

A STUDY ON HYPERTENSION AND ITS ASSOCIATED RISK FACTORS AMONG THE INDIGENOUS PEOPLE OF PURULIA, WEST BENGAL

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ABSTRACT

Background: Hypertension is rising as a critical health concern due to reduced physical work, poor diet, and alcohol and tobacco use, even in indigenous communities. Earlier, daily fieldwork sustained an active lifestyle. This pattern is undergoing gradual attenuation. The effects extend beyond individuals to the wider community. This change is more pronounced among the younger generation than among their parents. **Objective:** The present study was undertaken to assess the prevalence of hypertension and to identify its associated lifestyle risk factors among the Indigenous people, namely the Mahato and Kalindi communities of Purulia, West Bengal. **Materials and Methods:** The study was conducted on 212 adult men (aged ≥ 18 years). Anthropometric measurements, percent body fat, and visceral fat were recorded. BMI is calculated using the general formula. Blood pressure was measured after adequate rest. Information on food habits, substance consumption, and physical activity levels has been collected using a pre-structured schedule. A p-value < 0.05 was considered statistically significant. **Results:** Our study clearly highlights the risk factors for hypertension among the indigenous communities of Purulia. It has been observed that the prevalence of hypertension among the Mahato and Kalindi communities was 36.2% and 43.9%, respectively. **Conclusion:** Lifestyle changes are negatively affecting cardio-metabolic health, placing young people at comparable risk. Hypertension is more prevalent among Kalindi men, indicating that indigenous communities are no longer immune to lifestyle diseases. This trend is a major public health concern.

Keywords: Hypertension, Indigenous People, Lifestyle, Purulia

INTRODUCTION

Hypertension is a chronic condition that gradually deteriorates our health, but is often underestimated in its seriousness. In Saudi Arabia, it accounts for nearly one quarter of deaths associated with cardiovascular, renal, and endocrine diseases. Rapid urbanization, increasing body fat, and changing lifestyles have contributed to the growing burden of hypertension, with previous reports indicating that about 25.0% to 26.0% of adults are affected. Indigenous populations in general tend to have shorter life expectancy and a higher prevalence of chronic diseases. For example, in Brazil, about 1.7 million Indigenous people, belonging to 688 groups and occupying nearly 12.0% of the country's land, face increasing rates of diabetes, obesity, and hypertension due to lifestyle transitions, separation from traditional lands, and identity-related stress. The lack of adequate medical and nutritional support has made the situation worse, leading to a high death rate from heart disease, most of which is linked to high blood pressure [1-2].

Hypertension is a major risk factor for cardiovascular disease and accounts for about 23.0% of adult deaths and 32.0% of disability in India. Rapid urbanisation, lifestyle changes, unhealthy dietary habits, smoking, and alcohol consumption are contributing to the increasing prevalence of hypertension. According to the National Family Health Survey (NFHS-5, 2019–2021), data were collected from 707 districts and 6,36,699 households across India. The survey assesses the prevalence and risk factors of hypertension. It is estimated that hypertension contributes to 20.0 to 50.0 percent of deaths related to cardiovascular disease [3-4]. In Guatemala, despite almost half of the population belonging to the Maya community, very few studies have examined their health risks [5].

In Asian countries such as India and China, the burden of blood pressure-related diseases is increasing sharply due to population growth, urbanisation, and the rise of age-related illnesses. Urbanisation and unhealthy diets and lifestyles have led to a rise in hypertension. Similarly, in the high-altitude working population of the Qinghai Tibet Valley in China, modern lifestyles, along with excessive alcohol consumption and smoking, have contributed to higher rates of hypertension and prehypertension. An unhealthy diet, physical inactivity, smoking, and alcohol consumption are among the main lifestyle factors associated with hypertension [6-8]. Not only is the prevalence of hypertension rising among older

populations, but it is also rising among younger populations, where factors such as lifestyle, obesity, stress, and poor eating habits play an important role. These risk factors have been examined in studies conducted among medical students in Kolkata [9-10].

Around 100 million people worldwide live in slum areas, where the risk of developing various health problems is considerably high. A survey conducted among 1,052 individuals aged 25 to 64 years in the urban slums of the North 24 Parganas district of West Bengal revealed that they were significantly higher among residents. Some of these risk factors were lower in women than in men. In recent years, high blood pressure has emerged as a major cause of heart disease and death. In India, nearly 25.0% of hypertension cases occur in rural areas and around 10.0% in urban areas, particularly among individuals aged 40 to 49 years. The risk is relatively higher among women. Body weight is closely associated with salt intake, smoking, alcohol consumption, and physical inactivity. Awareness, lifestyle modification, and early detection can play important roles in the prevention and management of hypertension [11-12].

