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Study of Hypertension rates and Blood Pressure pattern among the tribal Population of Jharkhand.

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ABSTRACT:

Hypertension, diabetes, and cancer non-communicable diseases have replaced communicable diseases as the leading cause of mortality in most parts of the world including India. Hypertension is a major public health problem in India which often results in coronary artery disease and stroke. The main aim of this study is to describe the normal pattern of blood pressure and to assess the prevalence and associated factors of hypertension among a selected tribal population of Jharkhand. It was carried out among tribal populations of Ghatshila area, East Singhbhum District, Jharkhand. Using convenient sampling method, 320 individuals aged 20 years and above were selected. Pregnant mother and those individuals who were not willing to participate were excluded from the study. Data on socio-demographic variables, physical activity, tobacco consumption, and alcohol intake were collected. Blood pressure was recorded and classified according to Joint National Committee – 8 criteria. Data entry and analysis was done on SPSS version 17.

Systolic and diastolic mean blood pressure was found to be 126.5 mmHg and 78.1 mmHg respectively. In the study individuals only 43.7% of had normal blood pressure, and the rest had either hypertension or pre-hypertension. Increasing age, alcohol intake, sedentary lifestyle, obesity, and central obesity were found to be significant factors responsible for high blood pressure. Mean systolic and diastolic blood pressure of the Tribal population was like those of rural population of Jharkhand. A large proportion of the population had elevated blood pressure especially the elderly, thus necessary for annual screening in them. Alcohol intake and obesity were found to be associated with hypertension; hence, require for health education on harmful effects of alcohol and benefits of a balanced diet should be given to the tribal population.

KEYWORDS: SBP and DBP, Tribal Population; Risk Factors; Joint National Committee 8

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INTRODUCTION:

Till the 20th century, communicable diseases such as plague, cholera, tuberculosis used to be the major contributors to mortality where as in the 21st century non-communicable diseases such as hypertension, diabetes mellitus, and cancer have taken over as the major mortality contributors.[1] As reported by World Health Organization, hypertension (HTN) is the third 'killer' disease, accounting for one in every eight deaths worldwide [2]. It has been expected that the number of hypertensives may rise from 118 million in 2000 to 214 million in 2025 [3]. Nearly 9.4 million deaths each year or 16.5% of all deaths can be attributed to high blood pressure.4 In India, hypertension is the leading Non- Communicable Disease (NCD) risk & estimated to be attributable to nearly 10% of all deaths and in 2016, it was one of the leading risk factors responsible for 8.5% of the disability-adjusted life-years (DALYs)[4]. Hypertension is a major public health problem in both developed and developing countries. It is responsible for 9.4 million deaths worldwide. The World Health Organization world health statistics 2015 reported the global prevalence of hypertension as 25.9% among males and 24.8% among females.[3] High blood pressure possessestwo-fold higher risk of developing coronary artery disease, four times higher risk of congestive heart failure and seven times higher risk of cerebrovascular disease compared to normotensive people.[4]

It has long been believed that the blood pressure levels of tribal people are lower than the general population as they are isolated from the modern lifestyle and may have a lower prevalence of risk factors of hypertension such as sedentary lifestyle, unhealthy diet, obesity, mental stress, tobacco and alcohol intake. As tribal populations are relatively isolated from the modern lifestyle, it is often hypothesized that their blood pressure is lower than the general population. Many past research studies have also found the prevalence of hypertension to be lower in naïve tribal populations than the general population, but a recent meta- analysis has pointed out a change in this scenario with an increasing trend in prevalence of hypertension.[5-14] This could be due to changing lifestyle and a higher level of acculturation due to better road connectivity, use of gadgets such as television and mobile phones, emigration in search ofbetter education and job opportunities.

As there are limited studies done to understand the blood pressure profile and its variation among tribal people, the current study was undertaken to describe the normal pattern of blood pressure and to assess the prevalence and associated factors of hypertension among tribal population of Ghatshila area, East Singhbhum District, Jharkhand.

