Prevalence of hypertension among adults of tribal population in Kolli Hills, Namakkal District, Tamil Nadu

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Abstract:

Introduction: Rapid unplanned urbanization, globalization of unhealthy lifestyles and increase in life expectancy has led to increase in prevalence of hypertension, leading to premature death and disability. Despite these changes, still a huge number of people living in isolation as Tribals. The data on hypertension among these tribal people are limited. Hence, this study was attempted.

Objective: to estimate the prevalence of hypertension and to assess the factors associated with hypertension among adults of tribal population in Kolli Hills, Namakkal district, Tamil Nadu

Methodology: A cross sectional study was conducted among tribal adults aged 20-60 years in Kolli Hills, Namakkal district, Tamil Nadu during May 2017 to June 2017. Based on Multi- stage sampling technique, those adults satisfying inclusion criteria were selected and Pre-tested, Semi-structured questionnaire was administered using interview technique until sample-size was met. Following this anthropometric and blood pressure measurements were recorded. Data was entered and analyzed using SPSS version 18.

Results: Out of 1354 study subjects, 656(48.4%) were males and 698(51.6%) were females. The mean age was 43.16 years(SD±11.36). Majority 494(36.5%) studied up to middle school and 984 (72.7%) belonged to Lower Middle Socio-economic Class. Our Study revealed that 374(27.6%) were hypertensive. There was statistically significant association of hypertension with age OR3.74(95%CI 2.90-4.83), male gender OR1.5(95%CI:1.20-1.94), not literate OR1.67(95%CI:1.30-2.14), unemployment OR2.6(95%CI:1.3-5.1), smokeless tobacco consumption OR1.66(95%CI:1.23-2.25), alcohol consumption OR1.3 (95%CI:1.04-1.77), increased BMI OR1.77(95%CI: 1.37-2.28) and H/O diabetes OR5.4 (95%CI:3.2-9.0).

Conclusion: The prevalence of hypertension was 27.6% and hypertension was associated with age, gender, education, occupation, smokeless tobacco consumption, alcohol consumption, increased BMI and diabetes.

Key words: Hypertension, adults, tribal population

Introduction:

Hypertension or high blood pressure is a chronic medical condition in which the blood pressure in the arteries is elevated, requiring the heart to work harder than normal to circulate blood through the blood vessels. [1,2] It is one of the major risk factor for heart disease, stroke and kidney failure causing premature death and disability. It is also referred as silent killer and it represents Iceberg phenomenon of Diseases, due to which most of them with hypertension are not diagnosed. [3]Hypertension can be classified as primary hypertension or secondary hypertension. Majority of the cases are primary, where there is no obvious underlying cause. However, there is presence of risk factors. [4] The risk factors in hypertension are categorized as modifiable risk factors and non modifiable risk factors. Non modifiable risk factors are the attributes in the individual that cannot be changed such as age, sex, race, family history, genetic composition, etc and

modifiable risk factors are the attributes that can be changed in the individual such as obesity, excessive salt intake, inactivity or lack of exercise, high fat diet, tobacco use, alcohol consumption, etc [5]

In the past few decades, there is an increase in prevalence of hypertension in both elderly and adult population. This changes is been observed even in developing country like India with prevalence of hypertension ranging between27.5% and 33%. [6] Worldwide, It accounts for 7.5 million deaths and 57 million DALYS.[7] The reason being rapid unplanned urbanization, globalization of unhealthy lifestyles and increase in life expectancy.[8]

Despite all these changes and progress in the field of medicine, there are still a huge number of people living in isolation in natural and unpolluted surroundings far away from civilization with their traditional values, customs, beliefs and myths intact. They are commonly known as "tribals".[9] The Constitution of India recognizes the indigenous tribal groups or Adivasis or Janjatis as a special category and has designated them as the Scheduled Tribes. The total ST population of India stands at 104,281,034 as per 2011 census and accounts for 8.6% of the total population of the country. [10] In Tamil Nadu, 1.10 per cent of the population belonged to Scheduled tribes i.e., approximately around 7,94,697. [11] Majority of them reside in Namakkal District, Tamil Nadu. Every tribe has their own unique culture, customs and way of living. However, there are no data available with respect to prevalence and factors associated with hypertension among these tribal people. Hence, this study was attempted with an objective to estimate the prevalence of hypertension and to assess the risk factors of hypertension among adults of tribal population in Kolli Hills, Namakkal district, Tamil Nadu.

