Prevalence of Hypertension and its Determinants in an Urban Area of Uttarakhand
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ABSTRACT
Hypertension is the most frequent cardiovascular disease and is assuming epidemic proportions in developing countries as well. It affects nearly 26.4\% of the population worldwide. Prevalence of hypertension in India, for the last three decades has increased by about 30 times among urban residents and by about 10 times among rural residents. In this regard a study was conducted in an urban area namely Rishikesh of Dehradun district in between Dec. 2008 to May 2009. The purpose of this study was to know the prevalence of hypertension in Rishikesh and also to find out the associated risk factors with hypertension in this area. For this voter list was used as sampling frame and persons aged 30 years and above were shortlisted. A total of 327 volunteers were included in this study. A structured questionnaire was used to gather information about the prevalence of hypertension. Hypertension was defined as blood pressure more than 140/90 mm Hg. Prevalence of hypertension was presented in percentage, and association of risk factors was done by using Chi square test. A p value < 0.05 have been considered statistically significant. The overall prevalence of hypertension in Rishikesh was 38.5\%. Age, educational status, economic-status, physical activity, alcohol consumption and body mass index were found significantly associated with hypertension. Thus, both prevalence and risk factor studies are needed to estimate the prevalence of hypertension as well as get at specific risk factors for Indian Population. Such studies will help in setting the baseline by which the risk factor can be ranked and specific control strategies planned to promote health of the middle age and elderly population.

1. INTRODUCTION:
Hypertension is the most frequent cardiovascular disease and is assuming epidemic proportions in developing countries as well\textsuperscript{1}. Overall 26.4\% of the world’s population in the year 2000 had hypertension and it is expected that by the year 2025, approximately 1 in 3 adults aged above 20 years will have the disease\textsuperscript{2}. Hypertension is an iceberg disease and can be described as the sleeping snake which bites when it wakes up. Prevalence of hypertension is increasing in developing countries very rapidly and is said to be one of the most leading cause of mortality and morbidity among the elderly\textsuperscript{3}. Prevalence of hypertension in India, for the last three decades has increased by about 30 times among urban residents and by about 10 times among rural residents\textsuperscript{4}. Several risk factors have been implicated in the aetiology of hypertension. This includes geographic considerations, genetic, socio-economic, socio-cultural, dietary, and nutritional status etc\textsuperscript{5}. While the risk factors and their impact on hypertension is documented by well designed studies in the Western countries, systematically conducted studies using rigorous epidemiological techniques are lacking in India. Epidemiological studies to assess the prevalence of hypertension are urgently needed in developing countries like India to determine the baseline against which future trends in various risk factors can be assessed and preventive measures planned to promote health. Uttarakhand is a newly formed and one of the hilly states of India. Lifestyle of residents of this state is different from...
other parts of India and few studies on prevalence of hypertension are available from this state and most of these studies are hospital based. Thus with the attention of getting prevalence of hypertension and its associated risk factors in an urban area, the department of Zoology, Govt. post graduate college, Rishikesh did a cross sectional survey in Rishikesh city of district Dehradun, Uttarakhand.

2. MATERIALS AND METHODS

2.1 Study population and sampling frame

A cross sectional study was carried out among the adults in the age group of 30 years and above residing Rishikesh city of Dehradun district. According to 2001 census, Rishikesh had a population of 59,671. Males constitute 56% of the population and females 44%. A total of 33723 persons were found aged 30 years and above and 1% population of this area was studied. Voter list was used as sampling frame. A list of persons aged 30 years and above was prepared then all persons living in the study site were compiled and each participant was assigned their code number separately. Simple random method (lottery) was employed for the selection of the study participants in the study site. With the help of ward members study participants were informed by the oral communication regarding the aims and objectives of the present study. Written and verbal consent has been taken from each of the study participants. After selection of study participants’ door to door survey has been done. The duration of present study was between Dec 2008 to May 2009.

2.2 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 was 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). 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. Hypertension was diagnosed when systolic BP was P140mmHg and/or mean diastolic BP P 90mmHg or when a person had history of antihypertensive treatment fifteen days before the survey. Body mass index was calculated as weight in kilograms / height in meter. 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. Physical activity was assessed by inquiring study persons about work and spare time activities.

2.3 Statistical analysis

The collected data were analyzed on 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.

3. RESULTS

Total 337 persons were included in the study. Of them 10 (3.0%) persons fail to continue in the study. So the results of only 327 persons have been analyzed. The overall prevalence of hypertension was 38.5%. Age specific prevalence of hypertension showed that prevalence of hypertension increases with increasing age. A sharp increase in hypertension prevalence was found in fourth decade of life. Early onset of hypertension may be as a result of leading a stressful and fast urban lifestyle, without sufficient rest to mind and body (Table-1). Sex-wise distribution of participants suggests that higher prevalence of hypertension was found in females than males i.e. 39.3 % vs. 37.5%, but the difference was not found to be statistically significant. Prevalence of hypertension among alcoholic was higher than those who do not consume alcohol i.e. 47.9% vs. 33.7%. Alcohol consumption was significantly associated with prevalence of hypertension (p = 0.008) (Table-3). As per physical activity prevalence of hypertension was found high among sedentary persons as compared to physically active persons i.e. 41.3% vs. 36.5% respectively. Physical activity was significantly associated with prevalence of hypertension (p = 0.046) (Table-4). According to BMI, the sample size of 327 volunteers was categorized as normal, overweight and obese, and 186 (56.9%), 95(29.0%) and 46...
(14.1%) were found in each category respectively. The prevalence of hypertension was highest among obese (65.2%) compared to overweight (49.5%) and normal (26.3%) respectively. The prevalence was high statistically significant (p 0.000) (Table 4). All other factors studied were not found to be statistically significant among study subjects. Those factors were gender, smoking, dietary habits, family history, stress, occupation, economic status (p > 0.05).

