchinda, and Bamra. Among these, Jamankira was selected through a lottery method. Within Jamankira, there are 27 subcenters, out of which 9 subcenters were selected using simple random sampling with the help of a random table. From each of these 9 subcenters, 4 villages were selected using the same simple random sampling method. This process resulted in a total of 36 villages. Finally, 10 participants were selected from each of these 36 villages, making the total number of study participants 360. The 1st house was selected randomly in each village considering an important landmark of that particular village, then houses were visited consecutively till 10 interviews of tribal participants were completed and the responses were noted. The selected participant not fulfilling the study criteria, Exclusion criteria are not giving consent to participate in study. Data was collected till sample size was achieved.

Study Tools and Variables:

The study utilized a predesigned and pretested structured questionnaire along with instruments such as a calibrated weighing machine, a stretchable measuring tape, and a mercury sphygmomanometer with a stethoscope for anthropometric and blood pressure measurements. The dependent variable of the study was hypertension, which was defined according to the Eighth Joint National Committee (JNC-8) criteria as systolic blood pressure (SBP) ≥140 mm Hg and/or diastolic blood pressure (DBP) ≥90 mm Hg.[16] The independent variables included various sociodemographic and behavioural factors. Age of participants was recorded in completed years and categorized into 18–40 and 41–60 years. Gender included male, female. Type of family was classified as nuclear (a married couple with dependent children) or joint (extended family living together with blood relations among males and their spouses or female kin). Educational status was assessed as per the Modified Kuppuswamy scale (2024). Occupation was classified according to the National Classification of Occupations–2015. Socioeconomic status was also assessed using the Modified Kuppuswamy scale updated for 2024. Tobacco use(yes/no), Alcohol consumption, salt intake (e"5 grams/day), and physical activity (vigorous, moderate, or mild based on intensity and duration) were also assessed. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared (kg/m²) and categorized as per WHO Asian cut-offs: underweight (<18.5 kg/m²), normal (18.5–22.9 kg/m²), overweight (23.0–24.9 kg/m²), and obese (≥25 kg/m²). Family history of hypertension and current or past diagnosis of hypertension were also recorded as binary variables (yes/no).

Data Sources and data collection methods:

Ethical approval was obtained from the Institutional Ethical Committee of Veer Surendra Sai Institute of Medical Sciences and Research (VIMSAR), Burla (VIREC). The objectives of the study were explained to the participants and informed consent was obtained prior to data collection. A face-to-face interview was conducted to collect information on socio-demographic, behavioural, and clinical characteristics. Anthropometric measurements including height and weight were recorded using a measuring tape and a calibrated weighing machine, respectively. Height was measured with participants standing erect, barefoot, against a wall with the occiput, back, buttocks, and heels touching the wall, and weight was measured with participants barefoot and standing upright on a calibrated scale; for both measurements, three readings were taken and the average was used for analysis. Participants were made to sit in a relaxed position for at least 5 minutes before blood pressure (BP) measurement. BP was measured using a mercury sphygmomanometer placed at heart level, with the mercury column at the observer's eye level to avoid reading errors. The cuff of appropriate size was placed 2–3 cm above the antecubital fossa with

the cuff bladder covering at least 80% of the arm and centred over the brachial artery, after removing restrictive clothing. BP was first recorded by the palpatory method followed by the auscultatory method. Three readings were taken at 1–2minute intervals, and the average of the three readings was considered as the final blood pressure value. Systolic blood pressure was recorded at the appearance of the first Korotkoff sound and diastolic blood pressure at the disappearance of Korotkoff sounds, with a deflation rate of 2–3 mm Hg per second.

Data Handling and Management:

SPSS software version 21.0 was used for data analysis. Data entry was done regularly following data collection, after coding the different variables into relevant categories. Data cleaning was also performed by removing or modifying data that were incorrect, incomplete, improperly coded, or duplicated.

Data Analysis:

A descriptive analysis was done based on frequency distribution of socio-demographic characteristics. Mean and standard deviation of selected study variables were obtained. Crude Odd Ratio (OR), Chi-square test for categorical variables (nominal data) at 95% confidence interval (CI) and alpha level of significance set at 0.05 were used as measures of association in the analysis of factors associated with Hypertension. An odds ratio of <1 was considered protective, while odds ratio of >1 was considered a risk factor. An odds ratio equal to 1 indicated that there was no difference. Confidence interval was used to assess variability of the odds ratio. Risk factors with p <0.05 were considered as having significant association with hypertension. P-values up to 0.1 in the chi-square test were analysed with univariate analysis. Final analysis was done using multivariable logistic regression for those factors with p value <0.1 in univariate logistic regression and using the enter method to arrive at factors that were independent predictors of hypertension. The final model contained only statistically significant factors after adjusting for confounding.

