

## Studies on the Blood Pressure Level and Socio Demographic Factors Related with Hypertension within the Santal Tribal People (of Various Age Groups) of the District Purulia, West Bengal, India

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### Abstract

**Objective:** The aim of this cross-sectional, community-based survey was to investigate the prevalence of hypertension isolated systolic hypertension (ISH), Isolated diastolic hypertension (IDH) and pre hypertension according to socio demographic features among the members of Santal Tribal Community of the district Purulia, West Bengal, India, in individuals aged 20 to 70 years. **Methods:** A door to door survey work was conducted by the authors. Detailed information was collected from participants who were interviewed using a systematic random sampling method and a pretested structured questionnaires. Standard instruments were used to obtain data on weight, height and blood pressure. Data were analyzed using standard statistical method. **Results:** The prevalence of hypertension (Systolic Diastolic Hypertension) according to different risk factors in the study population (N=519) is presented in Table 1. The overall crude prevalence of hypertension (BP $\geq$  140/90 mmHg, based on the VII report of American JNC,2003 and WHO criteria for 18 years old or above) is 15.41%. The pre-hypertensive (BP =120 -139 / 80 - 89 mmHg) condition is about 32.76%. Isolated Systolic hypertensive (BP $\geq$  140/ <90 mmHg) and Isolated Diastolic Hypertensive (BP <140 /  $\geq$ 90 mmHg) rates are 13.87% and 3.85% respectively. 34.10% of the total study population is known to have normotensive pressure level (Table 1 and Fig 1). The additional dietary salt intake is defined as those individuals who take extra salt per meal excluding the previously added salt to meal during preparation. The prevalence of hypertension is higher in additional dietary salt consumers as compared to those not taking extra salt. The prevalence of hypertension is 67.01% in the salt intake group of >11 gm/day than the <7 gm/day (65.48%) salt consuming group (Table 1, Fig 5). BMI and WHR were significantly higher in the hypertensive group compared to the non-hypertensive group. **Conclusion:** The results of this investigation clearly indicate that there was a significant role of dietary salt in the development of hypertension.

**Keywords:** Hypertension; Schedule tribe community; Tribal community; Purulia; Cardiovascular diseases; Systolic and diastolic blood pressure; Anthropometric measurement.

### Introduction

The partial pressure exerted by the flow of blood through the major arteries of body is defined as blood pressure (BP). This pressure is greatest in the arteries during the contraction of the ventricles of the heart (Systole), which occurs near the end of cardiac cycle called systolic blood pressure (SBP), which forces blood into the arterial system. Pressure falls to its lowest level in the arteries when the heart is filled with blood (Diastole), which occurs near the beginning of the cardiac cycle known as diastolic blood pressure (DBP).

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Hypertension means abnormally high blood pressure of chronic medical condition in which blood pressure is elevated. High blood pressure is said to be present if it is persistently at or above 140 - 90 mmHg (Normal range of Systolic 100-130 mmHg and Diastolic 70 - 90 mmHg). Hypertension can be classified as

either primary or secondary. Primary hypertension means that no medical cause can be found to explain the raised BP and represents about 90-95 % of hypertension cases. Secondary hypertension indicates that high BP is a result of (i.e., secondary to) another condition, such as kidney disease or tumors (abnormal adenoma or pheochromocytoma).

Hypertension is one of the major cardiovascular risk factors contributing to myocardial infarction, cerebrovascular accidents, end-stage renal disease, congestive heart failure, peripheral vascular insufficiency and premature mortality (Lifton, 2001). According to the health and health-related

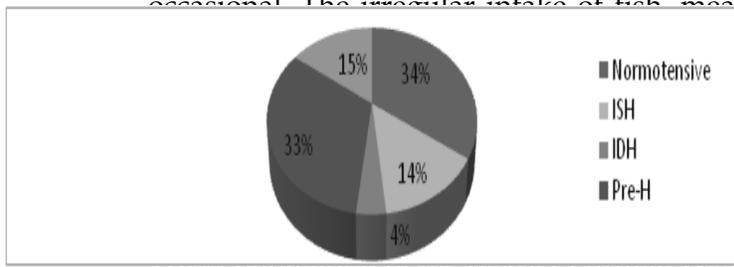
indicators of Ministry of Health (2000-2001), hypertension was the seventh leading cause of death not only in India but in other developing and developed countries (WHO,2004).

