



Growing burden of hypertension among the Kalindi and Mahato communities in Purulia District, West Bengal, India

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Abstract

Background: Hypertension is an emerging public health concern among tribal populations. This study examined the association between selected lifestyle variables and hypertension among adult males from the Kalindi and Mahato communities of Purulia district, West Bengal, India.

Materials and Methods: A cross-sectional study was conducted among 227 male participants aged 18 years and above, including 115 Kalindi and 112 Mahato participants. Frequencies and percentages were used to describe categorical variables. Binary logistic regression analysis was performed, with community included as an adjustment variable. Statistical significance was set at $p < 0.05$.

Results: The Kalindi community exhibited a higher prevalence of hypertension (45.3%) than the Mahato community (37.5%). Junk food consumption (AOR = 3.490, $p = 0.003$), extra salt intake (AOR = 2.115, $p = 0.017$), alcohol consumption (AOR = 2.171, $p = 0.024$), moderate physical activity (AOR = 4.247, $p = 0.003$), and low physical activity (AOR = 6.188, $p < 0.001$) were significantly associated with hypertension. Tobacco use was not significantly associated with hypertension (AOR = 1.107, $p = 0.852$).

Conclusion: Junk food consumption, extra salt intake, alcohol consumption, and lower physical activity levels were significantly associated with hypertension among the studied participants. These findings highlight the importance of considering modifiable lifestyle factors in hypertension prevention and control among the Kalindi and Mahato communities.

Keywords: Kalindi, Mahato, hypertension, lifestyle, physical activity

Introduction

Heart and circulatory diseases, diabetes mellitus, and hypertension are widely acknowledged as among the most significant risk factors (Ibrahim & Damasceno, 2012) [11]. Heart-related conditions account for approximately one-third of all deaths worldwide, and in the South-East Asia Region, high blood pressure specifically remains a leading contributor to cardiovascular mortality (World Health Organisation, 2009; 2023) [23, 24]. Raised blood pressure and blood glucose coexist with tobacco use, alcohol use, overweight, elevated cholesterol, sedentary behaviour, and disease burden. Worldwide, this co-occurrence contributes to 61% of cardiovascular deaths and more than 75% of fatal cases associated with ischemic and hypertensive cardiac conditions (World Health Organisation, 2009) [23].

Studies conducted across Africa and Asia identified a positive association between BMI and BP. Among the Indonesian population, overweight/obesity was observed among 25% of women and 10% of men, whereas hypertension affected 25% and 24%, respectively. BMI correlated positively with SBP and DBP ($r=0.23-0.27$, $P<0.01$), indicating greater risk of cardiovascular diseases (CVDs) (Tesfaye *et al.*, 2007) [20]. Among 1,727,411 Chinese adults aged 35 to 80 years, the study found a positive linear association between BMI and BP. The prevalence of hypertension was 41.6%, whereas 2 hypertensives affected 15.3% of the study population (Linderman *et al.*, 2018) [16]. This stressed the relevance of

preventive intervention among children, since obesity may precede the progression of metabolic syndrome and early-onset hypertension, thereby emphasising the necessity for specific preventive strategies. Correspondingly, Litwin and Kulaga (2021) [17] identified the Visceral Adiposity Index (VAI) as a valuable indicator for assessing the association between visceral adiposity and hypertension, underscoring its potential relevance in clinical assessment.

Leit *et al.* (2021) highlighted that metabolic conditions such as obesity and diabetes may exacerbate inflammatory activity in epicardial adipose tissue, thus contributing to increased cardiovascular risk and emphasising the association between metabolic disorders and CVD. Vyas *et al.* (2021) [22] assessed anthropometric indices and hypertension among slum-dwelling men in Kolkata, West Bengal, showing that waist circumference was significantly associated with hypertension risk and highlighting the usefulness of conventional anthropometric measures for hypertension risk assessment. Chakraborty and Bose (2012) [5] identified differences in abdominal adiposity in comparison between normotensive and hypertensive elderly Bengali men, highlighting its association with blood pressure. Ghosh *et al.* (2000) [9] observed the co-occurrence of chronic energy deficiency (47%) and hypertension (37.7%) among Sabar males in Purulia. Das *et al.* (2019) [8] associated adiposity, somatotype, and nutritional status with health risks.

