Prevalence of hypertension among rural population of Doiwala block, Dehradun, Uttarakhand India

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Abstract

Hypertension is a major health problem in developed as well as in developing countries. The prevalence pattern of hypertension in developing countries is different from that in the developed countries. The increasing epidemic of hypertension in India was documented by studies done at various places across the country. Various studies estimated a prevalence rate of hypertension among urban population ranging from 1.24% in 1949 to 36.4% in 2003 and for rural people from 1.99% in 1958 to 21.2 % in 1994. Uttarakhand is a newly formed and one of the hilly states of the India with more than 70% rural population. Since very scanty reports are available on prevalence of hypertension from Uttarakhand so this community based cross sectional study was conducted to know about the prevalence of hypertension in rural population of an area of Uttarakhand. Gumaniwala, a village near Rishikesh was the place of survey. A total of 340 peoples aged 30 years and above were selected through simple random sampling method for the study. All the subjects underwent an interview through a pretested questionnaire and clinical examination. Blood pressure of all the study subjects was measured using standardized technique. All the data were analyzed using SPSS software version 16.0. The prevalence of hypertension was presented as percentage. The association between categorical variables and hypertension were tested using Chi square test. A p value of < 0.05 was considered statistically significant. The overall prevalence of hypertension and pre-hypertension was 33.2% and 40.6% respectively. The prevalence of hypertension among females is higher (34.2%) than in males (32.4%). Among all studied variables age, smoking and Body mass index (BMI) were significantly related with hypertension (p<0.05). Since prevalence of hypertension is associated with socio-demographic factors hence the identification of the variables influencing hypertension is an important aspect for taking appropriate preventive measures to stop increase in the incidence of hypertension.

Keywords: Prevalence, Hypertension, BMI, Cross sectional, Pre hypertension

INTRODUCTION

Hypertension (HTN) is one of the most common worldwide disease affecting humans. It is one of the most important public health challenge worldwide because of its high frequency and concomitant risks of cardiovascular and kidney disease[1-2]. It has been identified as a leading risk factor for mortality and ranked three as a cause of disability adjusted life years[3]. In the past, the control and prevention of communicable diseases were emphasized, but recently attention has shifted to the control and prevention of the non communicable diseases, including hypertension, stroke, coronary artery disease and kidney diseases at the national level in view of the rising incidence of these diseases [4-5]. The prevalence pattern of hypertension in developing countries is different from that in the developed countries. India, one of the developing countries is a vast country with a heterogeneous and young population. Studies from India and Bangladesh have shown an increasing trend in the prevalence of hypertension [5]. The increasing epidemic of hypertension in India was documented by studies done at various places across the country [6]. Various studies estimated a prevalence rate of hypertension among urban population ranging from 1.24% in 1949 to 36.4% in 2003 and for rural people from 1.99% in 1958 to 21.2 % in 1994 [7]. Hypertension is thought to be less common in rural areas because of limited data and different rates of prevalence of hypertension. Although different rates may be due to different cut off marks in determining the level of hypertension and also differing age groups constituting the study population. Previously identified risk factor for hypertension in Indians includes increasing age, higher BMI, increased alcohol consumption, sedentary lifestyle and stress [8-10]. Uttarakhand is a newly formed state with 70% of rural population and very scanty reports are available on prevalence of hypertension from Uttarakhand. So the primary aim of this study was to determine the prevalence of hypertension in a rural population by means of door to door survey. An association of categorical variables with hypertension was the secondary aim of this study.

MATERIAL AND METHODS
Target Population and Sampling Frame

This study site was Gumaniwala gram sabha; a rural area of Doiwala Block located around 46 km from the city of Dehradun, the

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state capital of Uttarakhand situated in north east India with easy access from the Govt. Post Graduate College Rishikesh. The study village was chosen due to established research links between the village and research staff at the Govt. P.G. College Rishikesh. Data was collected during May 2008 to Dec. 2008. According to the census 2001 Gumaniwala, had population 5450 (Males 51.7% and Females 48.3%). Gram Sabha Gumaniwala has 15 wards within it. The voter list was used as sampling frame. Persons aged 30 and above were shortlisted for the study.   A total of 2432 persons were found aged 30 years and above.

Sample Size Determination

Sample size was calculated according to the formula given by Yamane and Taro [11].