MATERIALS AND METHODS:

The study was carried out among tribal settlements of Ghatshila area, East Singhbhum District, Jharkhand. Ghatshila is an important town of East Singhbhum and has a population of 129905 according to Census 2011. There are around 54664 tribal people which is 10.5% of total population residing in Ghatshila area, East Singhbhum District, Jharkhand, and it is spread across different area of three-gram

panchayats (Amaynagar, Dainmari, Ghatshila). Off the 32 major tribes in Jharkhand, Dainmari and Ghatshila are the dominant tribes residing in Ghatshila area, and they are all labors. The present study was conducted from October 2022 to July 2023, and the design is community- based cross-sectional study. The required sample size was estimated at 320 using the formula 4 pq/l^2 (prevalence of 25%, relative precision of 20% was considered at 95% confidence interval). Ethical clearance for the study was taken from Vidyasagar University ethical committee and permission to carry out the study wastaken from the area tribal officer. Local leaders were contacted, and their support garnered. Volunteers were recruited from the tribal population for assistance in carrying out the study. Convenient sampling was used to select 320 tribal people aged ≥20 years for the study. Pregnant women and those individuals who were not willing to participate were excluded from the study. Written informed consent was obtained from the study participants after explaining the study to them in their own language. Information was collected using a pretested and semi structured questionnaire. Data on sociodemographic variables, physical activity, tobacco consumption, and alcohol intake were collected. Modified Udai Parekh socioeconomic classification was used to classify people according to their socioeconomic status.[15]

Weight was recorded and rounded off to the nearest 0.5 kg using an electronic weighing machine. For recording height, the subjects were made to stand erect; looking straight on a level surface and height was read tothe nearest 0.5 cm. Waist circumference was measured to thenearest 1 mm, using a nonelastic plastic tape with the subject in standing position midway between the lower rib margin and the iliac crest. Hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. Body mass index of ≥25 kg/m^2 was considered as obesity, and waist hip ratio of ≥0.95 in males and ≥0.85 in females was considered as abdominal obesity.[16]

Blood pressure was recorded using a mercurysphygmomanometer in the right arm with the subject in the seating position. Two reading were taken and the average ofthese reading was taken for analysis. The first reading was taken after at least 15 min of rest and the second reading wastaken 15 min after the first reading. Joint National Committee (JNC) - 8 criteria were used for diagnosis of hypertension.[17] Hypertension was defined as systolic blood pressure more than or equal to 140 mmHg and/or diastolic blood pressure more than or equal to 90 mmHg. Individual aged ≥60 years were hypertensive if their systolic blood pressure more than or equal to 150 mmHg and/or diastolic blood pressure more than or equal to 90 mm Hg. Those individuals already diagnosed as hypertensive were also labeled as such. Data entry and analysis was done on SPSS version 17. Results of categorical variables are presented as number and percentage, whereas continuous variables are presented as mean and standard deviation. Student's *t*-test (two-tailed, independent) and Chi-square test have been usedto find the significance of study parameters. $p < 0.05$ was significant.

RESULTS:

A total of 320 tribal people participated in this study, out of which 187 (58.4%) were males and rest 133 (41.5%) females (Table 1). The mean age (±standard deviation) of the study participants was 42.9 (15.9) years. According to Udai Parekh socioeconomic classification, it was observed that a large proportion of people belonged to class V (lower class) and class IV (lower middle class).

The mean systolic and diastolic blood pressure was found to be 125.2 mmHg and 77.1 mmHg, respectively. Both systolic and diastolic blood pressure levels were higher in males as compared to females, but this difference was not found to be statistically significant (Table 2). It was observed that only 43.7% of the tribal people had blood pressure in the normal range, another 31.9% had pre-hypertension and were at a high risk of developing hypertension in near future. The prevalence of hypertension among tribal people was 24.4% (Table 3 and figure 1).

Increasing age, alcohol intake, sedentary lifestyle, obesity, and central obesity were found to be significant factors responsible for high blood pressure (Table 4). Gender, socioeconomic class, and tobacco intake were not found to be significant for high blood pressure.

TABLE 1: The socio demographic variables of the tribal populations.

