Original Article

Changing Perspectives in Tribal Health: Rising Prevalence of Lifestyle Diseases among Tribal Population in India

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Abstract

Background: The major focus of studies related to health among tribes in India has been on malnutrition. The world is in the stage of epidemiological transition, and noncommunicable diseases are overtaking the communicable diseases not only in general but also among the tribal population. **Objectives:** A cross-sectional study was conducted to find out the prevalence of diabetes and hypertension among the tribal population. **Methodology:** A house-to-house survey using a semi-structured questionnaire was conducted in three randomly selected tribal villages. Participants aged 18 and above from both genders were included. Blood pressure was recorded and random blood sugar was estimated for all the participants. Chi-square test was used to study association for categorical variables and one-way ANOVA and Student's *t*-test were used to study association for continuous variables. A $P < 0.05$ was considered significant. **Results:** A total of 952 tribal people were interviewed. About 40.2% were males and 59.8% were females. About 82.2% were Illiterate. 18.9% were underweight compared to 8.8% who were overweight or obese. The prevalence of diabetes was 3.8% (36 participants) of which 77.8% was newly detected. Increasing age was associated with diabetes. Overall, prevalence of hypertension was 16.7% (159 participants) of which 62.9% were newly detected. Age, gender, body mass index, and literacy status were associated with the presence of hypertension. Only eight participants had both diabetes and hypertension. **Conclusion:** Noncommunicable diseases burden in tribal population is as high as in the general population. Effective strategies to prevent this have to be devised.

Keywords: Diabetes, disease, hypertension, population, tribal

Introduction

"Tribals" refers to a group of people who live in isolation in natural, unpolluted surroundings far away from civilization with their traditional values, customs, beliefs, and myths intact and are considered to be the autochthonous people of the land. India has the second-largest concentration of tribal population in the world. Indian tribes constitute around 8.3% of the nation's total population.[1] There are 635 tribes in India located in five major tribal belts across the country and were inhabiting in hilly and plain forest regions.[2] There are a number of studies on the tribes, their culture and the impact of acculturation on the tribal society. Health is a prerequisite for human development and is an essential component for the well-being of humankind. The health problems of any community are influenced by interaction of various socioeconomic and political factors.[3] Major focus of studies related to health among tribes in India has been on malnutrition.

The world is in the stage of the epidemiological transition and the noncommunicable diseases are overtaking the communicable diseases. Systematic reviews of epidemiological studies suggest that overall prevalence for hypertension in India was 29.8% (95% confidence interval [CI] 26.7–33.0), of which about 33% urban and 25% rural Indians are hypertensive.[4] Such phenomenon is not only seen in urban and rural population but is also evident among the tribal population with studies reporting the pooled estimate of hypertension prevalence

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among tribes in India as 16.1% (95% CI: 13.5, 19.2), thus concluding an increasing trend in the prevalence of hypertension in adult tribal populations across three decades.[5] According to District Level Household and Facility Survey – 4, 8.3% of native tribes of Andaman's had very high blood glucose (>160 mg/dl). The reported prevalence of impaired fasting glucose (IFG)/impaired glucose tolerance (IGT) among tribal population was higher than the prevalence of diabetes and this observation could be suggestive of a potential increase in diabetes in the coming years.[6] An accelerated increase of diabetes and hypertension is also noticed in tribal (or) aboriginal populations worldwide, but very few studies had been done in hilly tribes of India.

Malayalee, (mala means hills and yalee means rulers) rules of hills is one of the primitive tribes in India living in Jawadhu and Kalryan Hills of Tamil Nadu. Jawadhu Hills is spreaded over Vellore District and Tiruvannamalai District. Around 80,000 people live in Jawadhu block. Out of this 98% are from Tribal community. The hill is around 2315–3000 feet higher from sea level. There are 11 panchayats and 229 hamlets within the radius of 150 km^2. The present study was done among the tribal population of Jawadhu hills, Vellore district, Tamil Nadu, India. The objective of this paper was to estimate the prevalence and the risk factors of hypertension and diabetes among the Jawadhu hill tribal population.

Methodology

A population-based cross-sectional study was carried out from January 2018 to March 2018. A house-to-house survey using a semi-structured questionnaire was conducted in three randomly selected tribal villages. Participants aged 18 and above from both genders belonging to Malayalee tribe of Jawadhu hills, residing in Tirupattur Taluk, Vellore district and willing to participate in the study were included for the study, whereas persons with severe chronic illness, physical disability, and mental disability were excluded from the study.