Materials & Methods:
It was a community based cross sectional study conducted among tribal adults aged 20-60 years in Kolli Hills, Namakkal district, Tamil Nadu during May 2017 to June 2017.

Sample size: In a study conducted by Radhakrishnan and Ekambaram [9], the overall prevalence of hypertension among tribal population was 31%. Assuming this prevalence and absolute precision of 5 % , the sample size was calculated using nMaster software and was found to be 343. Assuming 10% non response rate, the total minimum sample size required was 377. However, 1,354 was the sample size in this study based on multistage sampling technique (Figure-1)

After obtaining the ethical clearance from Ethical Committee, Karpaga Vinayaga Institute of Medical Sciences & Research Centre, Madurantakam, necessary

permissions were taken from the Gram Panchayat authorities of Kolli Hills. Those adults satisfying inclusion criteria were selected randomly. The purpose of the study was explained to the study subject. After obtaining informed written consent from them, a pre-tested Semi-Structured questionnaire consisting of socio demographic details and risk factors of hypertension was administered using interview method. Following this anthropometric and blood pressure measurements were recorded in a standard manner. The reports related to anthropometry and Blood pressure was provided to all the study subjects. All the participants were also given health education. Persons categorized as hypertensive based on our case definition were referred to nearby Primary Health Centre for management and those requiring further work up, were further referred to Government Hospital, Kolli Hills, Namakkal District or Karpaga Vinayaga Institute of Medical Sciences and Research Centre, Maduranthagam.

Case Definition: Two blood pressure readings was obtained on left arm after the study subject had rested for at least 5 minutes in a seated position using mercury sphygmomanometer, 10 minutes apart. The average of two readings was taken. SBP $\geq$ 140 mm Hg and/or DBP $\geq$ 90 mm Hg and/or treatment with anti-hypertensive medication was labeled as hypertensive.[12]

Body weight was measured on the weighing scale with minimum outerwear (as culturally appropriate) and without any footwear. Height was measured using a non-stretchable tape with the subject in an erect position against a vertical surface, with the head positioned so that the top of the external auditory meatus was in the level with the inferior margin of the bony orbit. Body mass index was calculated by dividing the weight in kilograms with the square of height measured in meters. WHO classification for BMI and Asian cut off was used to categorize overweight and obesity.[13]