Variable	**Frequency *n* = 320 (%)**
Age	
20-29 years	67 (20.9)
30-39 years	83 (25.9)
40-49 years	82 (25.6)
50-59 years	62 (19.3)
60-69 years	26 (8.1)
Sex	
Males	187 (58.43)
Females	133 (41.56)
Socio economic status (according to Udai Parekh)	
Class I (>43)	2 (0.6)
Class II (33-42)	3(0.9)
Class III (24-32)	12 (3.7)
Class IV (13-23)	91 (28.5)
Class V (<13)	212(66.3)

TABLE 2: SBP and DBP distribution among males and females' tribal population.

Variable		Mean ± SD		*p**
	Combined	Males	Females	
Systolic blood pressure(mmHg)	125.2±17.6	127.2±16.1	125.9±20.6	0.163
Diastolic blood pressure (mmHg)	77.1±10.8	78.2±7.7	78±9.8	0.144

*Unpaired2-sided *t*-test has been used, SD: Standard deviation

TABLE 3: Blood pressure of the study populations

Blood pressure class	Frequency (%)
Normal	140 (43.7)
Prehypertension	102 (31.9)
Stage1hypertension	61 (19.1)
Stage2hypertension	17 (5.3)
Total	320 (100)

Based on Joint National Committee 8 Classification

FIGURE 1: Percentage of blood pressure of the study populations (as per JNC 8)