India is the only country where large number of Tribal Communities are quite prevalent. Hypertensive disease within the tribal people is a serious problem to the society. These particular people do not know the term Hypertension and Cardiac Heart disease (CHD). These people both young and old, exhibit salt sensitivity a variable tendency toward expanded plasma volume, with low rennin levels and increased peripheral and renal vascular resistances (Dahl *et al.* 1962) .

**Table 1: Prevalence of Non-hypertensive, ISH, IDH, Pre-H and SDH according to Socio-demographic features of the Santal Tribal Peple of the district Purulia, West Bengal**

Socio-Demographic Features	Number	Normotensive (%)	Prevalence of hypertension (%)				
			ISH	IDH	Pre-H	SDH	
Total Population Surveyed	519	34.10	13.87	3.85	32.76	15.41	
Age Group	20-29 years	202	45.05	9.90	4.46	32.67	7.92
	30-39 years	103	39.81	9.71	2.91	33.98	13.59
	40-49 years	81	27.16	16.05	6.17	28.40	22.22
	50-59 years	51	17.65	13.73	1.96	43.14	23.53
	60-69 years	82	17.07	26.83	2.44	29.27	24.39
Sex	Male	210	21.43	16.19	5.24	36.67	20.48
	Female	309	42.72	12.30	2.91	30.10	11.97
Marital Status	Married	385	33.25	14.03	3.90	31.69	17.14
	Unmarried	134	36.57	13.43	3.73	35.82	10.45
Occupation	House hold work	53	20.75	18.87	9.43	30.19	20.75
	Agriculture	44	38.64	9.09	2.27	34.09	15.91
	Service	11	18.18	9.09	9.09	27.27	36.36
	Labour	11	27.27	18.18	9.09	36.36	9.09
	Student	34	26.47	23.53	2.94	38.24	8.82
Education	Others	366	36.89	12.84	3.01	32.51	14.75
	Illiterate	498	34.34	13.45	4.02	32.93	15.26
	School level	9	11.11	22.22	0.00	33.33	33.33
Drug Addiction	Higher	12	41.67	25.00	0.00	25.00	8.33
	Normal	211	53.08	3.79	2.84	35.55	4.74
	Alcoholic	308	21.10	20.78	4.55	30.84	22.73
BMI (Kg/m <sup>2</sup> )	14-19.9	249	38.55	11.24	2.01	34.14	14.06
	20-24.9	204	30.88	18.63	5.88	29.90	14.71
	25- above	66	27.27	9.09	4.55	36.36	22.73
WHR	0.8 - 0.89	345	36.99	12.05	3.56	33.42	13.97
	0.9 - 0.99	154	27.27	18.18	4.55	31.17	18.83
Salt Intake / Day	3 - 6.9	281	34.52	16.01	2.49	33.81	13.17
	7 - 10.9	44	36.36	11.36	2.27	27.27	22.73
	11 - above	194	32.99	11.34	6.19	32.47	17.01
Physical activity	Heavy	268	41.79	8.96	5.22	29.48	14.55
	Light	251	25.90	19.12	2.39	36.25	16.33

**Figure 1: Figure showing prevalence of Normotensive, Pre-hypertensive, Isolated Systolic Hypertensive, Isolated Diastolic Hypertensive and Systolic Diastolic Hypertensive individuals (in per cent) surveyed within the Santal Tribal People of the District Purulia, West Bengal**



The economic conditions of the tribal people especially of the district Purulia is very poor. Their per capita income is quite low. Usually they used to take putrefied rice two to three times a day with fried chilli and high amount of salt, approximately 14-15 gms/day. They cannot buy any fruits or vegetables, fish or meat as their source of income is very limited and poor. Sometimes they catch 'jiol' fish from the nearby water bodies and it is very occasional. The irregular intake of fish, meat

tribal population of the district Purulia, West Bengal, India, in individuals aged 20-70 years this information will help to recommend specific lifestyle interventions and to assess their impact on the control of hypertension.