Despite growing evidence on hypertension and its associated risk factors, limited population-specific evidence is available on the lifestyle factors associated with hypertension among the Kalindi and Mahato communities of Purulia district, West Bengal, India. Existing studies have examined hypertension in various Indian tribal populations and its relationship with nutritional status, anthropometric characteristics, and other risk factors; however, further investigation is needed to understand how lifestyle factors are associated with hypertension in these two communities. Considering the importance of identifying population-specific health risks, the present study aims to examine the lifestyle factors associated with hypertension among the Kalindi and Mahato communities in Purulia district, West Bengal, India.

Materials and Methods

Age: Participants' chronological age in years was recorded from their birth certificates or government-issued identity cards.

Study Participants: The study included 227 male participants aged 18 years and above from the Mahato and Kalindi communities of Purulia district, West Bengal, India. Of these, 112 participants belonged to the Mahato community and 115 belonged to the Kalindi community.

Sampling Method: Simple random sampling was used to select participants for the study.

Physical Activity Level (PAL): Physical activity level was categorised as high, moderate, or low according to the classification used in determining the Indian Diabetes Risk Score (Mohan *et al.*, 2005) [19].

Dietary and Substance-Use Behaviours: Information on junk food intake, extra salt intake, smoking, tobacco consumption (chewing products), and alcohol consumption was collected using a pre-structured schedule. Each variable was categorised as either "Yes" or "No".

Blood Pressure Measurement and Classification: Systolic and diastolic blood pressure were measured using a sphygmomanometer and a stethoscope. Hypertension was classified according to the Seventh Report of the Joint National Committee (JNC 7) on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (Chobanian *et al.*, 2003) [7].

Data Analysis: Data were analysed using Excel and IBM SPSS (version 25). Frequencies and percentages were calculated to describe the distribution of categorical variables. Binary logistic regression analysis was performed to examine the associations between selected lifestyle factors and hypertension. The exponentiated regression coefficient, $\text{Exp}(B)$, was interpreted as the adjusted odds ratio (AOR). Community was included as an adjustment variable in the model to account for potential differences between the Mahato and Kalindi communities. A p-value of less than 0.05 was considered statistically significant.

Results

The prevalence of hypertension differed between the Kalindi and Mahato communities of Purulia district, West

Bengal (Figure 1). The Kalindi community exhibited a higher prevalence of hypertension (45.3%) than the Mahato community (37.5%). Conversely, the proportion of participants without hypertension was higher among the Mahato community (62.5%) than among the Kalindi community (54.8%). These findings indicate a comparatively higher burden of hypertension among the Kalindi participants than among the Mahato participants.

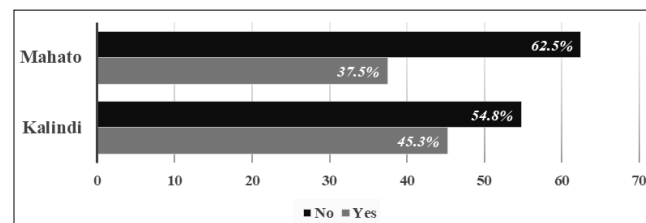


Fig 1: Prevalence of Hypertension

Table 1 presents the distribution of selected dietary, substance-use, and physical activity behaviours among male participants from Kalindi and Mahato. The findings indicate both similarities and variations between the two communities. Junk food consumption was prevalent in both groups. It was reported by 71.3% of Kalindi males and 73.2% of Mahato males. Non-consumption was observed among 28.7% and 26.8% of the respective groups. Extra-salt intake was common among participants. Its prevalence was higher among Kalindi males (74.8%) than among Mahato males (63.4%). Alcohol consumption differed markedly between the two communities: more than half of Kalindi males (53.9%) reported alcohol consumption, compared with only 18.8% of Mahato males. Conversely, most Mahato males (81.3%) reported no alcohol consumption; the corresponding figure for Kalindi males was 46.1%. Smoking prevalence was relatively comparable between the communities, at 34.8% among Kalindi males and 31.3% among Mahato males. A notable difference was observed in tobacco consumption. Tobacco use was more prevalent among Mahato males (52.7%) than among Kalindi males (31.3%). Accordingly, the proportion of non-users was higher among Kalindi males (68.7%) than among Mahato males (47.3%). reported non-use. Physical activity showed a broadly similar distribution. Moderate activity constituted the predominant category, it accounted for 41.7% of Kalindi males. The corresponding proportion among Mahato males was 41.1%. High physical activity was reported by 38.3% of Kalindi males. Among Mahato males, the proportion was 36.6%. Low physical activity was comparatively less prevalent. It was observed among 20.0% of Kalindi males. The corresponding proportion among Mahato males was 22.3%. Overall, dietary and physical activity patterns were broadly comparable. Smoking prevalence also showed limited inter-community variation. Greater differences were evident in alcohol and tobacco consumption. Alcohol use was more prevalent among Kalindi males. Tobacco use was more prevalent among Mahato males. These behavioural patterns provide relevant context for assessing health-related risk profiles. They may also contribute to understanding variations in hypertension-related risk between the study communities.