Formula n= N/ 1+ N (e) ^{2}

Where n= required sample, N= Population Size, e= Degree of Precision

Using above formula we get sample size of 347. Random sampling method has been employed to get appropriate sample size. With the help of Gram Pradhan and respective ward members study participants were informed by the oral communication regarding the aims and objectives of the present study. Verbal and written informed consent has been taken from each of the study participants. After selection of the participants the door to door survey has been done. Pregnant females and underweight persons were excluded from the study.   Blood pressure was graded as normal (SBP <120 and DBP <80 mmHg), pre-hypertension (SBP = 120-139and/or DBP = 80-89 mmHg), stage I hypertension (SBP = 140-159 and/or DBP = 90-99 mmHg), and stage II hypertension (SBP > 160 and/or DBP > 100mmHg) as per US Seventh Joint National Committee on Detection, Evaluation and Treatment of Hypertension (JNC VII) criteria [12]. Hypertension was diagnosed when systolic BP was ≥140mmHg and/or mean diastolic BP ≥ 90mmHg or when a person had history of anti hypertensive treatment fifteen days before the survey.

Data Collection Tools

All the volunteers had administered the pretested questionnaire. The following information were collected from each subject: age, gender, height, weight, education, occupation, income, diet, family history of hypertension, smoking habits, alcohol consumption, stress and physical activity. After verifying the questionnaire, blood pressure has been measured for each participant. For blood pressure measurements a 2 days formal training have been taken in Nirmal Asram Hospital, Rishikesh under the supervision of cardiologist. Blood pressure was measured for each participant, using the auscultatory method with a standardized

calibrated mercury column type sphygmomanometer (Elite Surgical Industries, Delhi**)** and an appropriate sized cuff encircling at least 80% of the arm in the seated posture, with feet on the floor and arm supported at heart level. Following standardized protocol, we made two separate measurements and recorded the average of the two measurements after rest and due explanation about the objective of the study. Systolic BP is the point at which two or more sounds is heard (Phase 1) and diastolic pressure is the point before the disappearance of sounds (Phase 5). Body mass index was calculated as weight in kilograms / height in meter^2 [13].   Dietary data were categorized according the type of food the person eats (vegetarian or mixed). Data on smoking habit were collected as smokers who smoke currently and non smokers who never smoked. Alcohol consumption was stratified as alcoholic who consumes alcohol currently and non alcoholic who never consumed alcohol. Socioeconomic status was categorized based on the earlier published study [14]. Physical activity was assessed by inquiring study persons about work and spare time activities.

Statistical analysis

The collected data were analyzed on SPSS version 16.0 software. The prevalence of hypertension was presented as percentage. The association between categorical variables and hypertension were tested using Chi square test. A p value of < 0.05 was considered statistically significant**.**

RESULTS

Total 347 participants were screened. Of them 7(2.1%) persons did not want to participate in the survey. Thus the results of 340 persons could be analyzed. The overall prevalence of hypertension is 33.2 %(Stage I and stage II Combined). Age specific distribution of hypertensive patients suggests that the prevalence of hypertension rises steeply with increasing age. At the age 30-39 the frequency of hypertension among study population is 10.0% which increases to 45.9% up to age group >=70. The overall prevalence of prehypertension was 40.6%. Gender specific distribution of hypertensive patients suggests that the prevalence of hypertension was more in females (34.2%) compared to males (32.4%) but the difference was not statistically significant (p>0.05) (Table 2).   Smoking habit was found in 167 (49.1%) persons while non smokers were 173(50.9%). The prevalence of hypertension was higher among smokers (41.3%) compared to non smokers (25.4%). The difference was statistically significant. (p value 0.004) (Table-3). According to BMI, the sample size of 340 volunteers was categorized as normal, overweight and obese, and 201(59.1%), 89(26.2%) and 50 (14.7%) were found in each category respectively. The prevalence of hypertension was highest among obese (58.0%) compared to overweight (37.1%) and normal (25.3%) respectively. The prevalence was high statistically significant (p 0.000) (Table -4).