## Methods

### Data Collection

A cross sectional population-based survey work has been carried out between September 2013 - June 2014 to estimate the current prevalence and distribution of hypertension and dietary correlation of hypertension within the Scheduled Tribe (ST) community of Raghunathpur subdivision of Purulia District, West Bengal. Purulia lies between 22.60

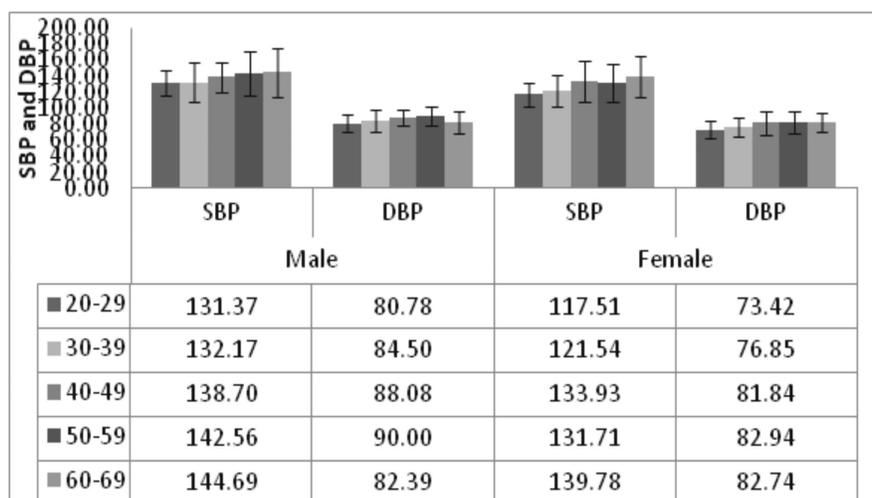
degrees and 23.50 degrees north latitudes and 85.75 degrees and 86.65 degrees east longitudes. The geographical area of the district is 6259 km<sup>2</sup>. Data has been collected from 10:00 am to 5:00 pm. Door to door survey has been undertaken by systematic random sampling method. About five hundred nineteen members of the households of six blocks of Raghunathpur Subdivisions who were above 20 years of age were interviewed and detailed information regarding age, sex, educational status, marital status, physical activity, salt intake and personal habits like smoking, alcohol intake and additional salt intake at household levels were collected. The information was recorded about dietary habits. Body weight, height, waist and hip circumference and pulse rate were measured using standard techniques. A mercury column sphygmomanometer was used to measure blood pressure in the sitting position.

### Definition and diagnostic criteria

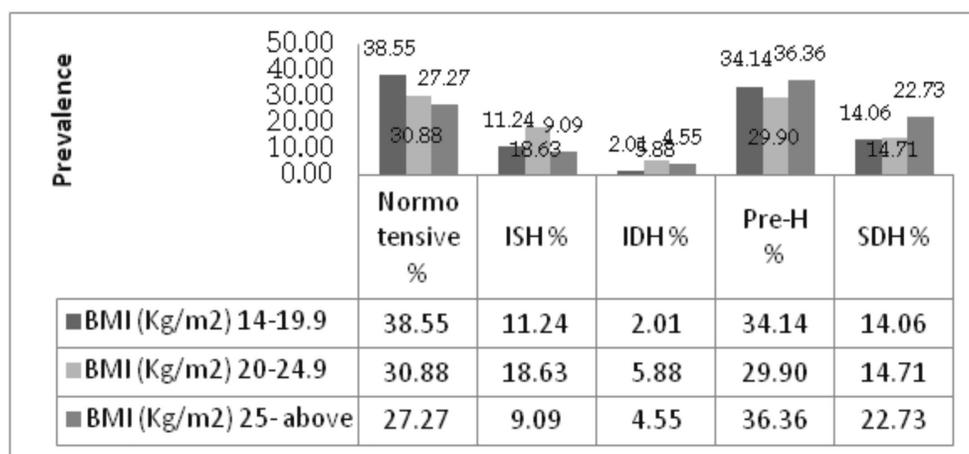
Both the 7<sup>th</sup> report of the JNC (Joint National Committee-VII, 2003) on the prevention, detection, evaluation and treatment of high BP and WHO, 1996 have recommended a new classification for adults-20 years older or above. Hypertensive e" 140/90 mmHg, Prehypertensive =120-139/80-89 mmHg, Normal < 120/80 mmHg. Besides, ISH e" 140/<90 mmHg and IDH < 140/e"90 mmHg.