Table 2 presents the binary logistic regression analysis of selected lifestyle variables associated with hypertension. Community was included as a control variable in the

adjusted model. The adjusted odds ratios (AORs) represent the odds of hypertension after controlling for community differences. Junk food consumption showed a statistically significant association with hypertension. Participants consuming junk food had 3.49-fold higher odds of hypertension than non-consumers (AOR = 3.490, 95% CI: 1.559–8.225, $p = 0.003$). Extra salt intake was also significantly associated with hypertension. Participants consuming extra salt had approximately 2.12-fold higher odds of hypertension (AOR = 2.115, 95% CI: 1.597–5.479, $p = 0.017$). Alcohol consumption demonstrated a significant association with hypertension. Alcohol users had approximately 2.17-fold higher odds of hypertension than non-users (AOR = 2.171, 95% CI: 1.486–5.697, $p = 0.024$). Tobacco consumption was not statistically significantly associated

Hypertension in the adjusted model (AOR = 1.107, 95% CI: 0.877–7.159, $p = 0.852$). Physical activity showed a significant association with hypertension. Using high physical activity as the reference category, participants with moderate physical activity had approximately 4.25-fold higher odds of hypertension (AOR = 4.247, 95% CI: 2.147–14.144, $p = 0.003$). Low physical activity was associated with the highest AOR among the examined categories. Participants with low physical activity had approximately 6.19-fold higher odds of hypertension than those with high physical activity (AOR = 6.188, 95% CI: 3.141–18.976, $p < 0.001$). Overall, junk food consumption, extra salt intake, alcohol consumption, and lower physical activity levels were statistically significantly associated with higher odds of hypertension in the adjusted model, whereas tobacco consumption was not statistically significant.

Table 1: Distribution of Dietary, Substance-consumption and Physical Activity Behaviours among Kalindi and Mahato Males

Variable	Category	Kalindi Male (n=115) Frequency (%)	Mahato Male (n=112) Frequency (%)
Junk Food Intake	No	33 (28.7%)	30 (26.8%)
	Yes	82 (71.3%)	82 (73.2%)
Extra Salt Intake	No	29 (25.2%)	41 (36.6%)
	Yes	86 (74.8%)	71 (63.4%)
Alcohol Consumption	No	53 (46.1%)	91 (81.2%)
	Yes	62 (53.9%)	21 (18.8%)
Smoking Status	No	75 (65.2%)	77 (68.7%)
	Yes	40 (34.8%)	35 (31.3%)
Tobacco Consumption	No	79 (68.7%)	53 (47.3%)
	Yes	36 (31.3%)	59 (52.7%)
Physical Activity Levels	High	44 (38.3%)	41 (36.6%)
	Moderate	48 (41.7%)	46 (41.1%)
	Low	23 (20.0%)	25 (22.3%)

Table 2: Logistic Regression Analysis of Lifestyle Risk Variables Associated with Hypertension, Adjusted for Community (n = 227)

Risk Variables	Sig.	Exp (B)	95% C.I. for EXP (B)	
			Lower	Upper
Junk Food (No)	(reference)			
Junk Food (Yes)	0.003	3.490	1.559	8.225
Extra Salt (No)	(reference)			
Extra Salt (Yes)	0.017	2.115	1.597	5.479
Alcohol (No)	(reference)			
Alcohol (Yes)	0.024	2.171	1.486	5.697
Tobacco (No)	(reference)			
Tobacco (Yes)	0.852	1.107	0.877	7.159
PAL (High)	(reference)			
PAL (Moderate)	0.003	4.247	2.147	14.144
PAL (Low)	<0.001	6.188	3.141	18.976

Sig. = p-value; Exp(B) = adjusted odds ratio (AOR), adjusted for community; 95% CI = 95% confidence interval for the AOR; Lower and Upper = lower and upper bounds of the confidence interval, respectively.

Discussion

The present study examined lifestyle factors associated with hypertension among the Kalindi and Mahato communities of Purulia district, West Bengal. It was observed that the prevalence of hypertension among the Kalindi and Mahato communities was 45.3% and 37.5%, respectively. After adjustment for community, junk food consumption, extra salt intake, alcohol consumption, and physical activity were significantly associated with hypertension, whereas tobacco consumption was not statistically significant. These findings highlight the importance of examining lifestyle-related factors when investigating hypertension in specific tribal populations.

