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Association of Hypertension with Modifiable Lifestyle Risk Factors: A Cross-sectional Study among the Bhumij Tribal Community of North 24 Parganas, West Bengal

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Abstract: *Background:* Hypertension (HPT) is a major public health concern not only in India but globally. Nowadays, the prevalence of HPT is increasing in the tribal population like the Bhumij, due to different modifiable lifestyle risk factors. This study aimed to determine the prevalence of HPT and its association with different modifiable lifestyle risk factors. *Materials and Methods:* It is a cross-sectional study in which only adult male participants aged> 18 years were selected. The sample size of the study was 107, and a simple random sampling method was used to select participants from the population. It has to be noted that all the statistical analyses were carried out using IBM SPSS version 25 with a $p < 0.05$ level of significance, and it was two-tailed. *Findings and recommendations:* The prevalence of hypertension (HPT) is high in this population; the prevalence of systolic blood pressure (SBP) and diastolic blood pressure (DBP) was 59,8% and 63.6%, respectively. The prevalence of different modifiable lifestyle risk factors (particularly junk food intake, extra salt intake, smoking and alcohol consumption) is high in this population. Binary logistic regression showed a strong association between modifiable lifestyle risk factors and HPT. Therefore, awareness and intervention are important to prevent the burden of HPT.

Keywords: Hypertension, Bhumij, lifestyle risk factors, lifestyle

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INTRODUCTION

Globally, hypertension is considered the leading cause of morbidity and mortality (Huang *et al.*, 2024). Hypertension (HPT) is strongly associated with the development of heart failure, ischemic heart disease, stroke, and kidney disease, and HPT resulted in around 57% of strokes and 24% of coronary artery disease-associated deaths (Gupta *et al.*, 2019). A rise in systolic blood pressure (SBP) caused 10.2 million deaths in 2017. In India, around 207 million people were found to be associated with HPT (Mathews *et al.*, 2021). In India, HPT was found to cause around 1.63 million deaths in the year 2016 (Mathews *et al.*, 2021). The increased burden of high blood pressure is further amplified with the consumption of tobacco (Smoking/smokeless) (Sinha *et al.*, 2023). In the past few years, a rise in high blood pressure (HBP) has been found in young adults (18-24 years) and among middle-aged persons (25-44 years), which results in a serious health issue across the entire world (Gupta *et al.*, 2004). In the year 2001, hypertension resulted in around 7.6 million deaths worldwide (Danaei *et al.*, 2011; Lopez *et al.*, 2006).

Hypertension has become the leading cause of death in the Western world, and it is the main cause of stroke, renal problems and kidney failure (Pradhan *et al.*, 2023). A diet with extra salt and excessive intake of alcohol all increase the risk of developing HPT (Pradhan *et al.*, 2023). According to research, numerous diseases like stroke, congestive heart failure, coronary heart disease and chronic kidney disease are all linked with high blood pressure (Makris *et al.*, 2010). It is observed that younger individuals are generally more vulnerable to hypertension than older individuals, and the risk factors include smoking and alcohol consumption (Reboldi *et al.*, 2004). In India, the burden of hypertension is expected to increase considerably in the upcoming years due to environmental and lifestyle-related changes, which are continuously producing a hazardous condition for survival (Kumar *et al.*, 2019).

Globally, Hypertension has been emerging as a serious public health threat. Globally, in the year 2008, approximately 40% of adults aged 25 years and above were diagnosed with HPT. In India, a sedentary lifestyle is the major contributing factor to the rise in prevalence of HPT (Patra *et al.*, 2018). Within the past few decades, the prevalence of HPT has increased to a greater extent in India (Patra *et al.*, 2018). In the year 2008, HPT was estimated to affect more than one out of five adults in India (Patra *et al.*, 2018). HPT is a major risk factor for cardiovascular diseases (CVDs), more particularly stroke and ischemic heart disease (Prabhakaran

et al., 2019). In many high-income countries, between the years 1975 and 2015, there was a decrease in the prevalence of HPT, but it rose rapidly in most of the low and middle-income countries (especially South Asia) (Prabhakaran *et al.*, 2019).

Hypertension (HPT) has become a major public health concern across the world; it can be called a silent killer since it is silent and generally shows no symptoms (Das *et al.*, 2025). According to the World Health Organisation (WHO), HPT affects around 1.28 billion adults globally between the ages of 30-79 years, and among them, two-thirds of the individuals live in low and middle-income countries (WHO, 2025). Globally, HPT is the major cause of premature death, and only one individual out of five individuals has it under control (Das *et al.*, 2025). The rapid changes in dietary habits and changes in lifestyle have caused an increase in non-communicable diseases over the past few years (Misra *et al.*, 2011). Therefore, the aim of the present study was to identify the prevalence of hypertension (HPT) and its association with some modifiable lifestyle risk factors, particularly eating junk food, extra salt intake, alcohol consumption, and smoking.