### 4. DISCUSSION

The prevalence of hypertension is on increase in developed nations as well as in developing countries. In context to India, the average prevalence of hypertension in India is 25% among urban dwellers and 10% in rural inhabitants. Factors responsible for these changes are rapid urbanization, lifestyle changes, dietary changes, stress and increased life expectancy. The overall prevalence of hypertension was found to be 38.5% in the present study. Present study prevalence rate among adults were comparable to some other Indian studies. Study by Gupta R and co-workers, in Jaipur among adults in the age group 20-75 years have shown the prevalence of hypertension was 37.0%. Banerji Monali et al, (41.4%) in Orissa, Prakash R (43.5%) in Udaipur, by Gupta MM et al, (43.3%) in Rewa MP, the Mumbai study by Gupta PC (44%) and the study done in Trivendrum by Joseph A (36%).

The prevalence rate in our study was less when compared to the Meerut study done by Maroof KA et al, (57.3%), the Thiruvananthapuram study by Kalavathy MC et al, (51.8%). The prevalence in our study was high when compared to other studies done by Anand MP (~27%) among executives of Mumbai, Meshram FC et al, (~22.5%) among police personnel of Nagpur, Mohan V et al, (~22%) among Chennai urban population and another study by the Deepa R et al, (14%) in Chennai among adults in the age group 20-60 years. Similar rates were found in other studies in US (28%) and Canada (22%). Higher prevalence was found in studies conducted in developed countries, Germany 55%, Finland 49%, Spain 47%, England 42%, Sweden 38% and Italy 38% (Wolf M et al., 2003).

#### 4.1 Prevalence of hypertension according to age and gender

In the present study, the prevalence of hypertension was found to increase steadily with age. A sharp increase in hypertension prevalence was observed in the fourth decade among study subjects. Early onset of hypertension in urban population may be as a result of leading a stressful and fast urban lifestyle, without sufficient rest to mind and body. Even though most age groups among the urban population showed a higher susceptible developing hypertension. Several studies have consistently demonstrated a positive relation between age and blood pressure. Study done in Delhi and adjoining rural area of Haryana by Chadha SL et al, showed prevalence to be 4.1% (males) and 2.84% (females) in the age group 25-34 years which increased to 22.9% (males) and 32.9% (females) in the age group 55-64 years. The Jaipur urban study by Gupta R et al, reported a prevalence of 15.4%
amongst <40 years age group, 34.7% between 40-49 years and 58% in the age group ≥ 50 years.
Increase prevalence with age is well documented, and this could be attributed to the accumulated effects of various risk factors.
The present study did not reveal any difference in the prevalence of hypertension between males and females 39.3 % and 37.5% respectively. Our findings were comparable to the studies by Kumar and Chaudhary in West Rajasthan23, Hussain SA24 et al, in North West Rajasthan, Anand MP17 in Mumbai and Zachariah25 et al, in the urban population in Kerala, who found no difference in the prevalence between males and females.
Studies by Jajjo UN26 et al, in Sewagram, Malhotra P27 et al, in North India and Joseph A14 et al, in Trivandrum showed the prevalence in females to be higher than males.
4.2 Prevalence of hypertension according to physical activity and alcohol consumption
Our study shows that 41.3% urban hypertensive’s led a sedentary life style among all study subjects. Sedentary life style among urban population show significant association with hypertension. It has been seen that sedentary individuals have 20-50% increased risk of developing hypertension revealed by the study of Blair28 et al.
In a National CSI17 study, 78% of hypertensive’s had a sedentary lifestyle compared to 45% of controls. Higher prevalence of sedentary lifestyle among the urban hypertensives could be due to the fact that they work in advanced infrastructural steps, which involve more intellectual but less physical work.
In the present study, prevalence of hypertension was found high among alcoholics 47.9% than non alcoholic subjects which are 36.5%. The difference between the two groups was found statistically significant. However potential mechanisms for the relationship include a direct pressor effect of alcohol on the vessel wall, a sensitization of resistance vessels to pressor substances, stimulation of the sympathetic nervous system and increased production of adrenocorticoid hormones29. However the Chennai urban population study found no association between hypertension prevalence and alcohol consumption.
4.3 Prevalence of hypertension according to Body mass index
In our study, it was found that 65.2% urban hypertensives had a BMI above 29.9 kg/m2. Framingham study31 showed that for every 10% increase in weight there was a rise of 6.5 mm Hg in systolic blood pressure. The Jaipur urban9 (both sexes) and rural studies32 (only males), Haryana rural study27, the Chennai urban population study30 as well as Bombay executive study30, study by Bansal SK33 have all shown a higher weight and BMI amongst hypertensive groups.
Increase in age, alcohol consumption, physical activity and body mass index were found to be significantly associated with prevalence of hypertension. Except age all were modifiable risk factors, so it is necessity for the health care providers to take note of this trend and plan appropriate preventive measures, including changing lifestyle modification.
5. ACKNOWLEGEMENT
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6. REFERENCES

Conflict of Interest: None Declared

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