Despite the growing evidence on hypertension and its associated risk factors in various populations, there is still limited information on the health profile of Indigenous communities in West Bengal, India. The Mahato and Kalindi communities of Purulia district of West Bengal represent socially and economically marginalized groups who often have limited access to healthcare and preventive services. Their transition from traditional to modern lifestyles and changing socio-economic conditions may influence their risk of developing hypertension. However, systematic studies on the prevalence and determinants of hypertension among these communities are lacking. Therefore, the present study was undertaken to assess the prevalence of hypertension and to identify its associated lifestyle risk factors among the Indigenous people, namely the Mahato and Kalindi communities of Purulia, West Bengal.

MATERIALS AND METHODS

Study population: This research was conducted in Garaphusra Village, located in the Purulia district under the jurisdiction of the Sindri Cultivation Road Post Office. Two community groups were included: Mahato and Kalindi. Their lifestyles, food habits, and health practices differ. In the present study, we collected data from 212 men (Mahato: 105 and Kalindi: 107) aged ≥ 18 years.

Sampling method: Simple random sampling was used to collect data.

Anthropometric measurements: Height, weight, waist circumference (WC), hip circumference (HC), and Mid-upper arm circumference (MUAC) were measured using standard techniques [13]. Height, weight, WC, HC, and MUAC were measured to the nearest 0.1 cm and weight to the nearest 0.5 kg. Visceral fat (VF) and percent body fat (PBF) were measured using a body fat monitor. Body Mass Index (BMI) was calculated as weight (in kilograms) divided by the square of height (in meters).

Blood pressure: The systolic and diastolic blood pressure of each participant was measured using a Sphygmomanometer and a stethoscope. All participants were asked to rest for at least 5 minutes before the measurement. Blood pressure was measured at least twice at 5-minute intervals, and the average of the readings was taken as the final value [14].

Education status: Participants were asked about their highest level of education attained, which was recorded for analysis. The coding scheme adopted in the study was as follows: 1: Non-literate (NL), 2: Can Sign. (CS), 3: Primary, 4: Secondary, 5: Higher secondary (HS), 6: Graduation and above.

Marital Status: Marital Status Coded as 1: Unmarried, and 2: Married.

Frequency of outside/junk food intake, extra salt intake, and substance consumption: Frequency of these behaviours was recorded using a structured schedule.

Physical activity level (PAL): PAL was categorised as high, moderate, and low according to the physical activity level to determine the 'Indian Diabetes Risk Score' [15].

Statistical analyses: All data were analysed using MS Excel and SPSS (Version 25). Student's t-test was used for continuous data. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 presents the socio-demographic and health-related characteristics of Mahato and Kalindi males. The mean age of Mahato males was 41.94 years (SD = 13.01) while that of Kalindi males was 40.33 years (SD = 15.17). In terms of educational status, 26.7% of Mahato males had no formal education, compared to 31.8% among Kalindi males. A small proportion in both communities was only able to sign their name (2.9% Mahato; 11.2% Kalindi). Higher

secondary (HS) education was reported by 23.8% of Mahato and 16.8% of Kalindi males, while graduation-level education was more common among Mahato males (22.8%) than Kalindi males (12.1%). Regarding occupational status, a higher proportion of Mahato males (66.7%) reported having physically demanding jobs compared to Kalindi males (60.7%). Conversely, 39.3% of Kalindi males had occupations that were physically less demanding, compared to 33.3% of Mahato males. Marital status revealed that 71.4% of Mahato males and 72.9% of Kalindi males were married, while 28.6% of Mahato and 27.1% of Kalindi males were unmarried. With respect to hypertension, 36.2% of Mahato males and 43.9% of Kalindi males were found to be hypertensive, whereas 63.8% of Mahato and 56.1% of Kalindi males had no hypertension.

Table 2 presents the mean values and standard deviations for BMI, visceral fat (VF), waist circumference (WC), waist-hip ratio (WHR), percent body fat (PBF), systolic blood pressure (SBP), diastolic blood pressure (DBP), and mid-upper arm circumference (MUAC) among Mahato and Kalindi males. Independent samples t-tests revealed that the mean BMI, systolic blood pressure, diastolic blood pressure, and mid-upper arm circumference were significantly different between the two communities ($p < 0.05$). Specifically, Kalindi males had significantly higher mean BMI, SBP, and MUAC compared to Mahato males, while Mahato males showed significantly higher mean DBP than Kalindi males. No statistically significant differences were observed for visceral fat, waist circumference, waist-hip ratio, or percent body fat ($p > 0.05$). The difference in WHR, although slightly higher among Kalindi males (0.91 ± 0.05) than Mahato males (0.90 ± 0.06), was not statistically significant ($p = 0.189$).