Results:

A total of 360 tribal participants were interviewed for the study. 196 (54.4%) were males. The average age of the participants was 41.52 ± 11.60 years. The mean age for males and females was 41.43 ± 11.65 years, and 41.63 ± 11.58 years respectively. Most participants (318, 88.3%) were Hindus. 53.3% families were nuclear type. In terms of education, 191(53.1%) of the respondents had completed primary school. Elementary occupations were reported by 113(31.4%) of the study participants. According to Socioeconomic Scale, the majority belonged to the upper-lower class (190, 52.8%), followed by the lower class (145, 40.3%). A family history of hypertension was reported by 68(18.9%) of the participants. Out of the total 360 study participants, 156 (43.3%) consume alcohol. Tobacco use was reported by 274(76.1%) participants. A majority of the study population (95%) consumed extra salt (more than 5 grams per day) in their diet. Based on the level of physical activity, 154(42.8%) fell into the Vigorous category. More than half of the participants (57%) had a Body Mass Index (BMI) within the normal range.

Figure 1 shows that "Out of the 49 individuals with hypertension, 40.8% were previously unaware of their condition, while 59.2% had already been diagnosed.

Table 2 shows that on chi-square analysis, age group, family history of hypertension, alcohol intake, and tobacco use were significantly associated with hypertension (P<0.05).

The multivariable logistic regression analysis (Table 3) shows the independent risk factors associated with hypertension, adjusting for potential confounding variables. The individuals aged between 41 and 60 years had significantly higher odds of developing hypertension (Adjusted Odds Ratio [AOR] = 2.578; 95% CI: 1.189–5.587; p = 0.016) compared to other age groups (18-40). A family history of hypertension was also found to be a strong determinant, nearly four times the odds of developing hypertension (AOR = 4.288; 95% CI: 1.941-9.472; p < 0.001). Alcohol consumption was another significant factor; individuals who consumed

Table 1: Socio-Demographic Characteristics and Lifestyle Factors of Study Participants (n=360).

Factors	Sub groups	Number (%)
Age (in years)	18-40	156 (43.3)
	41-60	204 (56.7)
Gender	Male	196 (54.4)
	Female	164 (45.6)
Religion	Hindu	318 (88.3)
	Other	42 (11.7)
Type of family	Nuclear	192 (53.3)
	Joint	168 (46.7)
Education	Illiterate	56 (15.6)
	Primary school certificate	191 (53.1)
	Middle school certificate	33 (9.20)
	High sc.& above	80 (22.2)
Occupation	Clerks	11 (3.06)
	Skilled workers & shop sales worker	36 (10)
	Skilled agricultural & fishery workers	82 (22.7)
	Plant & machine operator	40 (11.1)
	Elementary occupation	113 (31.4)
	Unemployed	78 (21.7)
Socio-economic status	Lower middle	25 (7.00)
	Upper lower	190 (52.8)
	Lower	145 (40.3)
Family history of Hypertension	Present	68 (18.9)
	Absent	292 (81.1)
Alcohol consumption	No	204 (56.7)
	Yes	156 (43.3)
Tobacco use	No	86 (23.9)
	Yes	274 (76.1)
Extra salt intake	No	18 (5.0)
	Yes	342 (95.0)
Physical activity	Mild	88 (24.4)
	Moderate	118 (32.8)
	Vigorous	154 (42.8)
Body mass index (B.M.I)	Underweight	53 (14.7)
	Normal	206 (57.2)
	Overweight	56 (15.6)
	Obese	45 (12.5)

*High sc. Stands for High school.

Figure 1: Hypertension Awareness and Control Among Hypertensives.