Various types of anthropometric measurements were done including the height

**Figure 2: Figure showing the changes of blood pressure (SBP and DBP) in different age groups surveyed within the Santal Tribal People of the District Purulia, West Bengal**



**Figure 3: Figure showing prevalence of Normotensive, Pre-hypertensive, Isolated Systolic Hypertensive, Isolated Diastolic Hypertensive and Systolic Diastolic Hypertensive individuals in per cent in different body mass index (BMI) groups surveyed within the Santal Tribal People of the District Purulia, West Bengal**



and weight. The body mass index (BMI) was calculated using the formula-Weight in Kg/Height in m<sup>2</sup>. Waist and hip circumference were measured for calculation of WHR. Obesity was defined as BMI >25Kg/m<sup>2</sup> for both male and females. Central obesity as per Indian criteria was defined as WHR >0.88 in males and >0.81 in females.

Amount of salt intake per individual with their diet was calculated as per their use of salt with foods during cooking as well as additional salt intake during eating. Additional salt intake was defined as those

individuals who ate extra salt with their meal excluding the previously added salt to meal during preparation.

#### Statistical Analysis

Various Statistical methods were used for the determination of the dependence of one variable to other and correlation study for the degree of association between two variables were used for the analysis of the data by using SPSS 20 version and Microsoft Excel software.

**Table 2: Correlation between Age and Blood pressure (SBP and DBP) surveyed within the Santal Tribal People of the District Purulia, West Bengal**

		Correlations		
		Age	Systolic	Diastolic
Age	Pearson Correlation	1	0.300**	0.219**
	Sig. (2-tailed)		0.000	0.000
	N	519	519	519
Systolic	Pearson Correlation	0.300**	1	0.785**
	Sig. (2-tailed)	0.000		0.000
	N	519	519	519
Diastolic	Pearson Correlation	0.219**	0.785**	1
	Sig. (2-tailed)	0.000	0.000	
	N	519	519	519

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Results

The prevalence of hypertension (Systolic Diastolic Hypertension) according to different risk factors in the study population ( N=519) is presented in Table 1. The overall crude prevalence of hypertension ( BP $\geq$  140/90 mmHg, based on the VII report of American JNC,2003 and WHO criteria for 18 years old or above) is 15.41%. The pre-hypertensive (BP =120 -139 / 80 - 89 mmHg) condition is about 32.76%. Isolated Systolic hypertensive (BP $\geq$  140/ <90 mmHg) and Isolated Diastolic Hypertensive ( BP <140 /  $\geq$ 90 mmHg) rate are 13.87% and 3.85% respectively. 34.10% of the total study population is known to have

normotensive (Table 1 and Fig 1).

Prevalence of hypertension is higher among the males 78.57% compared to females 57.28%. Isolated Systolic Hypertension, Isolated Diastolic Hypertension and Pre- hypertension levels are also higher in males than females.(ISHà16.19% and 12.30%, IDHà5.24% and 2.91%,Pre-Hà 36.67% and 30.10%) (Table-1, Fig-2).