Figure 1 shows the percentage distribution of junk food intake among Mahato and Kalindi males. Regular consumption of junk food was more prevalent among Kalindi males (47.2%) compared to Mahato males (23.1%). In contrast, irregular intake was more common among Mahato males (55.4%), while the proportion reporting no junk food intake was similar for both groups.

Figure 2 shows the percentage distribution of extra salt intake among Mahato and Kalindi males. Regular consumption of extra salt was much higher among Kalindi males (65.3%) than Mahato males (13.8%). In contrast, irregular intake was more common among Mahato males (53.8%), while the proportion reporting no extra salt intake was higher in Mahato (32.4%) than in Kalindi males (19.4%).

Table 1. Socio-demographic and Health-related Characteristics of Mahato and Kalindi Males

	Mahato (n = 105)	Kalindi (n = 107)
Age in years (mean, SD)	41.94 (13.01)	40.33 (15.17)
Educational status (%)		
NL	28 (26.7)	34 (31.8)
CS	3 (2.9)	12 (11.2)
Primary	6 (5.7)	14 (13.1)
Secondary	19 (18.1)	16 (15.0)
HS	25 (23.8)	18 (16.8)
Graduation and above	24 (22.8)	13 (12.1)
Occupational status (%)		
Physically demanded	70 (66.7)	65 (60.7)
Physically not demanded	35 (33.3)	42 (39.3)
Marital status (%)		
Unmarried	30 (28.6)	29 (27.1)
Married	75 (71.4)	78 (72.9)
Hypertension (%)		
No	67 (63.8)	60 (56.1)
Yes	38 (36.2)	47 (43.9)

Values for age are presented as mean \pm standard deviation (SD); all other variables are shown as frequency and percentage (%). NL = Non-Literate, CS = Can Sign; HS = Higher Secondary.

Figure 3 shows the percentage of regular substance consumption (tobacco, smoking, and alcohol) among Mahato and Kalindi males. Regular tobacco use was more prevalent among Mahato males (50.8%) than Kalindi males (31.9%). Smoking rates were nearly identical in both communities. In contrast, regular alcohol consumption was substantially higher among Kalindi males (51.4%) than Mahato males (13.8%).

Table 2: Differences in Adiposity and Blood Pressure Measurements Between Mahato and Kalindi Males

Variables	Mahato Male (n=105)		Kalindi Male (n=107)		t value	p value
	Mean	SD	Mean	SD		
BMI	20.83	3.55	22.04	3.07	2.65	0.008
VF	7.02	3.96	7.42	2.69	0.86	0.392
WC	80.60	8.45	81.21	8.07	0.54	0.592
WHR	0.90	0.06	0.91	0.05	1.32	0.189
PBF	19.62	6.17	21.55	9.80	1.72	0.087
SBP	122.46	16.10	126.79	10.52	2.31	0.022
DBP	77.06	10.85	72.67	9.19	3.18	0.001
MUAC	23.12	2.57	25.24	3.96	4.63	<0.001

Values are presented as mean \pm SD. Independent samples t-test was used to compare groups. VF = Visceral Fat; WC = Waist Circumference; WHR = Waist-Hip Ratio; PBF = Percent Body Fat; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; MUAC = Mid-Upper Arm Circumference