The measurement of Waist and Hip Circumference was based on the WHO STEPS Protocol, which instructed that the measurement of waist circumference be made at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest with the help of stretch resistant tape, which was snugged around the body at this point and the reading was taken nearest to 0.1cm after few natural breaths at the end of expiration. The hip circumference was measured to the nearest 0.1cm at the widest portion of buttocks and.[14]
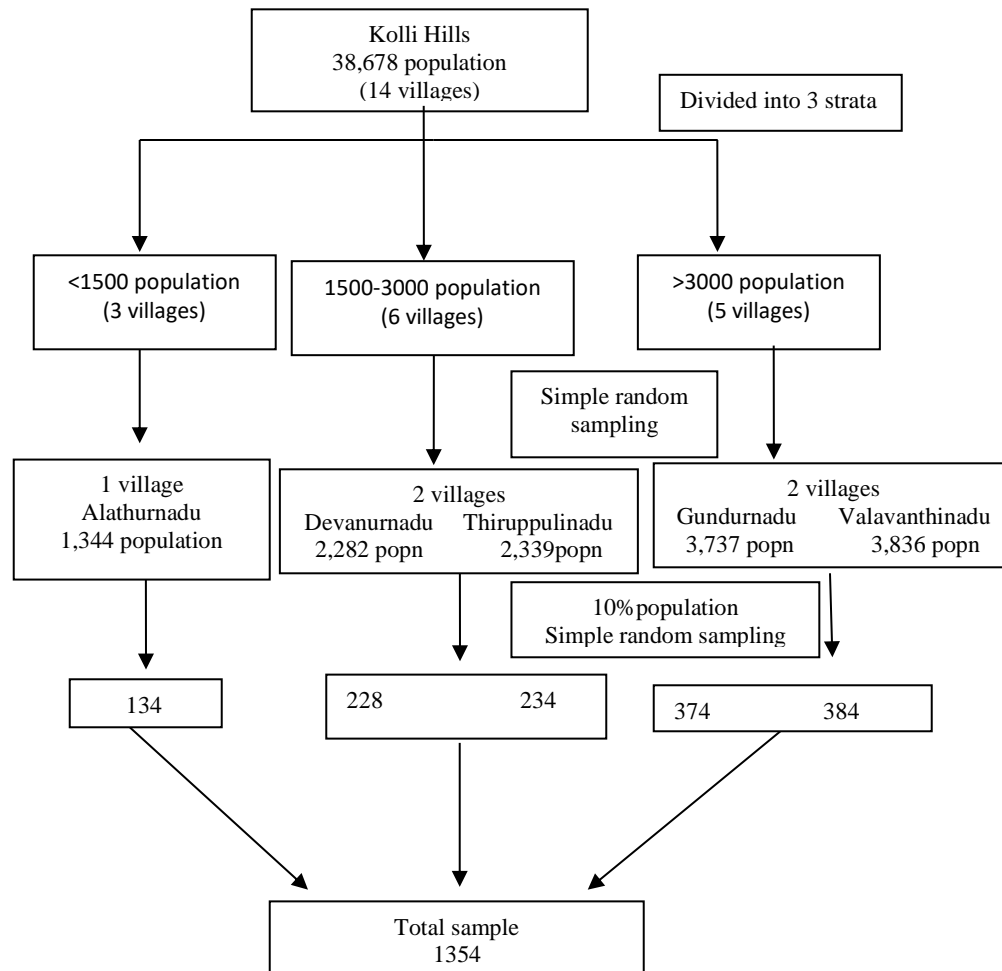
Methods/Statistical Analysis:
The statistical analysis was done using the Statistical Package for Social Sciences, SPSS version 18. Quantitative variables such as age, blood pressure, Body Mass index etc., were summarized using mean and standard deviation. Qualitative variables such as gender,

diet, H/O smoking etc., were summarized as percentages. The overall prevalence of hypertension and prevalence of hypertension by gender were described in terms of proportions. The associated factors of hypertension were evaluated by Chi-square test with 5% level of significance.

Figure -1
Flow Chart

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                        ┌─────────────────────┐
                        │     Kolli Hills      │
                        │  38,678 population   │          ┌──────────────────────┐
                        │    (14 villages)     │          │  Divided into 3 strata│
                        └─────────────────────┘          └──────────────────────┘
                                  │
        ┌─────────────────────────┼─────────────────────────┐
        ▼                         ▼                         ▼
┌──────────────────┐   ┌──────────────────┐       ┌──────────────────┐
│ <1500 population │   │ 1500-3000 pop.   │       │ >3000 population │
│   (3 villages)   │   │   (6 villages)   │       │   (5 villages)   │
└──────────────────┘   └──────────────────┘       └──────────────────┘
        │                         │          ┌───────────────────┐     │
        │                         │          │  Simple random    │     │
        │                         │          │    sampling       │     │
        │                         │          └───────────────────┘     │
        ▼                         ▼                                     ▼
┌──────────────────┐   ┌────────────────────────────┐   ┌────────────────────────────┐
│    1 village     │   │        2 villages          │   │        2 villages          │
│   Alathurnadu    │   │ Devanurnadu  Thiruppulinadu │   │ Gundurnadu   Valavanthinadu │
│ 1,344 population │   │ 2,282 popn   2,339 popn     │   │ 3,737 popn   3,836 popn     │
└──────────────────┘   └────────────────────────────┘   └────────────────────────────┘
        │                         │          ┌──────────────────────────┐  │
        │                         │          │     10% population        │  │
        │                         │          │ Simple random sampling    │  │
        │                         │          └──────────────────────────┘  │
        ▼                         ▼                                         ▼
   ┌─────────┐          ┌──────────────────┐              ┌──────────────────┐
   │   134   │          │  228        234  │              │  374        384  │
   └─────────┘          └──────────────────┘              └──────────────────┘
        └─────────────────────────┼─────────────────────────┘
                                  ▼
                        ┌─────────────────────┐
                        │    Total sample     │
                        │       1354          │
                        └─────────────────────┘
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Results: In our study the age of the study subjects ranged from 20-59years and the mean age was 46.16years (SD±11.36). Out of 1354 study participants, 656(48.4%) were males. Majority of them 494(36.5%) of them studied up to middle school and 1083(80%) of them were shop owner/farmer by occupation. Most of them were married 1235(91.4%), 1338(99%) of them were hindu by religion and 984(72.7%) of them belonged to lower middle class according to Modified B G Prasad Socio-economic class classification. [Table-1]