MATERIALS AND METHODS

Study Area and Population: Data were collected from the Bhumij tribal community (Jioldanga village) of Habra, North 24 Parganas, West Bengal. In the Jioldanga village, there were around 130 families who have been staying there since the year 1950. It was found that there are a few large families, and most families are mainly small families. The total population of this Bhumij community is around 480, and they have been staying there for many years. The village is covered with dense vegetation. The people of this community were engaged in agriculture as their primary occupation, while some are engaged in different work like carpentry, iron smelting, day labour and work related to construction. A few people run small shops, and very few people are basically engaged in white-collar jobs. The people of this community can speak and write the Bengali language. They have their own cultural beliefs and have certain taboos related to them. They also have certain taboos related to food, but nowadays, due to contact with the people who live outside the village, their lifestyle is constantly changing, and day by day their food habits are also changing; they showed an increased affinity towards eating fast food and sugary items, which has a significant impact on their overall health.

Study Participants: This was a cross-sectional study, and only adult males from Jioldanga village were selected, aged ≥ 18 years. The inclusion criteria included only adult males who were mentally and physically active. Individuals who were not

physically and mentally active or were under treatment for any type of disease, and females, were excluded from this cross-sectional study. The sample size consisted of 107 male participants, and the simple random sampling method was used to select the participants.

Data Collection: A structured interview method was carried out to record the chronological age of each participant. A sphygmomanometer and a stethoscope were used to measure the systolic blood pressure (SBP) and diastolic blood pressure (DBP) of each participant (Flack *et al.*, 2020). The classification of SBP and DBP was carried out according to the American College of Cardiology (ACC) and American Heart Association (AHA) as per 2017 guidelines (Flack *et al.*, 2020). Information regarding alcohol consumption, junk food intake, extra salt, and smoking was collected and categorised as 'No' and 'Yes'.

Data Analyses: Data were analysed using the Statistical Package for the Social Sciences (SPSS IBM 25). Frequencies and percentages were calculated for categorical variables. A Binary logistic regression analysis was performed to examine the association between these lifestyle risk factors and hypertension. A p-value < 0.05 was considered statistically significant.

RESULTS

Figure 1 presents the distribution of SBP levels among the study population. This figure clearly depicts that around 44.9% of the participants were in Stage 2

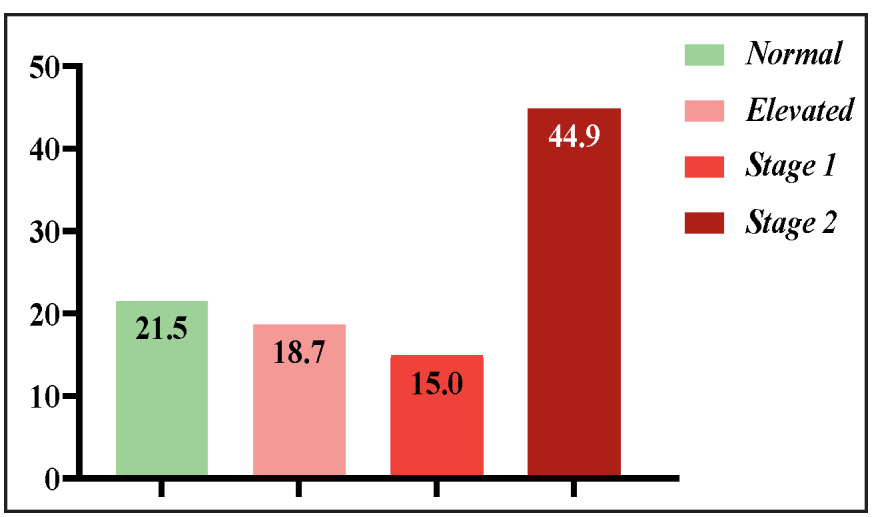


Figure 1: Prevalence of Systolic Blood Pressure

hypertension, while 21.5% of the participants were classified into normal SBP levels. It was observed that 18.7% of participants had elevated systolic blood pressure and 15.0% of the participants were classified under Stage 1 of hypertension. This pattern indicates that the burden of systolic blood pressure (SBP) is considerably high in this population.

