AN EPIDEMIOLOGICAL STUDY ON THE PREVALENCE AND DETERMINANTS OF SYSTEMIC HYPERTENSION AND BIOCHEMICAL PROFILE AMONG MUTHUVAN TRIBAL POPULATION, POOPPARA VILLAGE, PARAMBIKULAM

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Abstract:
Hypertension is an important independent predictor of cardiovascular disease, cerebrovascular accidents and death. JNC7 defines hypertension as blood pressure 140-90 mmHg. A methodological study was conducted to determine the prevalence and determinants of systemic hypertension among the members of Muthuvan tribal population in Poppapara village, Parambikulam. 53 adults above the age of 18yrs participated in the study out of the total 115 adults in the community (response rate 46 percentage). Blood pressure, anthropometry, RBS, uric acid, renal parameters and lipids were measured. The prevalence of hypertension was 71.6 percentage. Among males the prevalence of hypertension was 58.6 percentage while in females it was 87.5 percentage. In the studied male population 10 percentage were normotensives, 31 percentage were prehypertensives and the rest 58.6 percentage were hypertensives (27.6 percentage stage 1 hypertensives and 31 percentage stage 2 hypertensives). But in females nobody came under normotensive group, 12.5 percentage were prehypertensives and the rest 87.5 percentage were hypertensives (33.33 percentage stage 1 hypertensives and 54.16 percentage stage 2 hypertensives). All the male subjects above the age of 30yrs were hypertensives. In age group between 31-45yrs 12.5 percentage females were prehypertensives and the rest 87.5 percentage were hypertensives. All the female subjects above the age of 45yrs were hypertensives in the study group. There was a very low prevalence of overweight (7.5 percentage), central obesity (30.2 percentage), high Cholesterol level (19 percentage), high LDL level (17 percentage), high creatinine level (15 percentage), high uric acid level (17 percentage), and high RBS value (6.5 percentage) in the studied population. But in the presence of all the above positive factors a very high prevalence of systemic hypertension is exist in this tribal community. Statistically no significant relationship could be made out between systemic hypertension and life.
style factors, anthropometric parameters, or various biochemical parameters. There may be some genetic factors which may play a pivotal role in the high prevalence of systemic hypertension in this tribal community which needs further detailed studies to unveil them.

**Keyword**: Hypertension, Muthuvan, BMI, WHR, Lipid, creatinine, RBS

Hypertension affects nearly 26 per cent of the adult population worldwide (4). Hypertension is an important independent predictor of cardiovascular disease, cerebrovascular accidents and death (3). The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) defines hypertension as blood pressure 140/90 mmHg (7). Persons with blood pressure above optimal levels, but not clinical hypertension (systolic blood pressure of 120-139 mm Hg or diastolic blood pressure of 80-89 mm Hg), are defined as having “prehypertension” (1). Persons with pre-hypertension have a greater risk of developing hypertension than do those with lower blood pressure levels (5). In addition, pre-hypertension is associated with increased risk of major cardiovascular events, independent of other cardiovascular risk factors (5). The prevalence of cardiovascular diseases and hypertension is rapidly increasing in developing countries (4,10).

Backgrounds & Objectives Muthuvan is an indigenous ethnic tribal community. Their settlements (or ‘Kudi’s) are spread throughout the hill ranges of western ghat both in Tamil Nadu and in Kerala. They live in their settlements as a group of 100-200 people (11). According to the legends they entered in the hills from the city of Madurai. After Kannagi brought fire down on Madurai, forefathers of this population followed her and settled in the deep forests of western ghat (11). These people have their own strict customs, traditions and life style which are adapted to the habitat of wild life. Agriculture and collection of forest products are their main occupation. All the adult population both males and females are equally involved in agriculture and the collection of forest products. They used to walk a long distance through the forest as a part of their occupation. They harvest water from dense forest streams. They are mainly vegetarians and once in a while consume fresh water fish. Nobody in the community take other non-vegetarian food. Alcoholism is banned in the community but some members used to smoke beedi. They marry from the members of same community only. The Muthuvan tribal community which I chose for the study is a settlement (kudi) located nearly 25km deep inside tropical rain forest portion of the Parambikulam Tiger Reserve; a part of the western ghat mountain ranges. The settlement is located at an altitude of around 1700 meters from sea level. A high prevalence of systemic hypertension was noticed among the members of this particular tribal community while I was working among them as a part of rural service. A detailed study could not be carried out at that time due to various constrains. So a methodological study was conducted to determine the prevalence and determinants of systemic hypertension among the members of this tribal population. Institutional ethical committee clearance has been obtained prior to the study.