Among study participants, majority of them994 (73.4%) lived in semi-pucca house, 1332 (98.4%) of them had electricity as a source of lighting and 978(72.2%) of them lived in house with <2 rooms. Open air defecation was practiced by 103(7.6%) of the people [Table-2]

Based on the case definition of hypertension, it was revealed that 374(27.6%) of the study subjects had hypertension. [Table-3] In our study, 237(17.5%) of them were already diagnosed with hypertension. However, among them 215(15.9%) of them did not take adequate treatment for the hypertension.

We did regression analysis to know the factors associated with hypertension. The variables which were found to be statistically significant (P<0.05) are described in the Table-4.

Table 1: Distribution of study subjects by socio-demographic variables

Variables Age in years	Frequency (n) N=1354	Percentage (%)
<25	113	8.3
26-30	118	8.7
31-35	142	10.5
36-40	204	15.1
41-45	146	10.8
46-50	206	15.2
51-55	193	14.3
56-60	232	17.1
Gender		
Male	656	48.4
Female	698	51.6
Education		
Not literate	437	32.3
Primary school	165	12.2
Middle school	494	36.5
High school	165	12.1
Intermediate /diploma	56	4.1
Graduate	32	2.4
Postgraduate /professional	5	0.4
Occupation		
Unemployed/home maker	102	7.5
Unskilled worker	71	5.2
Semi-skilled worker	34	2.5
Skilled worker	40	3
Clerical/shop owner/ farmer	1083	80
Semi-professional	11	0.8
Professional	13	1
Marital status		
Married	1238	91.4
Single	76	5.5
Widow/widower	34	2.5
Divorced/separated	6	0.6
Religion		
Hindu	1338	99
Muslim	8	0.5
Christian	8	0.5
Socio-economic status*		
Upper Middle Class	67	4.9
Middle class	222	16.4
Lower Middle class	984	72.7
Lower Class	81	6

*Modified B G Prasad Classification 2017

Table 2: Distribution of study subjects based on their housing standards

Variables Type of house	Frequency(n) N=1354	Percentage (%)
Pucca	332	24.5
Semi-pucca	994	73.4
Kutcha	28	2.1
Source of lighting		
Electricity	1332	98.4
Kerosene	20	1.5
Others	2	0.1
Number of rooms		
<2	978	72.2
≥3	376	27.8
Source of water		
Piped water	1324	97.8
Ground water	23	1.7
Surface water	7	0.5
Type of toilet facility		
Separate toilet	811	59.9
Shared toilet	345	25.5
Public/community toilet	95	7
Open air defecation	103	7.6

Table 3: Distribution of study subjects by hypertension

Hypertension	Frequency (n)	Percentage (%)
Yes	374	27.6
No	980	72.4
Total	1354	100

Table 4: Association of various variables with hypertension

Variables	Hypertension		OR (95%CI)	☐☐ P value
	Yes n(%)	No n(%)		
Age				
≥45	260(69.5)	371(37.9)	OR=3.74 (95%CI 2.90-4.83)*	☐☐☐109.04,df=1, P=0.001
<45	114(30.5)	609(62.1)		
Gender				
Male	260(56.1)	446(45.5)	OR=1.5 (95%CI:1.20-1.94)*	☐☐=12.269, df=1, P=0.001
Female	164(43.9)	534(54.5)		
Education				
Not literate	152(40.6)	285(29.1)	OR=1.67 (95%CI:1.30-2.14)*	☐☐=16.55, df=1, P=0.001
Literate	222(59.4)	695(70.9)		