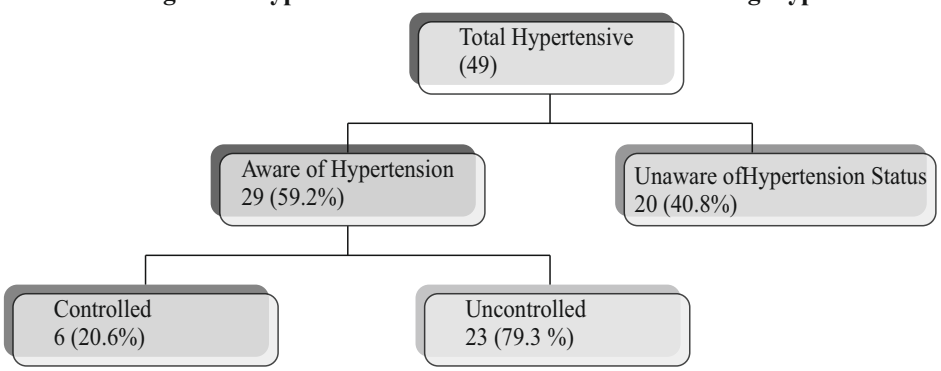

Table 2: Association between Socio-Demographic and Lifestyle Factors with Hypertension (n=360).

Variables	Sub groups	Hypertension		χ2	p
		No (%) (n=311)	Yes (%) (n=49)		
Age (in years)	18-40	144 (92.3)	12 (7.7)	8.202	0.004
	41-60	167 (81.9)	37 (18.1)		
Gender	Male	168 (85.7)	28 (14.3)	0.167	0.683
	Female	143 (87.2)	21 (12.8)		
Religion	Hindu	273 (85.5)	45 (14.2)	0.676	0.411
	Other	38 (90.5)	4 (9.5)		
Education	Illiterate	46 (82.1)	10 (17.9)	3.863	0.277
	Primary	162 (84.8)	29 (15.2)		
	Secondary	29 (87.8)	4 (12.1)		
	High sc. & above	74 (92.5)	6 (7.5)		
Occupation	Clerk	9 (81.8)	2 (18.2)	10.691	0.058
	Skilled worker	32 (88.9)	4 (11.1)		
	Sk. Agricultural worker	71 (86.6)	11 (13.4)		
	Machine operator	37 (92.5)	3 (7.5)		
	Elementary occupation	89 (78.8)	24 (21.2)		
	Unemployed	73 (93.6)	5 (6.4)		
Socioeconomic status	Lower middle	22 (88)	3 (12)	5.257	0.072
	Upper lower	171 (90)	19 (10)		
	Lower	118 (81.4)	27 (18.6)		
Family h/o hypertension	Present	51 (75)	17 (25)	9.248	0.002
	Absent	260 (89)	32 (11)		
Alcohol intake	No	191 (93.6)	13 (6.4)	20.978	0.000
	Yes	120 (76.9)	36 (23.1)		
Tobacco use	No	83 (96.5)	3 (3.5)	9.847	0.002
	Yes	228 (83.2)	46 (16.8)		
Extra salt intake	No	16 (88.9)	2 (11.1)	0.101	0.751
	Yes	295 (86.3)	47 (13.7)		
Physical activity	Mild	75 (85.2)	13 (14.8)	0.377	0.828
	Moderate	101 (85.6)	17 (14.4)		
	Vigorous	135 (87.7)	19 (12.3)		
B.M.I	Underweight	46 (86.8)	7 (13.2)	0.347	0.952
	Normal	179 (86.8)	27 (13.2)		
	Overweight	47 (83.9)	9 (16.1)		
	Obese	39 (86.7)	6 (13.3)		

Table 3: Univariate & Multivariable logistic regression analysis for the associated risk factors of hypertension

Factors	exposed %	unexposed % with HTN.	cOR with HTN.	aOR with C. I	P with C. I
Age in years (41-60)	18.1%	7.7%	2.695 (1.336-5.242)	2.578 (1.189-5.587)	0.016
Family h/o HTN	25%	11%	2.708 (1.399-5.242)	4.288 (1.941-9.472)	<0.01
Alcohol intake	23.1%	6.4%	4.408 (2.246-8.649)	2.825 (1.282-6.225)	0.010
Tobacco use	16.8%	3.5%	5.582 (1.690-18.43)	3.319 (0.838–12.141)	0.089

alcohol had over three times the odds of being hypertensive (AOR = 2.825; 95% CI: 1.282-6.226; p = 0.010) compared to non-drinkers. Tobacco use initially appeared to be a strong risk factor (Crude Odds Ratio = 5.582, p=0.005), its adjusted association with hypertension was not statistically significant (AOR = 3.319; 95% CI: 0.838–12.141; p = 0.089).