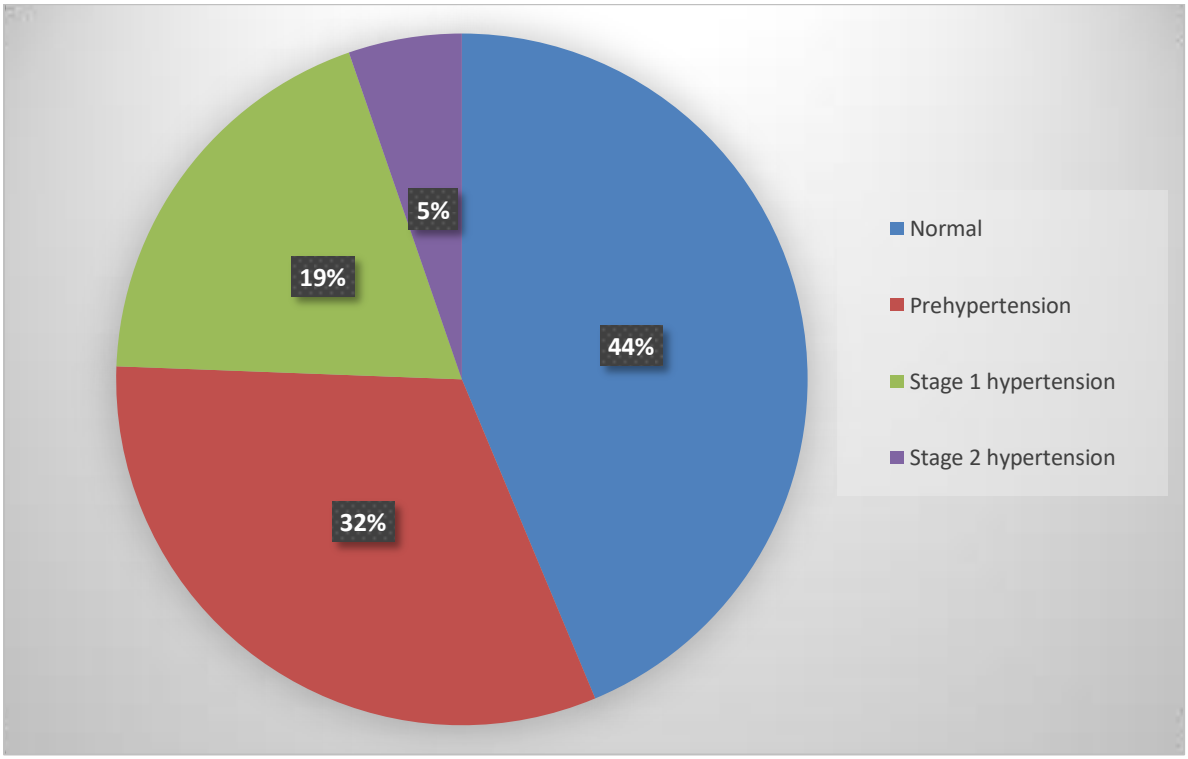

TABLE 4: **The factors associated with hypertension.**

Variable	Total(*n*=320)	Hypertensive *n* (%)	Normotensive *n*(%)	Odds ratio (95%CI)	χ^2	*p*
Age in years						
20-29	89	14 (15.7)	75 (84.3)	1	26.09	<0.001#
30-39	88	20 (25.0)	68 (77.2)	2.2 (0.6-7.1)		
40-49	77	29 (37.6)	48 (62.3)	4.7 (1.8-17.8)		
50-59	57	25 (43.8)	32 (56.1)	7.6 (2.4-26.2)		
60-69	9	4 (44.4)	5 (55.6)	7.4 (1.9-21.5)		
Sex						
Males	187	65 (34.7)	122 (65.2)	1	0.486	0.534
Females	133	54 (40.6)	79 (59.4)	0.8 (0.5-1.4)		
Socio economic class						
Class 1	02	01 (50.0)	01 (50.0)	1.6 (0.3-9.2)	4.594	0.380
Class 2	03	01 (33.3)	02 (66.7)	2.4 (0.6-3.4)		
Class 3	12	04 (33.3)	08 (66.7)	0.7 (0.3-1.8)		
Class 4	91	25 (27.4)	66 (72.6)	1.9 (0.8-3.1)		
Class 5	212	83 (39.1)	129 (61.9)	1		
Tobacco smoking						
Smoker	53	11(20.8)	32 (79.2)	1.7 (0.5-2.4)	0.242	0.698
Non-smoker	267	59 (22.1)	198 (77.9)	1		
Tobacco chewing						
Present	88	27 (30.6)	61 (69.4)	0.9 (0.5-1.6)	0.169	0.709
Absent	232	53 (22.8)	169 (77.2)	1		
Alcohol intake						
Present	109	30 (27.5)	79 (72.5)	1.9 (1.1-3.1)	3.012	0.045*
Absent	211	50 (23.7)	161 (76.4)	1		
Sedentary lifestyle						
Yes	80	33 (41.3)	47 (58.7)	1.7 (1.1-3.4)	3.629	0.031*
No	240	57 (24.5)	183 (75.5)	1		
Obesity						
Obese	45	18 (40)	27 (60)	2.1 (1.2-4.5)	3.224	0.040*
Non-obese	275	77 (28.0)	198 (72.0)	1		
Abdominalobesity						
Present	89	36 (40.4)	53 (59.6)	2.2 (1.1-3.5)	4.600	0.019*
Absent	231	54 (23.4)	177 (76.6)	1		

***p*<0.05, #*p*<0.001, CI: Confidence interval**

DISCUSSION:

This study was undertaken to understand the normal pattern of blood pressure and to assess the prevalence with associated factors of hypertension among a selected tribal population. Based on the inclusion and exclusion criteria,a total of 320 tribal people (187 males, 133 females) were selected for the study.

The mean systolic and diastolic blood pressures were both higher among males as compared to females,

but this difference was not found to be statistically significant. Mean systolic blood pressure was 127.20 mmHg among males and125.92 mmHg among females. On an average, the systolic blood pressure was 1.3 mmHg higher in males. Mean diastolic blood pressure was 78.2 mmHg among males and 78.0 mm Hg among females. On an average, the diastolic blood pressure was also higher in males. These levels are like those reported in rural areas of Jharkhand by National Family Health Survey 3 report.[18] Lower blood pressure in females is due to the action of estrogen hormone. The mean blood pressure of females is lower than males till the time they reach menopause, and later the blood pressure levels will be similar in both sexes.[19]