Materials and Methods Patients A study was conducted between August and October 2010 to determine the prevalence of hypertension and any association with known determinants and biochemical abnormality in the Muthuvan tribal community, Pooppara village, Parambikulam.
All adult population above the age of 18yrs was invited to participate in the study. Rapport with the community was built with the help of the Head of Tribal Community, ASHA worker in the community, JHI and JPHN who were the in charge of the community. The total adult population in the community was 115, among them 63 were males and 52 were females (male:female ratio is 1.21:1). Out of them 53 subjects who were available at the time of study participated, ie 46% of the total population in the community participated in the study and they formed the study population. In the study population 29 were males and 24 were females (male:female ratio is 1.21:1). ie Both in the total population and the study population had the same male:female ratio. The average age of the study population was 36.90yrs and the average age of the total population was 35.05yrs. For each subject a detailed history was taken including relevant past history. This was followed by general examination, anthropometric measurements and systemic examination. Blood pressure (systolic and diastolic phase V Korotkoff) was measured using a standard mercury sphygmomanometer in the right upper limb in a sitting position after 5 minutes of rest. 3 separate BP recordings were made at an interval of 30 minutes by using identical sphygmomanometers and the mean BP is taken for analysis. Blood pressure variation was within the range of 4-8 mm of Hg. Cardiovascular system examination also carried out and looked for the presence of carotid and renal bruit. Height was measured using a stadiometer while weight was recorded using a weighing machine. Body mass index was calculated using the formula weight in kg/height in meter². Waist circumference was measured at the midpoint between lowermost point of the costal margin and highest point of iliac crest with the subject standing, at the end of normal expiration. Hip circumference was measured at the level of the greater trochanters with the subject wearing minimum clothes (9).

Waist – hip ratio was calculated using the formula Waist circumference/ Hip circumference in centimeter. Blood samples were collected (6ml) with sterile technique using disposable syringes and transported in ice to Madurai Medical College biochemistry laboratory were biochemical analysis were performed using autoanalyser. Lipid profile, Blood urea, S.Creatinine and S. Uric acid levels were estimated. Random blood sugar was measured using Accuchek glucometer at the spot itself.

Definition and diagnostic criteria: Hypertension was diagnosed according to JNC 7 criteria. Normal blood pressure was defined as systolic blood pressure <120 mm Hg and diastolic blood pressure <80 mm Hg and pre-hypertension as systolic blood pressure between 120 to 139 mm Hg or diastolic blood pressure between 80 to 89 mm Hg. Hypertension was defined as systolic blood pressure 140 mm Hg /or diastolic blood pressure 90 mm Hg. Of these systolic BP 140-159 mm Hg and /or diastolic BP 90-99 mm Hg is categorized stage 1 hypertension and systolic BP 160mm Hg and / or diastolic BP 100mm Hg is categorized as stage 2 hypertension(7). All subjects currently on anti-hypertensive medications were classified as ‘hypertensive’, irrespective of their current blood pressure reading. Overweight was defined as BMI 25 kg/m² while central obesity was defined as WHR >0.88 in male and >0.81 in female(6,1).

Statistical analysis: The ‘chi square test’ was employed for comparison of categorical variables. Independent variables tested were age,
gender, smoking (only for males), family history of hypertension, BMI, WHR, and impaired glucose tolerance (IGT)/diabetes, lipids, uric acid and renal parameters. A ‘P value’ <0.05 was considered significant. Statistical analyses were performed using SPSS Statistical Package.

Results; In the study population the prevalence of hypertension was 71.6%; of these 68.4% was previously diagnosed as hypertensives and were on treatment but most of them were not under adequate control of hypertension. Among males the prevalence of hypertension was 58.6% while in females it was 87.5%. In the studied male population 10% were normotensives, 31% were prehypertensives and the rest 58.6% were hypertensives (27.6% stage 1 hypertensives & 31% stage 2 hypertensives). But in females nobody came under normotensive group, 12.5% were prehypertensives and the rest 87.5% were hypertensives(33.33% stage 1 hypertensives & 54.16% stage 2 hypertensives).

PATTERN OF HYPERTENSION
Among males of 18-30yrs of age 57% were normotensives, 28.6% prehypertensives and 14.4% were hypertensives. All the male subjects above the age of 30yrs were hypertensives.

HYPERTENSION AMONG MALES
Among females of 18-30yrs of age 20% were prehypertensives and 80% patients were hypertensives. In age group between 31-45yrs 12.5% were prehypertensives and the rest 87.5% were hypertensives. All the female subjects above the age 45yrs were hypertensives in the study group.