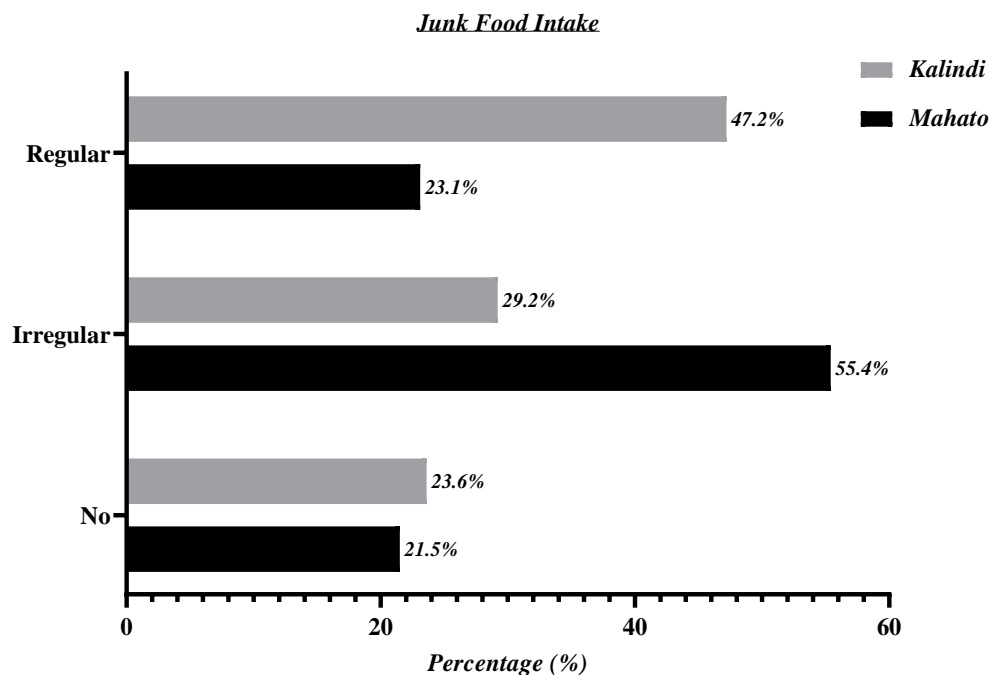


Figure 1. Percentage Distribution of Junk Food Intake Among Mahato and Kalindi Males

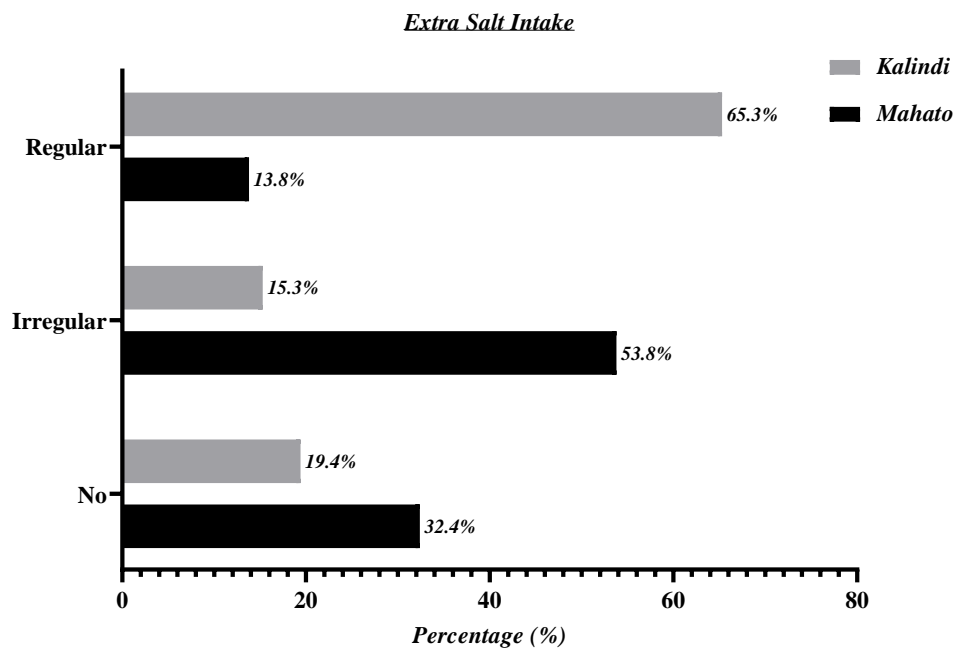


Figure 2: Percentage Distribution of Extra Salt Intake Among Mahato and Kalindi Males