Figure 2 presents the distribution of DBP levels among the study population. Interestingly, it was found that the proportion of individuals in Stage 1 and Stage 2 of hypertension was equal, and accounts for 31.80% of the participants. It was found that approximately 36.40% of the participants were classified as normal/elevated. This pattern indicates that the burden of diastolic blood pressure (DBP) is considerably high in this population.

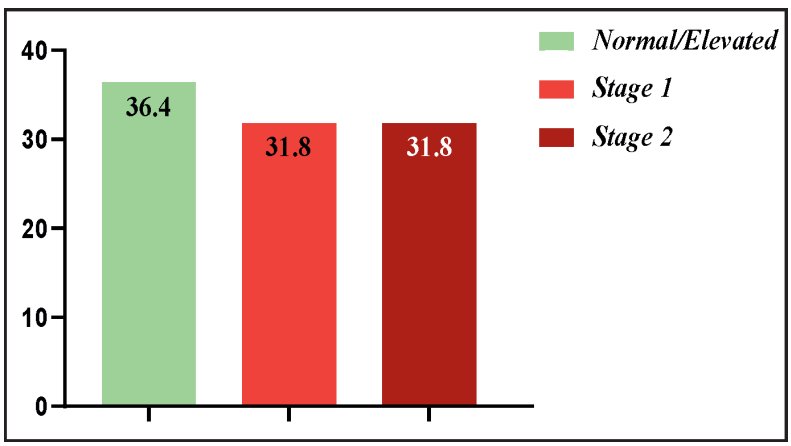


Figure 2: Prevalence of Diastolic Blood Pressure

Table 1 presents the frequency and percentage distribution of modifiable lifestyle risk factors among the participants. It was noticed that the prevalence of lifestyle risk factors was found to be high. The consumption of junk food was reported by 69 participants (64.49%), while 38 participants (35.51%) reported no consumption of junk food. Similarly, 66 participants (61.68%) reported extra salt intake, while 41 participants (38.32%) did not consume extra salt. In the case of alcohol consumption, 58 participants (54.21%) reported alcohol consumption, whereas 49 participants (45.79%) reported no alcohol consumption. Smoking was reported among 63 participants (58.88%), while 44 participants (41.12%) were classified as non-smokers. These findings clearly showed that there was a higher

prevalence of lifestyle-related risk factors, and these unhealthy lifestyle practices can contribute to an increase in the risk of developing hypertension.

Table 1: Frequency and Percentage Distribution of Modifiable Lifestyle Risk Factors among the Bhumij Tribal Community

Risk Variables	*Frequency*	*Percentage (%)*
Junk Food consumption (No)	38	35.51
Junk Food consumption (Yes)	69	64.49
Extra Salt (No)	41	38.32
Extra Salt (Yes)	66	61.68
Alcohol (No)	49	45.79
Alcohol (Yes)	58	54.21
Smoking (No)	44	41.12
Smoking (Yes)	63	58.88

A binary logistic regression was performed to understand the association of modifiable lifestyle risk factors with hypertension (Table 2), and the analysis showed that consumption of junk food, extra salt intake, and smoking were significantly associated with hypertension (HPT). The participants who consumed junk food had 2.50 times higher odds of hypertension (p=0.026), while those who ate extra salt had 3.169 times higher odds (p<0.001). Participants who smoked had 2.401 times higher odds of HPT when compared with non-smokers (p=0.007). In our study, it was found that the participants who consumed alcohol were not significantly associated with HPT (p=0.473). Overall, the participants who consumed extra salt showed the strongest association with HPT, followed by consumption of junk food and smoking.

Table 2: Association of Modifiable Lifestyle Risk Factors with Hypertension among the Bhumij Tribal Community

Risk Variables	*Sig.*	*Exp (B)*	*95% C.I. for EXP(B)*	
			Lower	*Upper*
Junk Food (No)	(reference)			
Junk Food (Yes)	0.026	2.506	1.224	6.152
Extra Salt (No)	(reference)			
Extra Salt (Yes)	<0.001	3.169	1.935	6.246
Alcohol (No)	(reference)			
Alcohol (Yes)	0.473	1.256	0.965	3.356
Smoking (No)	(reference)			
Smoking (Yes)	0.007	2.401	1.109	4.291

DISCUSSION

Many studies have been carried out in West Bengal to determine the prevalence of hypertension, but the present study was carried out in the Bhumij tribal population (Jioldanga village) of Habra, North 24 Parganas, West Bengal, not only to assess the prevalence of HPT but also to see the association of hypertension with different modifiable risk factors, particularly junk food intake, alcohol consumption, smoking and extra salt intake.