The sample size for the study was estimated utilizing the prevalence rate of hypertension in Indian population. The earlier studies carried out on hypertension among tribal people in other parts of India have observed prevalence rate ranging between 15% and 30%.[7] Sample size of 711 was calculated according to an expected prevalence of hypertension (p) of 20% at 5% level of significance and an allowable error (d) of 15% on the prevalence of hypertension, using the formula $Z\ (1-\alpha/2)^2\ pq/d^2$. With accounting for 20% nonresponse rate, the sample size was 852 and to still more improve the validity we added another 100 to the sample and the total study population was made to 952.

The field investigators comprised a medical officer, laboratory technician, staff nurse, and medico-social workers. The team visited the Jawadhu tribal settlements and by simple random technique, a house was selected and proceeded further. In each selected house, persons fulfilling the inclusion criteria were included in the study. A detailed interview of each person in the household was conducted using a pretested validated questionnaire which included personal information, demographic details, age, gender, smoking, alcohol consumption, diet, educational status, economic status, family history of any disease, usage of health-care facility. Body mass index (BMI) was calculated for all patients based on their anthropometry and classified according to the World Health Organization classification.[8] (<18.5 – underweight, 18.5–24.99 – normal, ≥25.0–29.99 – overweight, and ≥30.0 – obesity). All of them were screened for diabetes, by random blood glucose levels. Based on random blood sugar (RBS), the cutoff values were fixed as sugar level ≥200 mg/dl are considered as diabetic, and sugar levels between 140 and 199 mg/dl are considered to be prediabetic, and sugar level <140 mg/dl is normal.[9]

During the course of the interview, blood pressure (BP) was recorded by the trained field staff. Two measurements of BP on each study participant were recorded by single trained field staff using a mercury sphygmomanometer. Study participants were instructed to refrain from drinking any caffeinated beverage and from smoking during the half-hour preceding the BP measurement. BP measurements were obtained after the subject had rested for at least 5 min in a seated position. The first BP measurement was recorded after obtaining sociodemographic information from the study participant, whereas the second was recorded after a brief clinical examination. All BP measurements were made on the left arm of each study participant in sitting position, using a cuff of appropriate size at the level of the heart.[10] The average of two BP readings was taken to describe the BP of the participant. Hypertension was defined if systolic BP (SBP) was ≥140 mmHg and/or diastolic BP (DBP) ≥90 mmHg, and/or on treatment with antihypertensive. Participant with SBP ≥120–139 mmHg and/or DBP ≥80–89 mmHg were defined as prehypertension. Participant were defined as having Stage I hypertension if SBP ≥140–159 mmHg and/or DBP ≥90–99 mmHg. Stage II hypertension was defined if SBP ≥160–179 mmHg and/or DBP ≥100–110 mmH.[11]

Statistical analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.). Descriptive data were presented as frequencies and proportions. Chi-square test was used to study the association between categorical variables. One-way ANOVA and Student's *t*-test were used to study association for continuous variables. A value of $P < 0.05$ was considered statistically significant.

Results

A total of 952 tribal participants were interviewed during the study. Five hundred and sixty-nine (59.8%) were females as compared to 383 (40.2%) males. Majority of them (677 out of 952) were in the age group of 31–60 years and 82.2% of them were illiterate. About 18.9% were underweight compared

to 8.8% who were overweight or obese. Around 10.3% of participants were smokers and alcoholic.

Based on the RBS value, 36 (3.8%) participants were diabetic. Among these 36 participants, 28 participants were (77.8%) newly detected and only 8 participants (22.2%) were known diabetics. Furthermore, 89 (9.3%) participants were prediabetic. Gender distribution of diabetics and prediabetics is depicted in Figure 1.

Overall prevalence of hypertension was found to be 16.7% (159 participants). Of these, 97 (10.2%) participants had Stage I hypertension and 62 (6.5%) participants had Stage II hypertension. Among the 159 participants with high BP, 100 (62.9%) participants were newly detected, whereas 59 (37.1%) participants were already known hypertensives. The prevalence of prehypertension was found to be 34.9%. Gender distribution analysis of prehypertension and hypertension is depicted in Figure 2.

Furthermore, SBP was high among 80 participants (8.4%) with SBP ≥140 mm Hg and 46 participants (4.8%) with SBP ≥160 mm Hg. Based on DBP, 68 participants (7.1%) had Stage I hypertension and 34 participants (3.6%) had Stage II hypertension. Thus, the prevalence of isolated systolic hypertension was 13.2% and isolated diastolic hypertension was 10.7%. Comparison of mean SBP and DBP according to age group revealed that increasing age group had a statistically significant increase in mean BPs with a $P < 0.0001$ using one-way ANOVA test. Similar analysis with gender revealed that males had a significant high mean SBP compared to females with a $P = 0.04$ by Student' *t*-test [Table 1].

