

## Prevalence of Hypertension Among an Urban Population of Bhubaneswar City, Orissa, India

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### INTRODUCTION

Hypertension is relatively common in developed countries and gives no exception to the developing countries. As the developing countries undergo the transition to the disease pattern of developed countries, cardiovascular diseases are becoming proportionately more important as a cause of morbidity and mortality, and the control of hypertension will become an issue in many countries (World Hypertension League, 1995). Risk factors of hypertension seem to cut across cultural patterns and many studies have shown that the etiological factors affecting the distribution of blood pressure in traditional societies are different from those in westernised/urbanised societies (McGarvey and Schendel, 1986; Ward, 1983). Waldron et al. (1982) made a cross cultural comparative study of 84 different societies and cultures and found significant increase in mean population blood pressure when societies were ordered along a continuum of economic development and they stated that the more modern the society, the greater the risk of heart disease for individuals in that community. India, in spite of its greater diversity, both in terms of biological as well as socio-cultural aspects, only a few of her populations have been explored for the study of variation in blood pressure. A few studies from India (Chadha et al., 1990, 1993; Gopinath et al., 1994; Pais et al., 1996) have shown increased prevalence of cardiovascular diseases. Gopinath et al. (1994) stress that in India, there is need to organize a community based program for identifying individuals with hypertension, bringing them into medical facilities for further evaluation and maintaining a high proportion of them in a long term control program. In this context, the present study is attempted to investigate the prevalence of hypertension in an urban population of Bhubaneswar city, India.

### METHODS

A sample of 105 men and 117 women of 20

years and above age were selected randomly from the Karan population inhabiting Bhubaneswar city of Orissa state, India. The pregnant and lactating women were not included in the sample. A minimum of three blood pressure readings were taken from each participant in sitting posture as per the standard procedure by a random zero sphygmomanometer (Elko, India). The recommendations of the United State's National Committee on Detection, Evaluation and Treatment of High Blood Pressure (JNC V, 1995) were followed for classifying people into different categories of normal and high blood pressure. It states that when systolic and diastolic pressures fall into different categories, the higher category should be selected to classify the individual's blood pressure status. Thus, a person is considered as hypertensive if he/she possesses systolic blood pressure (SBP)  $\geq 140$  mmHg and/or diastolic blood pressure (DBP)  $\geq 90$  mmHg. In addition mean blood pressure levels were presented.

### RESULTS

The characteristics of the sampled population are presented in table 1. The mean age is 50.5 among men and 44.9 in women. The body mass index is 24.5 for men and 24.6 for women. The smoking, chewing of pan and alcoholism are recorded among moderate proportions. The prevalence of various categories of hypertension by sex among Karan population is presented in table 2. The prevalence of hypertension among men and women are 50.5 % and 32.5 %

Table 1: Characteristics of the study sample

| Characteristic                  | Men(n=105)      | Women (n=117)   |
|---------------------------------|-----------------|-----------------|
| Age (Mean $\pm$ SD)             | 50.5 $\pm$ 13.5 | 44.9 $\pm$ 12.4 |
| Body mass index (Mean $\pm$ SD) | 24.5 $\pm$ 1.9  | 24.6 $\pm$ 2.7  |
| Smokers (%)                     | 28.6            | 0.0             |
| Chewing (%)                     | 24.8            | 23.1            |
| Alcohol (%)                     | 73.3            | 5.6             |

**Table 2: Prevalence of different categories of hypertension by sex in Karan population**

| Blood pressure category                     | Men |      | Women |      | Both Sexes |      |
|---------------------------------------------|-----|------|-------|------|------------|------|
|                                             | N   | %    | N     | %    | N          | %    |
| Normal (SBP<140 and / or DBP<90)            | 52  | 49.5 | 79    | 67.5 | 131        | 59.0 |
| Isolated systolic HT (SBP>139 and DBP<90)   | 7   | 6.7  | 4     | 3.4  | 11         | 4.9  |
| Isolated diastolic HT (SBP<140 and D-BP>89) | 7   | 6.7  | 6     | 5.1  | 13         | 5.9  |
| Combined HT (SBP>139 and DBP>89)            | 39  | 37.1 | 28    | 23.9 | 67         | 30.2 |
| Total hypertensives                         | 53  | 50.5 | 38    | 32.5 | 91         | 41.0 |

respectively. Among hypertensives, majority fall under the category of combined hypertension rather than isolated systolic or isolated diastolic hypertension. There are considerable sex differences in the prevalence of hypertension ( $\chi^2 = 7.47$ ,  $p < 0.001$ ). The mean SBP as well as DBP are more among men (SBP=137.2, DBP=88.1) than among women (SBP=129.6, DBP=84.1) (Table 3). The t-values (4.339 for SBP, 3.37 for DBP) indicate considerable sex differences in the mean levels of blood pressure. The F-values indicate significant variation in both SBP and DBP across different groups. There is a steady increase in blood pressure levels along with the age.