Table 1. Age wise distribution of subjects according to blood pressures as per JNC VII Criteria

Age Groups (Yrs.)	Total Population (n)	Normal No (%)	Prehypertensive No.(%)	Stage 1 HTN No. (%)	Stage 2 HTN No.(%)
30-39	70	27 (38.6)	36 (51.4)	5 (7.1)	2 (2.9)
40-49	71	21 (29.6)	31 (43.7)	12 (16.9)	7 (9.9)
50-59	77	19 (24.7)	26 (33.8)	15 (19.5)	17 (22.1)
60-69	61	13 (21.3)	21 (34.4)	16 (26.2)	11 (18.0)
>= 70	61	9 (14.8)	24 (39.3)	11 (18.0)	17 (27.9)
Total	340	89 (26.2)	138 (40.6)	59 (17.3)	54 (15.8)

Chi Square (df) = 35.606 (12), p value 0.000

Table 2: Gender wise distribution of subjects according to blood pressures as per JNC VII Criteria

Gender	Total Population (n)	Normal N (%)	Prehypertensive N (%)	Stage I HTN N (%)	Stage II HTN N (%)
Men	185	52 (28.1)	73 (39.5)	35 (18.9)	25 (13.5)
Women	155	37 (24.5)	65 (41.9)	24 (15.5)	29 (18.7)
Total	340	89 (26.2)	138 (40.6)	59 (17.3)	54 (15.8)

p value > 0.05

Table 3. Smoking habits wise distribution of subjects according to blood pressures as per JNC VII Criteria

Smoking Habits	Total Population (n)	Normal N (%)	Prehypertensive N (%)	Stage I HTN N (%)	Stage II HTN N (%)
Smokers	167	37 (22.2)	61 (36.5)	36 (21.6)	33 (19.8)
Nonsmokers	173	52 (30.0)	77 (44.5)	23 (13.3)	21 (12.1)
Total	340	89 (26.2)	138 (40.6)	59 (17.3)	54 (15.8)

Chi square (df) = 9.811(3), p value 0.004

Table 4. BMI dependent distribution of subjects according to blood pressures as per JNC VII Criteria

BMI category	Total Population (n)	Normal N (%)	Prehypertensive N (%)	Stage I HTN N (%)	Stage II HTN N (%)
Normal	201	62 (30.1)	88 (43.8)	29 (14.4)	22 (10.9)
Overweight	89	22 (24.7)	34 (38.2)	18 (20.2)	15 (16.9)
Obese	50	5 (10.0)	16 (32.0)	12 (24.0)	17 (34.0)
Total	340	89 (26.2)	138 40.6)	59 (17.3)	54 (15.8)

Chi Square (df) = 24.442(6), p< 0.000

DISCUSSION

Hypertension is a major   health problem in India and other developing countries [4,15]. The prevalence of hypertension shows increasing trend   in India. The average prevalence of hypertension in India is 25% in urban population and 10% in rural population. Our results reveal the prevalence of hypertension in rural indians is to be seen similar to urban indians and other world regions [16].   The prevalence of hypertension was found 33.2% in our study   and the findings were similar to the study done in rural areas of Tamil Nadu in the age group of 45-60 years where it was 33.0% [17]. Although the rates of hypertension among females were higher than males, the difference was not significant. Our findings were comparable to some other indian studies which also shows high prevalence of hypertension in females than males but   the differences were not statistically significant [9,18-19]. Recent reports of the prevalence of hypertension in urban india suggested rates of 29.3-45.1% in men and 25.2-38.2% in women with steady increase seen over the past 20 years[5,8,20-21]. Lower prevalence rates have been reported in rural areas though with a steady increase in rates seen since the 1960s [6, 9,10, 22]. A case control study done in Banglore showed that smoking was an independent risk factor for hypertension which was comparable to our study findings as it showed a significant association between smoking and hypertension[23].In present study higher prevalence of hypertension was observed in persons having higher BMI which was comparable to some other indian studies done in different places of india, as in urban Jaipur (both sex) [24],   rural study (only males) [25], Haryana rural study [9], the Chennai Urban Population Study (CUPS) [26], as well as Bombay executive study [27]. All shown a higher weight and BMI amongst hypertensive groups. The prevalence rates in our study were similar to other low and middle income countries, when compared i.e. 29% in rural and 27% in urban Ghana[28] and 25% in urban Cameroon [29]. In high income countries the degree of prevalence of hypertension vary widely from 17% in Greece, 20%   in USA, 38% in Japan and 40 % in Spain in persons aged 20 years and above [16].   Worlds highest prevalence rate is found in Europe in persons aged 35 years and above while only 28% in North America[30].

In our study age, smoking and high BMI were significant predictors of hypertension which suggests that both   smoking and higher weight are the main   modifiable factors.

CONCLUSION

In india the burden of hypertension in healthcare system is assumed highest as compared to any other country in the world [31]. Present study reveals that age, smoking and   high BMI were the contributing factors of hypertension. Except age, smoking and obesity are modifiable factors with very little expenses and   even preventive programmes. So identifying and controlling hypertension may be one of the most important ways in which India can help to control its disease burden in the coming years.

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