Prevalence of hypertension is increased significantly with increasing body mass index (BMI) 61.45%, 69.12% and 72.73% hypertensive individuals are found in three increasing BMI groups such as BMI<19.9 kg/m<sup>2</sup>, BMI=20-24.9kg/m<sup>2</sup> and BMI $\geq$ 25 kg/m<sup>2</sup>.Systolic diastolic hypertension ( SDH )

**Table 3: Correlation between Body mass index(BMI) and Blood pressure (SBP and DBP) surveyed within the Santal Tribal People of the District Purulia, West Bengal**

		Correlations		
		BMI	Systolic	Diastolic
BMI	Pearson Correlation	1	0.110*	0.147**
	Sig. (2-tailed)		0.012	0.001
	N	519	519	519
Systolic	Pearson Correlation	0.110*	1	0.785**
	Sig. (2-tailed)	0.012		0.000
	N	519	519	519
Diastolic	Pearson Correlation	0.147**	0.785**	1
	Sig. (2-tailed)	0.001	0.000	
	N	519	519	519

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

tendency is increased with increasing BMI (14.06%, 14.71% & 22.73% respectively) (Table 1, Fig 3).

Correlation study between age and blood pressure revealed that the blood pressure (SBP and DBP) is directly correlated with the age it is significant at 0.01% level (Table 2).

Correlation study between body mass index (BMI) and blood pressure revealed that the blood pressure (SBP and DBP) is highly correlated with the BMI at 0.01% and 0.05% level of significance (Table 3).

## Discussion

The prevalence of hypertension is increased gradually with the increasing age i.e., it is maximum (82.35%) in the age group of 50-59 years, while it is minimum (54.95%) in the age group of 20-29 years. The similar findings have been reported by various studies in India and other countries too (Joshi *et al*, 2000, Jojoo *et al*, 1993, Singh *et al*, 2000 and Kotchen *et al*, 1982).

The prevalence of hypertension is higher in males (78.57%) than females (57.28%). This compatible finding is reported by other scientists also (Jojoo *et al*, 1993, Joshi *et al*, 2000).

A positive association is observed between body mass index and development of hypertension. The person having BMI  $\geq$  25 shows higher risk of hypertension (72.73%). Similar findings were reported by a number of studies on hypertension (Jojoo *et al*, 1993, Das *et al*, 2005 and Malhotra *et al*, 1998).

A long time extra salt intake has been considered to causes hypertension. This is proved true by this study or in other studies too. A higher hypertension prevalence rate is observed in additional dietary salt intake individuals compared to those who do not take extra salt in their diet. Prevalence of hypertension is 67.01% in  $\geq$  11gm salt /day intake group, while prevalence of hypertension is 65.48% in those who take  $<$ 7gm salt/day.

Similar association between salt and hypertension has been observed by other workers (Singh *et al*, 1997, Sadhukhan *et al*, 2005).

Incidence of hypertension is not related with any direct cause. There are some factors which lead to develop hypertension. They are - Sedentary life style, Stress, Obesity (BMI $>$ 25), Faulty food habits, Vitamin-D deficiencies, Potassium deficiency (Hypokalemia), Salt sensitivity, Alcohol intake, Aging etc.

Rise in salt intake is usually accompanied by a small rise in plasma sodium tends to be raised in essential hypertension. Dietary salt intake controls the stiffness of the larger conduit arteries, the reactivity of the smaller resistance vessels and the wall thickness of both. A raised intake induces an increase in collagen deposition and increased generation for reactive oxygen species within arterial walls. The changes in salt intake present a major challenge to excrete this large amount of salt, which leads to heart failure and renal diseases. Sodium and Chloride are the two predominant factors of extra cellular fluid volume. High amount of salt in the diet may play an important role in determining blood pressure in human (INTERSALT, 1988 and Henderson *et al*, 2003).

A result of the present study within the Santal Tribal People of District Purulia clearly point out some cases of hypertension, due to high amount of NaCl (raw salt intake) in their diet.

The results also shows that not only salts other causative factors may be the source of hypertension within this community.

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