Previous studies among tribal populations in India have reported associations between hypertension and several behavioural and nutritional factors. Babu *et al.* (2024) ^[1] examined hypertension and its associated risk factors among tribal populations in India, while Meshram *et al.* (2012) ^[18] investigated hypertension and its correlates among adult tribal populations in Kerala. Laxmaiah *et al.* (2015) ^[14] also examined the socioeconomic, demographic, and behavioural factors associated with hypertension among tribal populations. The findings of the present study are consistent with the broader importance of investigating lifestyle-related factors in these populations, although the specific associations and effect estimates may differ between studies.

Physical activity was significantly associated with hypertension in the present study. Using high physical activity as the reference category, participants reporting moderate physical activity had an adjusted odds ratio (AOR) of 4.247, while those reporting low physical activity had an AOR of 6.188. Both associations were statistically significant according to the reported model results. The higher AOR observed among participants with low physical activity suggests that this group had the strongest association with hypertension among the physical activity categories examined. Previous research, including the studies by Meshram *et al.* (2012), Laxmaiah *et al.* (2015), and Kandpal *et al.* (2016) ^[12, 14, 18], provides relevant context for examining physical activity in relation to hypertension. However, direct comparisons require consideration of differences in study populations, physical activity measurements, and statistical adjustment.

Alcohol consumption was also significantly associated with hypertension in the present study. Participants reporting alcohol consumption had an AOR of 2.171 compared with non-consumers. This finding can be considered alongside previous investigations of hypertension among tribal populations, including those by Babu *et al.* (2024), Meshram *et al.* (2012), and Laxmaiah *et al.* (2015) ^[1, 14, 18]. Differences in the magnitude of the reported associations across studies may reflect variations in population characteristics, patterns of alcohol consumption, and other factors included in the statistical models. Because the present study is observational, the association should not be interpreted as evidence of a causal relationship.

Extra salt intake was significantly associated with hypertension after adjustment for community. Participants reporting extra salt intake had an AOR of 2.115 compared with those who did not report this behaviour. Giri *et al.* (2022) ^[10] examined hypertension and associated factors among the Sabar and Munda tribes of Eastern India, providing relevant population-specific context for the present findings. Research on dietary practices and hypertension among other tribal populations may also help situate the results. Nevertheless, comparisons between studies should be based on the precise definitions of additional salt intake and the analytical methods used. The present findings indicate an association between reported extra salt intake and hypertension but do not establish that additional salt consumption caused hypertension among the participants.

Junk food consumption was another factor significantly associated with hypertension. Participants reporting junk food consumption had an AOR of 3.490 compared with non-consumers. This finding highlights the relevance of dietary behaviours in investigations of hypertension among the Kalindi and Mahato communities. Kshatriya and Acharya (2016) ^[13] discussed the multiple nutritional and cardiovascular challenges experienced by Indian tribal populations, providing a broader context for examining changing nutritional and lifestyle patterns. However, the specific relationship between junk food consumption and hypertension should be interpreted in light of the dietary variables measured in the present study and the limitations of the study design.

In contrast, tobacco consumption was not statistically significantly associated with hypertension in the adjusted model (AOR = 1.107, $p = 0.852$). This finding does not establish that tobacco use has no relationship with

hypertension; rather, the present analysis did not demonstrate a statistically significant independent association after adjustment for community and the variables included in the model. Differences between the present findings and those of other studies may reflect variations in tobacco-use definitions, exposure patterns, population characteristics, and model specifications.

Overall, the findings indicate that junk food consumption, extra salt intake, alcohol consumption, and physical activity were significantly associated with hypertension among the Kalindi and Mahato participants, whereas tobacco consumption was not statistically significant in the adjusted model. These results contribute to the understanding of behavioural factors associated with hypertension in these communities.

Conclusion

The present study identified significant associations between hypertension and several modifiable lifestyle factors, including junk food consumption, extra salt intake, alcohol consumption, and physical activity among the Kalindi and Mahato communities. Tobacco consumption was not significantly associated with hypertension in the adjusted model. These findings highlight the importance of targeted lifestyle interventions focusing on dietary practices, physical activity, and alcohol consumption to support hypertension prevention and control in these communities.

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Ethical Clearance: We obtained written informed consent from all participants before data collection. This study was conducted with permission from the Head of the Department of Anthropology & Tribal Studies, Sidho-Kanho-Birsha University, Purulia, West Bengal, India.

Conflict of Interest: The authors declare no conflicts of interest.

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