The prevalence of HPT is found to be high in this population (Figures 1 and 2). The present study showed that the prevalence of SBP was nearly 59.8% and the prevalence of DBP was nearly 63.6%; these represent a considerably high burden of hypertension in this population. Similar findings were reported from a study conducted by Ganie *et al.* in the year 2021, which was conducted in five districts of Kashmir, and the study reported the prevalence of HPT was 41.4% (Sreenivas *et al.*, 2021). A similar prevalence was observed from a study conducted by Chakma *et al.* among the tribal population of Central India in the year 2017, and in that study, HPT was found in 28.2% of males (Sharma *et al.*, 2017). A study conducted in the tribal population of Odisha by Yadlapalli *et al.* in the year 2008 reported that the prevalence of HPT was 19.0% among the tribal population (Das *et al.*, 2008). A study conducted in the year 2012 by Meshram *et al.* in tribal areas of Kerala found that 40.0% of the tribal adults were hypertensive (Meshram *et al.*, 2012). Aswin *et al.* conducted a study in the year 2024 in the Thrissur District of Kerala and found that almost half of the tribal participants (48.0%) were hypertensive (Anand *et al.*, 2024). Similar findings were reported from a study conducted in the year 2015 by Laxmaiah *et al.*, which reported that higher HPT prevalence was found in 27.1% of men (Laxmaiah *et al.*, 2015). A study conducted in the Kanyakumari District of Tamil Nadu, India, in the year 2026 reported that 27.1% reported having hypertension, while 24.3% were newly detected as hypertensive; therefore, the total prevalence was 51.4% (Vaisakh *et al.*, 2026).

Among the studied participants, the prevalence of lifestyle risk factors was found to be high (Table 1). The consumption of junk food was reported by 64.49%, while 35.51% reported no consumption of junk food. Similarly, 61.68% reported extra salt intake. In the case of alcohol consumption, 54.21% reported alcohol consumption, whereas 45.79% reported no consumption of alcohol. Smoking was reported by 58.88% of the participants. These findings clearly showed that there was a higher prevalence of lifestyle-related risk factors. These findings align with the

previous studies; a study conducted among the Cuttack District of Odisha in the year 2022 by S. K. Giri *et al*. found that the prevalence of alcohol consumption and Extra salt intake was 63.5% and 82.0% (Mohapatra *et al*., 2022).

The present study reveals that consumption of junk food, extra salt intake, and smoking were significantly associated with hypertension (HPT) (Table 2). The participants who consumed junk food had 2.50 times higher odds of hypertension (p=0.026), while those who ate extra salt had 3.169 times higher odds (p<0.001). Participants who smoked had 2.401 times higher odds of HPT when compared with non-smokers (p=0.007). Overall, the participants who consumed extra salt showed the strongest association with HPT, followed by consumption of junk food and smoking. Similar findings were observed from a study conducted by Chakma *et al*. (2017) in the Malda district of Madhya Pradesh, which reported that individuals who consumed a higher amount of extra salt had a higher prevalence of HPT (Sharma *et al*., 2017). Another study conducted by Giri *et al*. (2022) reported that extra-salt intake was significantly associated with HPT, with an OR of 1.86 (95% CI: 1.03-3.35) (Mohapatra *et al*., 2022). A study conducted in the tribal district of Odisha in the year 2026 reported that people who consume extra salt have high SBP and DBP levels (Jayasree *et al*., 2026). A similar pattern was observed in a study which reported that participants who consume extra salt and smoke were more vulnerable to high blood pressure compared to their counterparts (Bharati *et al*., 2022). In another study, it has been observed that there is a strong relationship between smoking and hypertension (Vennam *et al*., 2024). The people residing in the Jioldanga village are moving towards a sedentary lifestyle behaviour, which has had a major impact on their health (Das *et al*., 2026). All these findings suggest a strong association of different modifiable risk factors, particularly junk food intake, extra salt, alcohol consumption and smoking, with an increased risk of developing HPT, which is very much associated with the development of various cardiovascular diseases (CVDs).

CONCLUSION

The present study revealed a higher prevalence of HPT, which is strongly associated with different modifiable lifestyle-related risk factors, particularly junk food intake, extra salt intake, smoking and alcohol consumption. The Bhumij tribal people were earlier recognised for their healthy lifestyle behaviour; their culture was shaped by

traditional taboos, but nowadays, due to contact with people living in cities, their lifestyle is constantly changing, which was clearly visible from this study. So, it is important to make them aware of these lifestyle-related risk factors so that they can lead a healthy life.

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ETHICAL CONSIDERATION

All studied participants were informed before data collection. The present study was conducted with prior permission from the Head of the Department of Anthropology, West Bengal State University, Barasat, West Bengal, India.

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