Discussion:

The present study was undertaken to assess the prevalence of hypertension and its associated factors among the tribal population of Sambalpur district, Odisha. Out of 360 study participants, the prevalence of hypertension was found to be 13.6%.

The prevalence observed in this study (13.6%) is comparable to Sathiyanarayanan et al.[14] (A cross-sectional study, multistage sampling technique, 952 tribal participants aged 18 and above, in Tirupattur Taluk, Vellore district) and Prajna Paramita Giri et al.,[15] (A cross sectional study, the tribals of the Tangi-Chowdwar block of Cuttack district, 832 study subjects aged >/=18 years, multistage stratified random sampling) where hypertension prevalence among tribal populations was 16.7%. Similarly, S.A. Rizwan et al.,[17] in their systematic review and meta-analysis, reported a pooled hypertension prevalence of 16.1% among Indian tribes. Some other studies reported a higher prevalence. For example, Nisha Meshram et al.,[18] (47.3%, A community based cross sectional analytical study, 330 adult tribals, aged 25-60 years in Lohandiguda Block of Bastar District of Chhattisgarh), and Mohd Ashraf Ganie et al.,[19] [41.4%, 6808 tribals aged >20 yr (5695 Gujjars and 1113 Bakarwals) of Kashmir, using multistage cluster sampling technique.]. These differences may be attributed to geographical variations, cultural and lifestyle changes, and the age groups studied.

Regarding associated risk factors, age, family history of hypertension and alcohol consumption emerged as significant determinants in both univariate and multivariable analyses.

The average age of the participants was 41.52 ± 11.60 years. The mean age for males was 41.43 ± 11.65 years, and for females, it was 41.63 ± 11.58 years. This observation was similar to the study by Nisha Meshram et al.,[18] (41.6 ± 10.2 years), Priyanka Sajeeva et al.,[20] (42.2 ± 11.48 years, 298 adults, Kani tribe in Thiruvananthapuram district, Multistage Cluster Sampling). Age was found to be an independent risk factor, with individuals aged 41–60 years having significantly higher odds of hypertension compared to those aged 18–40 years (AOR: 2.578; 95% C.I: 1.189-5.587; p=0.016). This is consistent with findings from multiple studies, including those by Meyiyanger Sanglir et al.,[21] (urban tribal of aged 30-50 years in Nagaland, simple random sampling technique), and Vanishree Shriraam et al.,[22] (Cross sectional study, 502 Tribal Population of all men and women 40 years and above in hilly area in Vellore district, Tamil Nadu, Stratified Random Sampling) where age was positively associated with hypertension. Some other studies like Nisha Meshram et al.,[18] (Cross sectional analytical study among adult tribal populations aged 25-60 years in Lohandiguda Block of Bastar District of Chhattisgarh) shows that age is not associated with hypertension. These differences may be attributed to geographical variations, Population Differences, Age Range Studied, cultural and lifestyle changes. Age-related vascular changes, including arterial stiffness and endothelial dysfunction, are well-established contributors to elevated blood pressure Franklin SS et al.,[23] This middle-aged demographic is particularly critical, as hypertension tends to develop and accumulate risk in the fourth and fifth decades of life.[2]

A positive family history of hypertension was another significant predictor (AOR: 4.288, 95% CI: 1.941-9.472; p<0.01). This association aligns with findings from studies such as Mohd Ashraf Ganie et al.,[19] and Priyanka Sajeeva et al.,[20] where genetic predisposition was a major risk factor. The role of shared lifestyle factors and genetic susceptibility likely contributes to the familial aggregation of hypertension cases.

Alcohol consumption was found to increase the odds of hypertension significantly (AOR: 2.825; 95%

CI: 1.282-6.225; p=0.010). This is similar to the findings by Meyiyanger Sanglir et al.,[21] Priyanka Sajeeva et al.,[20] and Bodhi Sri Vidya Vennam et al.,[24] (National Family Health Survey-5 data conducted in 2019–2021, 67263 tribal women and 8441 tribal men aged 15 to 49 years) observed alcohol intake as a consistent behavioural risk factor for hypertension among tribal groups.

Many studies like S. Sathiyanarayanan et al.,[14] in 2019, Vani Kandpal et al.,[25] (Cross sectional study among 288, tribal population age between 20 and 60 years in India) & Tapas Chakma et al.,[26] (A cross-sectional study, cluster sampling, adult tribal population in Central India) founds no association with hypertension. These differences may be attributed to confounding factors or drinking pattern. Therefore, more longitudinal studies are required to clarify this relationship further.