Occupation				
Unemployed/home maker	13(3.5)	89(9.1)	2.6(95%CI:1.3-5.1)*	□□=12.33, df=2,P=0.002
Clerical/farmer/semi-professional/professional	321(85.8)	786(80.2)	0.93(95%CI: 0.63-1.3)	
Unskilled/ semiskilled/ skilled worker	40(10.7)	105(10.7)	1 (Reference)	
H/O Smokeless tobacco				
Yes	84(22.5)	145(14.8)	OR=1.66*	□□=11.315, df=1,
No	290(77.5)	835(85.2)	(95%CI: 1.23-2.25)	P=0.001
H/O Alcohol consumption				
Yes	117(31.3)	245(25)	OR=1.3*	□□=5.40,df=1,
No	257(68.7)	735(75)	(95%CI: 1.04-1.77)	P=0.02
Body mass Index				
≥23	146(39)	260(26.5)	OR=1.77*	□□=20.16, df=1,
<23	228(61)	720(73.5)	(95%CI: 1.37-2.28)	P=0.001
Waist- Hip ratio				
Abnormal	333(89)	836(85.3)	OR=1.3	□□=3.19,df=1,
Normal	41(11)	144(14.7)	(95%CI:0.96-2.02)	P=0.07
Diabetes				
Yes	45(12)	24(2.4)	OR=5.4*	□□=51.4, df=1,
No	329(88)	956(97.6)	(95%CI: 3.2-9.0)	P=0.001

Discussion: In our study, the overall prevalence of hypertension was 27.6%. This finding was similar to a study in Kancheepuram district, Tamil Nadu, by Govindan et al, [15] where prevalence was around 28.2%. However, this was in contrast to the study among Tribals in Himachal Pradesh and Kerala, by Kumar et al [16] and Meshram et al [17], where prevalence of hypertension was found to be 22% and 40%. The prevalence of hypertension among males in this study was 36.8% as compared to females which was around 23.5%. This was similarly observed in a study by Radhakrishnan et al [9] in Yercaud, Salem, Tamil Nadu where 36% of males and 26% females had hypertension and contrast to a study by Raina et al [18] where 12.9% males and 6% females had hypertension.

In our study, hypertension was associated with age, gender (male predominance), education (not literate), occupation, smokeless tobacco consumption, alcohol consumption, increased Body mass index and diabetes. Similarly in a study by Hathur et al [19], among Jenu Kuruba tribal population, hypertension was associated with increasing age and gender and in a study by Kumar et al[16] among Tribal population of Madhya Pradesh, hypertension was associated with increasing age, gender and alcohol consumption but there was no statistically significant association between hypertension and BMI and tobacco consumption (both smoking and smokeless). Similarly in a study done by Gopalkrishnan et al [20] and Oommen et al [21] in urban area also revealed that hypertension was associated statistically significantly with factors like increasing age, gender (male predominance), history of diabetes mellitus and overweight/obesity.

In our study, we did not find any statistically significant association between hypertension and family history of hypertension, smoking, history of extra salt intake, diet, waist hip ratio, waist circumference, socio economic status, housing conditions or assets owned. This is in contrast to study by Sebastian et al [22] where hypertension was associated with family history and sedentary life style and in a study by Shrivastava et al [23] where hypertension was associated with reduced physical activity/week, smoking, abdominal obesity and high salt intake. In the present study, we did not assess the physical activity among study subjects.

We also could not find the statistically significant association of hypertension with stress which was similarly observed in the study by Agyei et al [24]. However, in a study by Madhumitha et al [3] and Jadhav et al [25], hypertension was associated with stress. This difference in finding could be because of different stress scales used in these studies.

Our study had certain limitations. Since it was a cross sectional study design, there is lack of temporality between associated factors and hypertension. As our study was among adult tribal population from Kolli Hills, Namakkal District, Tamil Nadu, the results of our study may not be generalizable to other tribal population as every tribe has their own unique culture, customs and way of living.

Conclusion: The overall prevalence of hypertension among adults of tribal population in Kolli Hills, Namakkal district, Tamil Nadu was 27.6% (Males 36.8% and

Females 23.4%). In our study, hypertension was associated with age, gender (male predominance), education, occupation, smokeless tobacco consumption, alcohol consumption, increased Body mass index and diabetes. To recommend, health education regarding the risk factors of hypertension and its complications should be given. Utilization of health care facilities (NCD clinic) with respect to screening and treatment should be emphasized. Further prospective studies should be done among tribal population to confirm the associated factors of hypertension.

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