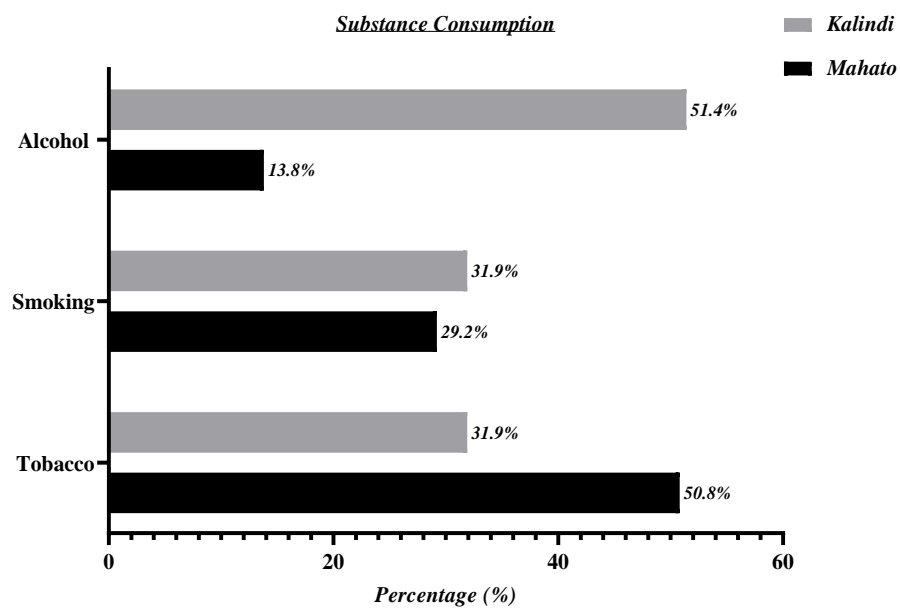


Figure 3: Percentage of Regular Tobacco, Smoking, and Alcohol Consumption Among Mahato and Kalindi Males

Figure 4 shows the percentage distribution of physical activity levels among Mahato and Kalindi males. Moderate activity levels were the most common in both communities (41.6% in Mahato and 39.8% in Kalindi males). A higher proportion of Kalindi males reported low PAL (39.1%) compared to Mahato males (36.0%), while the percentage reporting high PAL was similar in both groups.

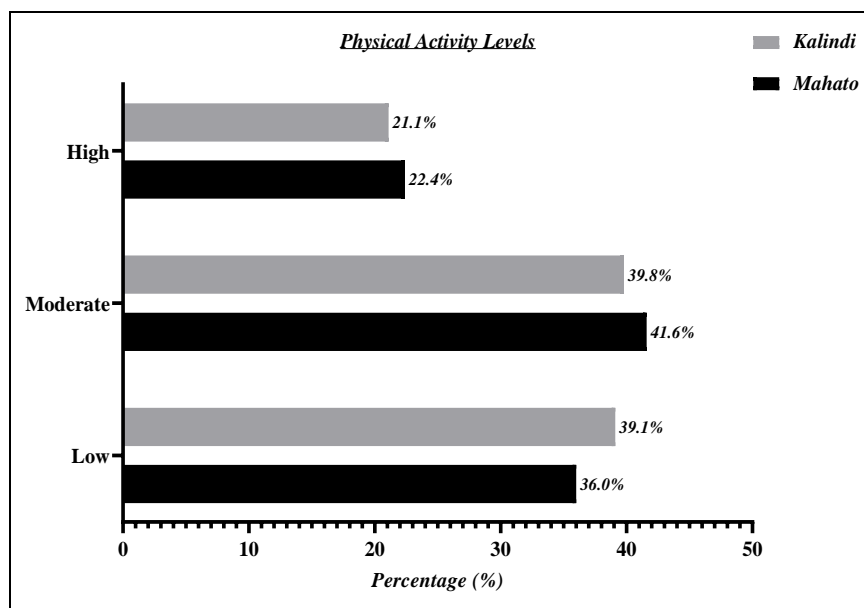


Figure 4. Percentage Distribution of Physical Activity Level (PAL) Between Mahato and Kalindi Males

DISCUSSION

Our study clearly highlights the risk factors for hypertension among the indigenous communities of Purulia. It has been observed that the prevalence of hypertension among the Mahato and Kalindi communities was 36.2% and 43.9%, respectively. This shows that the incidence of non-communicable diseases is increasing rapidly even in a tribal society. Earlier, it was believed that their traditional way of life provided some protection against these diseases, but this perception is now changing.

Comparing our findings with national-level studies, our results are higher or lower than the 28.4% among the Santal population of Jharkhand and the 31.7% reported by Kisku et al. (2019) [16]. Behera and Mishra (2020) [17]. Among the Juang and Munda populations of

Odisha. This means that the rates of hypertension are not the same among different tribal populations in India. Differences in social status, culture, food types, and access to health care can be major factors as reported by Behera and Mishra (2020) [17].