HYPERTENSION AMONG FEMALES
31% of the male subjects are smokers in the study group. Among male hypertensives 43% were smokers and 53% were non smokers. The ‘p’ value for the relation between smoking and hypertension among males is 0.026 and it implies that there is no significant relationship between male hypertension and smoking. All the female individuals in the community are non-smokers. All the members in the community both males and females are non-alcoholics. All the male members in the study group had a BMI <25kg/m². 87.5% of the total female individuals in the study group had a BMI <25kg/m². Among the hypertensives 90% had a BMI <25kg/m²,only 10% of the hypertensive population had BMI 25kg/m². All the normotensives had a BMI <25kg/m². The ‘p’ value for the relation between BMI & hypertension is 0.583 which means there is no significant relationship is
exist between these two parameters. In the study group only 30.2% people are having central obesity, 17.2% of male population and 45.8% of female population is having central obesity as per the standards. Among hypertensives only 31.6% is having high WHR for the sex. The ‘p’ value for the relation between WHR and hypertension is 0.121. 81% of the subjects in the study group had a serum total cholesterol level 200mg/dl. Among hypertensives 76% had a total S. cholesterol 200mg/dl and the rest had a total S. cholesterol >200mg/dl. Among normotensives 93% had a total S. cholesterol 200mg/dl. The ‘p’ value for this relationship is 0.340 and there is no significant relation between hypertension and S. total cholesterol. 83% of the subjects in the study group had an LDL level 130mg/dl. In the hypertensive population 78% had LDL value 130mg/dl. The rest had LDL value 130mg/dl. In normotensives 93% had LDL value 130mg/dl. The ‘p’ value for this relationship is 0.253 and there is no significant relationship between hypertension and S.LDL. 76.4% of the male hypertensives had an HDL value of more than 40mg/dl and 66.7% of male normotensives also had an HDL value more than 40mg/dl. But in female subjects all of them; including normotensives and hypertensives had an HDL value between 38mg/dl and 43mg/dl. There is no statistically significant relationship between hypertension and HDL values. 83% of the subjects in the study group had a normal serum uric acid level (males 3.1-7.0mg/dl; females 2.5-5.6mg/dl). 86% of hypertensives had a normal serum uric acid level and 80% of the normotensives also had a normal serum uric acid level. The ‘p’ value for this relation is 0.378 and there is no statistically significant relationship between these two parameters. All the members of the study group; both normotensives and hypertensives had a normal blood urea level. 85% of the total subjects in the study group had a normal serum creatinine level (males 0.6-0.9mg/dl; females 0.5-0.9mg/dl). 84% of the hypertensive subjects had a normal serum creatinine level and 87% of normotensives also had a normal serum creatinine level. The ‘p’ value for the relation between hypertension and serum creatinine is 0.728 which means there is no significant relationship between these two parameters. 89% of the hypertensives in the study population had an RBS value 140mg/dl while all the normotensives had an RBS value >140mg/dl. The ‘p’ value for this relation is 0.191 which says there is no statistically significant relationship exists between hypertension and high RBS value.

Discussion

The prevalence of hypertension has been increasing in India both in rural and urban communities. The prevalence of hypertension in urban areas of India ranged from 2.6% to 5.6% between 1960-1980 and it has increased to 20-33% in last decade. The prevalence of prehypertension is also increasing in India as evidenced by different studies. In different studies across India prehypertension is detected in 54% of subjects in Assam, 47% in Chennai and 44% in north India. But in most of these studies there is a corresponding linear increase in overweight, central obesity and other cardiovascular risk factors in the studied population. In our study a very high prevalence of hypertension (71.6%) is found in the members of this indigenous tribal community; Muthuvan. The prevalence of hypertension among females is much higher than that in males (87.5% Vs 58.6%). All these values are much higher than the Indian rural prevalence of hypertension. All the members of the community are hard working and physically very active.
Only a minor portion of their diet is composed of non-vegetarian food items. 1kg of common salt is enough for a period of 1 month for a family of 4 members (average intake of salt per day per person is 8.3g). Only 31% of the male subjects of the community had the habit of smoking. All the female individuals are non-smokers and all the members in the community are non-alcoholics. All the male subjects and 87.5% of female subjects had a BMI <25kg/m². Only 30.2% of the study population had central obesity. In considering all the members of the study group 81% of the population had a serum total cholesterol level 200mg/dl, 83% of the population had an LDL level 130mg/dl. All of them had a normal blood urea level and 85% had a normal serum creatinine level. 83% of the population had a normal serum uric acid level and 93.5% of them had a normal RBS value. But in the presence of all the above positive factors a very high prevalence of systemic hypertension is exist in this tribal community. Statistically no significant relationship could be made out between systemic hypertension and life style factors, anthropometric parameters, or various biochemical parameters. There may be some genetic factors which may play a pivotal role in the high prevalence of systemic hypertension in this tribal community which needs further detailed studies to unveil them.

Conclusions:
A VERY HIGH PREVALENCE OF HYPERTENSION IN THE COMMUNITY 71.6%

PREVALENCE AMONG FEMALES IS MORE THAN MALES (87.5% Vs 58.6%)

ALL MALES ABOVE 30 Yrs ARE HYPERTENSIVES

93 % OF FEMALES ABOVE 30Yrs ARE HYPERTENSIVES

NO SIGNIFICANT RELATION BETWEEN HYPERTENSION AND BMI, WHR, URIC ACID, LIPID PROFILE, RENAL PARAMETERS, & RBS

THERE MAY BE SOME UNDERLYING GENETIC FACTORS WHICH NEEDS FURTHER STUDIES

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