The study found 43.7% and 31.9 % of people to have normal blood pressure and prehypertension respectively. According to the latest JNC criteria, normal blood pressure is defined as systolic blood pressure <120 mmHg and diastolic blood pressure <80 mmHg. Prehypertension is defined as systolic blood pressure between 120 and 139 mmHg (up to 149 mmHg for people aged more than 60 years) and diastolic blood pressure between 80 and 89 mmHg. The prevalence of hypertension in the tribal population was 24.4%. This was lower than the estimates given by a study conducted in Kerala by Meshram et al. Who reported an estimated prevalence of 40%.[8] The prevalence of hypertension among various tribal's of the country has been reported from as low as 16.1% from Gujrat to as high as 43.4% in Uttarakhand. [5-14]This variation is mainly due to the difference in their lifestyle and level of culture. Regarding the factors affecting blood pressure, it was observed that the chance of being hypertensive increased with advancing age. Among young people aged 20-29 years, only 15.7 % had hypertension whereas among elderly people aged more than 70 years, 44.4 % had hypertension. With increasing age, arteries and arterioles become less elastic due to atherosclerotic changes resulting in elevated blood pressure levels in older people. Gender and socioeconomic status did not significantly affect the blood pressure of the study tribal population.

It was observed that around 27.5 % of the study individuals consumed alcohol and most of them took it daily. The present study found the odds of increased blood pressure among alcohol consumers to be 1.8 times that of non- alcoholics. A similar finding has also been reported among other studies conducted among different tribal groups of India. [10,13,14] Alcohol causes elevation of blood pressure by the direct pressor effect of alcohol on blood vessels, sensitization of resistance vessels to pressor substances, sympathetic nervous system stimulation and increased production of adrenocortical hormones.[20] With regard to tobacco intake and hypertension, the study did not observe any association. A large proportion of people leading a sedentary lifestyle and those having obesity (general or abdominal) had elevated blood pressure levels. The odds of an obese person being hypertensive were two times that of a non- obese person (Table 4). A similar finding has been reported in other tribal studies. [6,12,13] Obesity causes hypertension by activating the rennin angiotensin aldosterone system, increasing sympathetic activity, promoting insulin resistance and leptin resistance, increasing cholesterol levels, increased pro coagulatory activity and by endothelial dysfunction.

Other mechanisms include increased renal sodium reabsorption, causing a shift to the right of the pressure natriuresis relationship and resulting volume expansion.[21]

CONCLUSION:

The mean systolic and diastolic blood pressure of the tribal populations was 125.2 mmHg and 77.1 mmHg respectively andthese levels like those of rural population of Jharkhand. It was also observed that only 43.7% of the study individuals had normal blood pressure and the rest had either hypertension orpre-hypertension. As elderly elevated blood pressure was common, annual screening should be done among them. Alcohol intake and obesity were found to be associated with hypertension; hence, health education on harmful effects of alcohol and benefits of regular physical activity and proper balanced diet should be given to the tribal population. Overweight/obesity is an important risk factor for hypertension, so weight control through regular physical exercise should be recommended for prevention of hypertension. Knowledge and awareness about hypertension may be imparted through appropriate information, Education, and communication (IEC) activities to reduce burden of chronic diseases in the population.

RECOMMENDATION:

Author suggests that similar studies should be undertaken to assess the prevalence of hypertension among Tribal people of different regions as well as other ethnic groups, especially in rural areas. In India, there are many such prevalence of hypertension among tribal populations, those studies will help us to generate new data which can be used for compare with the prevalence of hypertension in the local, national, and global context.

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CONFLICT OF INTEREST:

The authors declare that there are no conflicts of interest regarding publication of this paper.