Our study found that lifestyle is one of the key factors that increase the risk of hypertension. The present study analysed the sociodemographic characteristics, body composition, dietary habits, substance consumption, and physical activity levels of Mahato and Kalindi men, revealing significant differences in lifestyle and health risks between the two communities. The average age of Mahato men (41.94 ± 13.01 years) and Kalindi men (40.33 ± 15.17 years) is almost the same. Mahato men are ahead in education, with 22.8% having graduate-level education compared to 12.1% among Kalindi. The rate of illiteracy is higher in the Kalindi community (31.8%) compared to Mahatos (26.7%). Professionally, physically strenuous work is higher among Mahato (66.7%), while the rate of light work is higher among Kalindi (39.3%). There was no major difference in marital status between the two communities. These factors may increase the risk of hypertension. These results are consistent with Patel et al. (2021) who stated that economic and social vulnerability is a major cause of increasing hypertension among tribal populations [18].

Among the identified risk factors, substance consumption is important. Tobacco use is higher among Mahato men (50.8%) compared to Kalindi (31.9%). Smoking rates are almost identical in both communities (around 31.9%). Regular drinking is significantly higher among Kalindi men (51.4%) compared to Mahatos (13.8%). Previous studies indicate that these factors are associated with higher BMI, systolic blood pressure, and a higher risk of cardiovascular disease [19-20].

In dietary habits, the regular consumption of junk food is higher among Kalindi men (47.2%) than among Mahatos (23.1%). Irregular junk food intake is higher among Mahatos (55.4%). Excessive salt intake is significantly higher among Kalindi (65.3%) compared to Mahatos (13.8%). These dietary differences can affect their BMI and systolic blood pressure. These factors have played a major role in the increase in hypertension. Research by Murmu et al. (2022) also found that prolonged alcohol and tobacco use increased the risk of heart disease among tribal men [21].

Body measurement indicators such as BMI, waist circumference, and physical activity have also played important roles. Moderate physical activity was most common in both communities (Mahato: 41.6%; Kalindi: 39.8%). Low physical activity is higher among Kalindis (39.1%) compared to Mahatos (36.0%). High levels of physical activity are almost equal in both communities. Less physical activity can contribute to higher obesity and high blood pressure. Kalindi men have higher BMI, systolic blood pressure, junk food and excessive salt intake, lower physical activity, and higher alcohol intake, which increases their health risks. Mahato men maintain relatively healthier eating habits and regular physical activity, but tobacco use is slightly higher. This matches the findings of Naik et al. (2021), who noted that obesity and an inactive lifestyle are new reasons for the increase in hypertension in tribal societies [22].

Our results are consistent with both national and international research. Aboriginal populations in Australia [23], Native American tribes in the United States [24], and Indigenous groups in Brazil [25]. These studies show modern lifestyle, moving away from traditional foods, easy access to alcohol, and reduced physical activity have all contributed to a rapid increase in hypertension. This means that it is not only hereditary factors but also social changes that increase the disease in Indigenous society.

Overall, our research shows the urgent need for culturally relevant public health initiatives in Purulia. Community blood pressure checks, programmes to reduce alcohol and tobacco use, awareness of low-salt and low-fat diets, and promotion of physical activity will help reduce the risk of heart disease in the future. At the same time, socioeconomic development and access to primary health care will play major roles in reducing this risk. The results indicate that lifestyle modification, increased awareness of food and substances, regular physical activity, and health check-ups are essential for both communities. Controlling excessive salt and alcohol intake, especially among the Kalindi community, and changing dietary habits will help reduce their risk of heart disease and high blood pressure.

The relationship between obesity and heart disease risk has been shown in many studies. Artham et al. (2009) reported that obesity is associated with high blood pressure, heart failure, and coronary heart disease. However, they also stated that in some cases, obesity can act as an “obesity paradox”. This dual role has influenced later interpretations [26].

In India, assessment of obesity is important at all ages. A study of children in the Purulia district showed that BMI does not always accurately capture body fat [27]. The Body Adiposity Index (BAI) may be more suitable for diagnosing childhood obesity. This becomes more complicated with age. Another study showed a direct correlation among anthropometric size, physical activity, and cardiovascular disease in older age. Genetic influences also control this relationship [28].

CONCLUSION

The present study demonstrates that hypertension is increasing rapidly among the indigenous communities, like the Mahato and Kalindi of Purulia. Low educational status, lifestyle changes, and reduced physical activity are all contributing to the increased risk of heart disease and metabolic disorders. Hypertension is more prevalent among Kalindi men, indicating that indigenous communities are no longer immune to lifestyle diseases. This trend is a major public health concern. Therefore, there is a need for village-based initiatives – health awareness, regular screening, and promotion of active lifestyles are essential to reduce future hypertension-related morbidity among these populations.

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

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