In the present study, tobacco use was prevalent among 76.1% of participants, highlighting its widespread acceptance among the tribal community. Tobacco use showed a significant association with hypertension in univariate analysis (cOR=5.582, p=0.005), although the association not found to be significant in multivariate analysis (AOR = 3.319; 95% CI: 0.838–12.141; p = 0.089). Despite the loss of statistical significance, the elevated odds ratio suggests that tobacco remains an important risk factor, as also emphasized by Dhruvendra Lal et al.,[27] and Vanishree Shriraam et al.,[22] The high odds ratio suggests a potential independent effect, and the lack of significance could be due to a smaller sample size of non-tobacco users, and was found confounding with age and alcohol. Evidence from large datasets like NFHS-5 and the study by Prajna Giri et al.,[15] among Eastern Indian tribes have demonstrated significant associations between tobacco use and hypertension. Dhruvendra Lal et al.,[27] (NFHS-5 secondary analysis) found that daily smokers had a 1.2 times higher risk of hypertension compared to non-smokers. Though our study did not achieve statistical significance in multivariate analysis, the biological plausibility and consistent findings elsewhere strongly suggest that tobacco control measures must be prioritized for hypertension prevention among tribal populations.

Physical activity levels and BMI (body mass index) were not significantly associated with hypertension in this study. This contrasts with several other studies, such as those by Dhananjay Kumar et al.,[28] and M.G. Deo et al.,[29] where obesity and sedentary lifestyles were significant predictors. One possible explanation could be the overall higher baseline physical activity among tribal populations engaged in agriculture and labour-intensive occupations.

Extra salt intake did not show a statistically significant association with hypertension in this study, although 95% of participants reported consuming extra salt. Previous studies, including Prajna Paramita Giri et al.,[15] have identified high salt intake as a risk factor. The absence of association in this study could be due to the widespread use of extra salt in this community. Another important observation was the relatively high level of awareness (59.2%) among hypertensives, compared to other studies like Palash Jyoti Misra et al.,[30] where awareness was as low as 24%. The control rates were still poor (only 20.6%), indicating gaps in treatment adherence or accessibility to effective management services.

Limitation:

The cross-sectional design limits the ability to establish causal relationships between identified risk factors and hypertension; it only allows for the observation of associations. The study was confined to selected tribal areas of Sambalpur district and may not be generalizable to all tribal populations in Odisha. The study may be underpowered for multivariable logistic regression analysis, as the number of outcome events (n=49) was limited, resulting in fewer than the recommended 10–20 events per predictor variable, which may affect the stability and precision of the adjusted odds ratios.

Conclusions:

The study reveals that hypertension is a significant and growing public health concern among the adult tribal population of Sambalpur district, Odisha. Independent risk factors such as increasing age, positive family history of hypertension, and alcohol consumption emerged as significant contributors.

Recommendation:

Regular community-based screening for hypertension should be strengthened among tribal populations to ensure early detection and timely management. Health education programs focusing on lifestyle modification should be implemented at the community level.

Declaration:

Conflict of Interest: There is no conflict of interest.

Funding: Nil

Use of AI: ChatGPT was used only for language editing and grammar correction. It was not used for data analysis, interpretation, or generation of scientific content.

References:

1. World Health Organization. Hypertension [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Jun 22]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension
2. World Health Organization. Global Health Observatory: Noncommunicable diseases mortality [Internet]. Geneva: World Health Organization; 2021 [cited 2026 Jun 22]. Available from: https://www.who.int/data/gho
3. GBD 2016 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks for 195 countries and territories, 1990–2016: a systematic analysis. Lancet. 2017;390(10100):1345-1422.
4. International Institute for Population Sciences (IIPS). National Family Health Survey (NFHS-4), 2015–16: India Report. Mumbai: IIPS; 2017.
5. International Institute for Population Sciences (IIPS), ICF. National Family Health Survey (NFHS-5), 2019-21. Mumbai: IIPS; 2021.
6. Gupta R, Xavier D; Hypertension India Study Group. Hypertension epidemiology in India: meta-analysis of 1.5 million subjects. J Hum Hypertens. 2019;33:345-355.
7. Ministry of Health and Family Welfare. National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD). New Delhi: Government of India; 2023.
8. Directorate of Public Health, Government of Odisha. NP-NCD annual report. Odisha: Directorate of Public Health; 2022.
9. Office of the Registrar General and Census Commissioner, India. Census of India 2011. New Delhi: Ministry of Home Affairs; 2011.
10. Mohan V, Gupta R, Misra A, et al. Barriers to hypertension control in rural and tribal India. BMC Public Health. 2022; 22:1137.
11. Ministry of Tribal Affairs. Tribal health in India. New Delhi: Government of India; 2018.
12. Anchala R, Kannuri NK, Pant H, et al. Hypertension in India: a systematic review. J Hypertens. 2014;32(6):1170-1177.
13. Toppo M, Kumar R, Thakur R, et al. Prevalence of hypertension among tribal population in India. Indian J Public Health Res Dev. 2021;12(3):173-178.
14. Sathiyanarayanan S, Muthunarayanan L, Devaparthasarathy TA. Changing perspectives in tribal health: rising prevalence of lifestyle diseases among tribal population in India. Indian J Community Med. 2019;44(4):342-346.
15. Giri PP, Mohapatra B, Kar K. Prevalence of hypertension and the associated factors among Sabar and Munda tribes of Eastern India. J Family Med Prim Care. 2022;11(9):5065-5071.
16. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 Evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA. 2014;311(5):507-520.
17. Rizwan SA, Kumar R, Singh AK, Kusuma YS, Yadav K, Pandav CS. Prevalence of hypertension in Indian tribes: a systematic review and meta-analysis of observational studies. PLoS One. 2014;9(5):e95896.
18. Meshram N, Verma N, Shrivastava N, et al. Assessment of prevalence of hypertension and its risk factors among adult tribal population in Lohandiguda Block of Bastar District of Chhattisgarh. Indian J Community Med. 2023;48(4):588-594.
19. Ganie MA, Parvez T, Viswanath SA, et al. Prevalence, pattern and correlates of hypertension among tribal population of Kashmir, India: a cross-sectional study. Indian J Med Res. 2021;154(3):467-475.
20. Sajeev P, Soman B. Prevalence of noncommunicable disease risk factors among the Kani tribe in Thiruvananthapuram district, Kerala. Indian Heart J. 2018;70(5):598-603.
21. Sanglir M, Ramesh RM, Mathew Z, George K, Angami S, Prasad JH. Prevalence and determinants of hypertension among urban tribal communities in Nagaland, India: a community-based study. J Family Med Prim Care. 2023;12(1):76-82.
22. Shriraam V, Mahadevan S, Arumugam P. Prevalence and risk factors of diabetes, hypertension and other non-communicable diseases in a tribal population in South India. Indian J Endocrinol Metab. 2021;25(4):313-319.
23. Franklin SS, Larson MG, Khan SA, Wong ND, Leip EP, Kannel WB, et al. Does the relation of blood pressure to coronary heart disease risk change with aging? The Framingham Heart Study. Circulation. 2001;103(9):1245-1249.
24. Vennam BSV, Kuppli SS, Bora JK, Sahoo SS, Gujjarlapudi C, et al. Socioeconomic and behavioral factors of hypertension among Indian tribal population: evidence from NFHS-5. PLoS One. 2024;19(12):e0312729.

25. Kandpal V, Sachdeva MP, Saraswathy KN. An assessment study of cardiovascular disease-related risk factors in a tribal population of India. BMC Public Health. 2016;16:434.
26. Chakma T, Kavishwar A, Sharma RK, Rao PV. High prevalence of hypertension and its selected risk factors among adult tribal population in Central India. Pathog Glob Health. 2017;111(7):343-350.
27. Lal D, Virk AK, Bhardwaj A, et al. Pestilent relationship between smoking and hypertension or pulse pressure among males over 15 years in India: NFHS-5 survey. PLoS One. 2024;19(5):e0294898.
28. Kumar D, Kumari R, Anwar K, Singh R. Community-based assessment of risk factors for cardiovascular diseases in a tribal population of Tharus in Bihar, India. J Family Med Prim Care. 2022;11(8):4404-4409.
29. Deo MG, Pawar PV, Kanetkar SR, Kakade SV. Prevalence and risk factors of hypertension and diabetes in the Katkari tribe of coastal Maharashtra. J Postgrad Med. 2017;63(2):106-113.
30. Misra PJ, Mini GK, Thankappan KR. Risk factor profile for non-communicable diseases among Mishing tribes in Assam, India: results from a WHO STEPs survey. Indian J Med Res. 2014;140(3):370-378.