REFERENCES:

1. World Health Organization Global Status Report on Non-Communicable Diseases 2010. Available from: http://www.who.int/nmh/publications/ncd_report_full_en.pdf.
2. World Health Organization. A Global Brief on Hypertension WHO/DCO/WHD/2013.Available from: http://www.who.int/cardiovascular_diseases/publications/global_brief_hypertension/en/.
3. World Health Organization. World Health Statistics 2015. Available from: http://www.apps.who. int/iris/bitstream/10665/170250/1/9789240694439_eng. pfui=1

4. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: Analysis of worldwide data. Lancet. 2005; 365:217-23.
5. Rizwan SA, Kumar R, Singh AK, Kusuma YS, Yadav K, Pandav CS et al. Prevalence of hypertension in Indian tribes: A systematic review and meta-analysis of observational studies. 2014;9(5): e 95896.
6. Sachdev B. Prevalence of hypertension and associated risk factors among nomad tribal groups. Antrocom Online J Anthropol. 2011;7(2):181-9.
7. Mandani B, Vaghani B, Gorasiaya M, Patel P. Epidemiological factors associated with hypertension among tribal population in Gujrat. Natl J Community Med. 2011;2(1):133-5.
8. Meshram II, Arlappa N, Balkrishna N, Rao KM, Laxmaiah A, Brahmam GN. Prevalence of hypertension, its correlates and awareness among adult tribal population of Kerala state, India. J Postgrad Med. 2012;58(4):255-61.
9. Raina SK, Chander V, Prasher CL, Raina S. Prevalence of hypertension in a tribal land locked population at high altitude. Scientifica (Cairo). 2016; 2016:3589720.
10. Radhakrishnan S, Ekambaram M. Prevalence of diabetes and hypertension among a tribal population in Tamil Nadu. Arch Med Health Sci. 2015;3(1):66-71.
11. Hathur B, Basavegowda M, Ashok NC. Hypertension: An emerging threat among tribal population of Mysore, Jenu Kuruba tribe diabetes and hypertension study. Int J Health Allied Sci. 2013;2(4):270-4.
12. Kandpal V, Sachdeva MP, Saraswathy KN. An assessment study of CVD related risk factors in a tribal population of India. BMC Public Health. 2016; 16:434.
13. Laxmaiah A, Meshram II, Arlappa N, Balakrishna N, Rao KM, Reddy CH, et al. Socio-economic and demographic determinants of hypertension and knowledge, practices, and risk behavior of tribals in India. Indian J Med Res. 2015;141(5):697-708.
14. Kumar RK, Tyagi AR, Tiwari R, Rai N. A study of hypertension among tribal adults in a block of Mandla district, Madhya Pradesh, India. Int J Community Med Public Health. 2016;3(5):1033-7.
15. Wani RT. Socioeconomic status scales- modified Kuppuswamy and Udai Parekh's scale updated for 2019 J Family Med Prim Care. 2021; 8:1846–9
16. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 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):507-20.
17. National Programme for Prevention and Control of Diabetes, Cardiovascular Disease and Stroke. A Manual for Medical Officers. Government of India; 2008. p. 16. Available from: http://www.clinicalestablishments.nic.in /Write Read Data/58. pdf. [Last accessed on 2016 Aug 04].
18. Sharma R. Revision of prasad's social classification and provision of an online tool for real-time updating. South Asian J Cancer. 2013;2(3):157.

19. International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), India, 2005-06. Kerala, Mumbai: IIPS; 2008.
20. Jervase E, Barnabas D, Emeka A, Osondu N. Sex differences and relationship between blood pressure and age among the Ibos of Nigeria. Internet J Biol Anthropol. 2008;3(2):1-5.
21. Anand MP. Epidemiology and Current Concepts in Hypertension. 2nd ed. Mumbai, India: ICP; 1995. p. 4-13.
22. Wofford MR, Hall JE. Pathophysiology and treatment of obesity hypertension. Curr Pharm Des. 2004;10(29):3621-37.
23. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: Analysis of worldwide data. Lancet 2005; 365:217–23.
24. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et *al.* A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: A systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012; 380:2224–60.
25. Patel V, Chatterji S, Chisholm D, Ebrahim S, Gopalakrishna G, Mathers C, *et al*. Chronic diseases, and injuries in India. Lancet 2011; 377:413–28.
26. Dandona L, Dandona R, Kumar GA, Shukla DK, Paul VK, Balkrishnan K, *et al*. Nations within a nation: Variations in epidemiological transition across the states of India, 1990–2016 in the Global Burden of Disease Study. Lancet 2017; 390:2437–60.