Association between study variables such as age, gender, educational status, smoking, alcohol and BMI, and disease status were studied using the Chi-square test. Since 932 of 952 participants were mixed diet consumers, it was not analyzed. About 6.4% of the participants aged >60 years were diabetics. This association with increasing age and diabetic status was found to be statistically significant ($P = 0.05$). Other factors were not significant [Table 2].

About 59 (37.8%) participants with age >60 years were hypertensive, which was statistically significant ($P < 0.0001$). One-hundred and six female participants (18.6%) were hypertensive compared to 53 male participants (13.8%), and this difference was statistically significant ($P = 0.05$). Furthermore, high BMI was statistically significant ($P = 0.05$) with 20 (23.8%) participants with a BMI ≥25.00 having hypertension compared to 15% of participants with normal BMI having hypertension. One hundred and forty (17.9%) participant who are illiterate had hypertension compared to 19 (11.2%) participant who were literate. This difference was also statistically significant ($P = 0.036$). Smoking and alcohol did not show any association with hypertension in the present study [Table 2]. Only eight participants had both diabetes and hypertension. Most of them had only either diabetes or hypertension as single morbidity.

Discussion

The present study aimed to study the prevalence of hypertension among the Malayalee tribe residing in Tirupattur taluk of Vellore district, TamilNadu. We found an estimated prevalence of hypertension as 16.7% (159 participants). This was almost similar to the meta-analysis report by Rizwan *et al*.[5] which reported 16%. However, in a study done by Hathur *et al*.,[3] in Mysore, Karnataka, reported a higher prevalence of 21% among Jenu Kuruba tribes in 2013. Similarly, in a study done by Sachdev,[7] in 2011, found that the prevalence rate of hypertension was very high (22.8%) ranging from 16.3% to 30.9% among different caste of nomad tribals of Rajasthan. The prevalence of hypertension among the Nicobarese tribe was found to be 50.5%,[12] which is higher when compared to our estimates. Furthermore, age, gender, and BMI had a statistically significant association with hypertension in the present study which is similar to results of other studies.[3,5,13] In a study done by Mukhopadhyay *et al*.[14] among Lepchas tribes in Sikkim mean SBP and DBPs consistently increased with increasing intake of alcohol in both sexes. However, alcohol and smoking were not associated with hypertension in the present study.

Hathur *et al*.[3] reported 13.9% systolic hypertension and 16.2% diastolic hypertension. The present study found it to be 13.2% and 10.7%, respectively. The prevalence of prehypertension

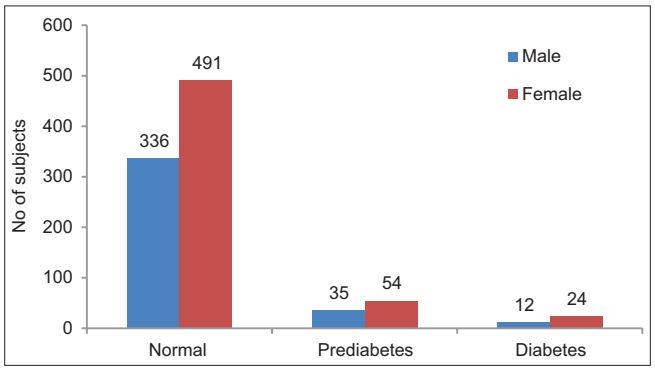

Figure 1: Gender wise prevalence of diabetes among the study population ($n = 952$)

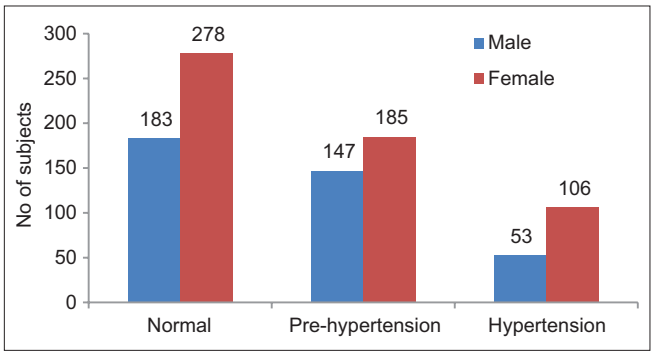

Figure 2: Gender wise prevalence of hypertension among the study population ($n = 952$)

was found to be 34.9% in the present study. Gender distribution analysis of prehypertension shows 38.4% male participants and 32.5% of females had prehypertension. This is similar to a study done in Yercaud tribes[13] which reported about 42% males and 30% females were in the stage of prehypertension. The proportion of newly detected hypertension was 62.9% in the present study, but Hathur *et al*.[3] reported 99% of their participants were newly detected hypertensive.

A systematic review of studies on diabetes in the tribal population in India from 2000 to 2011 found that the prevalence of diabetes was 5.9% (95% CI; 3.1%–9.5%); the prevalence for IFG varied from 5.1% to 13.5% and IGT, from 6.6% to 12.9%.[6] Prevalence results obtained in the present study is well within this range. Gender distribution among diabetics' shows among 569 female participants, 24 (4.2%) were diabetics, whereas 12 participants (3.1%) of 383 males were diabetic. This could be because the present study had almost 60% of female participants. In a similar study done by Radhakrishnan in Yercaud, the prevalence of diabetes was found to be 5% in males and 5.5% in females. However, Beula[15] in their study in tribal areas of Kanyakumari found 1.6% females and 0.8% males had diabetes. Moreover, a study by Sachdev[16] among the tribal population showed that the prevalence was 9.8% and 12.5%, respectively, with higher prevalence among female population when compared with male population. Several studies are in support of age-specific onset of Type 2 diabetes mellitus.[17,18] The association with increasing age and diabetic status was found to be statistically significant (P = 0.05) in the present study also. Although diabetes and hypertension mostly coexist among individuals, in the present study, only eight subjects had both diabetes and hypertension.

Table 1: Comparison of mean systolic and diastolic blood pressure according to age and gender (n=952)

Study variables	SBP (mean±SD)	*P*	DBP (mean±SD)	*P*
Age group (years)				
≤30	113.03±14.5	<0.0001*	70.99±9.1	<0.0001*
31-60	116.87±17.0		73.37±11.6	
>60	131.58±25.9		78.38±13.4	
Gender				
Male	117.89±16.4	0.231	74.81±11.1	0.046†
Female	119.41±21.1		73.28±12.3	

*Significant with ANOVA, †Significant with Student's *t*-test.
SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SD: Standard deviation

Conclusion

The prevalence of diabetes and hypertension was 3.6% and 16.7%, respectively. People who were newly detected as diabetes were 77.8% and hypertension was 62.9%. Increasing age was associated with the presence of both diabetes and hypertension. High BMI, literacy status, and gender were statistically associated with hypertension. The prevalence of isolated systolic hypertension was 13.2% and isolated diastolic hypertension was 10.7%. Comparison of mean SBP and DBP according to age group revealed that increasing age group had statistically significant increase in mean BPs. Only eight participants had both diabetes and hypertension.

Recommendations

Tribal health should be given priority and adequate health-care

Table 2: Association between study variables and disease status (n=952)

Study variables	Diabetes, *n* (%)	χ^2	*P*	Hypertension, *n* (%)	χ^2	*P*
Age group (years)						
≤30	1 (0.8)	5.80	0.052*	8 (6.7)	63.24	<0.0001*
31-60	25 (3.7)			92 (13.6)		
>60	10 (6.4)			59 (37.8)		
Gender						
Male	12 (3.1)	0.74	0.390	53 (13.8)	3.77	0.053*
Female	24 (4.2)			106 (18.6)		
Education						
Literate	9 (5.3)	1.34	0.246	19 (11.2)	4.40	0.036*
Illiterate	27 (3.4)			140 (17.9)		
Smokers						
Yes	2 (1.9)	1.07	0.445	21 (20.4)	1.128	0.288
No	34 (4.0)			138 (16.3)		
Consuming alcohol						
Yes	3 (2.9)	0.24	0.789	20 (19.4)	0.61	0.434
No	33 (3.9)			139 (16.4)		
BMI						
Underweight	9 (5.0)	2.46	0.291	36 (20.0)	5.94	0.057*
Normal	22 (3.2)			103 (15.0)		
Overweight/obese	5 (6.0)			20 (23.8)		

*Significant with Chi-square test. BMI: Body mass index

infrastructure should be developed in tribal areas to cater to their health needs. Noncommunicable diseases burden in tribal population is in an increasing trend. Effective strategies to prevent this have to be devised among tribal population. Opportunistic screening at all levels in the health-care delivery system from sub-center and above for the early detection of diabetes, hypertension, and common cancers is one of the important strategies of National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke. Concerned policymakers should focus on the changing health needs of tribal communities.

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Conflicts of interest

There are no conflicts of interest.

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