### DISCUSSION

A substantial proportion of individuals in the present study possess hypertension and there is considerable variability between within groups as well as between sexes. WHO Experts Committee concludes that cardiovascular diseases will emerge or be established as a substantial

health problem in the World by 2000 AD and that when life-expectancy reaches 50 -60 years, mortality from cardiovascular diseases accounts for 15 – 20% of all deaths (WHO, 1990). A remarkably high prevalence of hypertension further confirms the well-established phenomenon of high blood pressure and increased blood pressure levels with age accompany the process of modernisation (Dressler et al., 1987; Schall, 1995). It is anticipated that relatively higher levels of blood pressure along with higher prevalence of hypertension occur in urban populations rather than in rural people. Komachi and Shimamoto (1980) have shown that migration and urbanisation cause a rise in blood pressure levels, which is attributed to change in life style.

Previous studies from India (Table 4) have reported variable hypertension prevalence and most have used WHO criteria (i.e.,  $\geq 160$ mmHg and/or  $\geq 95$ mmHg). The present study results are thus not directly comparable to the other studies from India since the present study uses JNC-V criteria for classifying hypertension.

**Table 3: Prevalence of hypertension and mean systolic and diastolic blood pressure levels in Karan population**

| Age group | Men (n) | Women (n) | Prevalence of hypertension |             | SBP (Mean $\pm$ SD) |                  |                |                 | DBP (Mean $\pm$ SD) |       |
|-----------|---------|-----------|----------------------------|-------------|---------------------|------------------|----------------|-----------------|---------------------|-------|
|           |         |           | Men n (%)                  | Women n (%) | Men                 |                  | Women          |                 | Men                 | Women |
| 20-29     | 3       | 7         | 0 (0.0)                    | 0 (0.0)     | 120.0 $\pm$ 2.0     | 114.6 $\pm$ 2.2  | 79.3 $\pm$ 3.1 | 74.9 $\pm$ 3.2  |                     |       |
| 30-39     | 23      | 37        | 3 (2.9)                    | 5 (4.3)     | 128.1 $\pm$ 7.2     | 122.0 $\pm$ 9.8  | 83.3 $\pm$ 5.8 | 79.7 $\pm$ 8.5  |                     |       |
| 40-49     | 28      | 31        | 10 (9.5)                   | 9 (7.7)     | 133.4 $\pm$ 8.5     | 128.9 $\pm$ 12.3 | 85.9 $\pm$ 5.8 | 83.4 $\pm$ 8.2  |                     |       |
| 50-59     | 28      | 26        | 22 (21.0)                  | 11 (9.4)    | 144.1 $\pm$ 11.4    | 133.4 $\pm$ 3.11 | 92.1 $\pm$ 8.4 | 87.2 $\pm$ 10.8 |                     |       |
| 60+       | 23      | 16        | 18 (17.1)                  | 13 (11.1)   | 144.6 $\pm$ 11.6    | 147.1 $\pm$ 10.0 | 92.1 $\pm$ 9.0 | 94.4 $\pm$ 6.7  |                     |       |
| Total     | 105     | 117       | 53 (50.5)                  | 38 (32.5)   | 137.2 $\pm$ 12.2    | 129.6 $\pm$ 14.2 | 88.1 $\pm$ 8.2 | 84.1 $\pm$ 10.0 |                     |       |

Variation in mean BP levels by age groups by ANOVA: F value for SBP=32.02;  $p < 0.001$

F value for DBP=19.70;  $p < 0.001$

Variation in mean BP levels by sex by t-tests:

t value for SBP= 4.39;  $p < 0.01$

t value for DBP= 3.31;  $p < 0.01$

**Table 4: Prevalence of hypertension in Indian populations**

| Population/<br>Place of the Study | Prevalence (%) |              | Reference                  |
|-----------------------------------|----------------|--------------|----------------------------|
|                                   | Men            | Women        |                            |
| <i>Tribal</i>                     |                |              |                            |
| Lepchas (Sikkim)*                 | 45.3           | 34.0         | Mukhopadhyay et al. (1996) |
| Yerukula (Andhra Pradesh)*        | 2.8            | 1.2          | Reddy (1998)               |
| Khondh (Andhra Pradesh)*          | 7.8            | 11.5         | Kusuma et al. (in press)   |
| Valmiki (Andhra Pradesh)*         | 13.5           | 32.4         | Kusuma et al. (in press)   |
| <i>Rural</i>                      |                |              |                            |
| Rajasthan                         | 6.9            | 8.8          | Baldwa et al. (1984)       |
| Himalayas (high altitude)         | 2.4            | 2.4          | Puri et al. (1986)         |
| Rajasthan                         | 6.1            | 7.3          | Hussain et al. (1998)      |
| Western Rajasthan                 | 4.0            | 3.6          | Kumar and Chaudhary (1991) |
| Maharashtra                       | 2.9            | 4.1          | Jajoo et al. (1993)        |
| Rural population of Kerala        | 17.9           | -            | Kutty et al. (1993)        |
| Uttar Pradesh                     | 1.6            | -            | Agarwal et al. (1994)      |
| Rajasthan*                        | 23.7           | 16.9         | Gupta and Sharma (1994)    |
| Around Delhi                      | 4.1            | 3.3          | Chadha et al. (1997)       |
| West Bengal                       | 1.4            | (both sexes) | Majumder et al. (1994)     |
| Andhra Pradesh (lower castes)*    | 4.5            | 8.3          | Reddy (1998)               |
| Andhra Pradesh (middle caste)*    | 13.7           | 6.2          | Reddy (1998)               |
| Population around Delhi**         | 4.1            | 3.3          | Chadha et al. (1997)       |
| Wadabalija (Andhra Pradesh)*      | 22.6           | 19.8         | Kusuma et al. (in press)   |
| Settibalija (Andhra Pradesh)*     | 27.9           | 21.4         | Kusuma et al. (in press)   |
| <i>Urban</i>                      |                |              |                            |
| Haryana                           | 6.0            | 7.1          | Gupta et al. (1978)        |
| Delhi                             | 11.7           | 13.7         | Chadha et al. (1997)       |
| Delhi**                           | 25.9           | 22.2         | Gopinath et al. (1994)     |
| Rajasthan*                        | 29.5           | 33.5         | Gupta et al. (1995)        |
| Delhi**                           | 10.8           | 12.3         | Chadha et al. (1997)       |
| Andhra Pradesh*                   | 18.9           | 12.3         | Reddy (1998)               |
| Wadabalija (Andhra Pradesh)*      | 18.4           | 18.4         | Kusuma et al. (in press)   |
| Settibalija (Andhra Pradesh)*     | 27.1           | 26.1         | Kusuma et al. (in press)   |

\*SBP $\geq$ 140 and/or DBP $\geq$ 90 mmHg; \*\*SBP $\geq$ 160 and/or DBP $\geq$ 90 mmHg

Wide range of prevalences of hypertension is reported by these studies. Low prevalences of hypertension were recorded by among tribal population of Andhra Pradesh (Reddy, 1998), high altitude population of Himalayas (Puri et al., 1986), rural population of Maharashtra (Jajoo et al., 1993), Uttar Pradesh (Agrawal et al., 1994), West Bengal (Majumder et al., 1994), Delhi (Chadha et al., 1997), etc. Most of the rural population recorded relatively lower prevalences than urban groups. Most of the studies on urban population recorded higher prevalences of hypertension (Chadha et al., 1990, 1997; Gupta et al., 1995; Reddy, 1998). Majumder et al. (1994) reported that the prevalence of hypertension is lower (1.4%) among middle caste agriculturists while it is higher (17%) among Marwaris, a business community living in Calcutta city.

Reddy (1998) concluded, based on a study among four different socioeconomic groups from Andhra Pradesh, that the prevalence of hypertension followed a socioeconomic gradient. Mukhopadhyay et al. (1996) reported a remarkably high prevalence of definite as well as borderline hypertension among Lepchas of the Himalayas where, about 34% of women and 45.3% of men are found to possess either borderline or definite hypertension. These high prevalences have been attributed to the regular use of millet beer in often-large quantities and regular inclusion of black tea with salt among Lepchas.

The results on age wise prevalence of hypertension are in consonant with several other earlier cross-sectional and prospective studies. Schall (1995) reports that women above forty-five years old among Manus of Papua New Guinea had a

tenfold increased risk of hypertension compared to younger women, but for men age was not significantly associated. Several researchers (Kannel et al., 1984; Williams et al., 1993) reported that among adults, mainly in developed countries, blood pressure increases with advancing age and the increase is particularly steep among women. Such that blood pressure levels, specially, systolic blood pressure, for menopausal women exceed those among men.

**KEY WORDS** Hypertension. Blood Pressure. Epidemiology. Urban. Orissa. India.

**ABSTRACT** The present study is attempted to investigate the prevalence of hypertension in an urban population of Bhubaneswar city, Orissa, India. A sample of 222 individuals (105 men and 117 women) belonging to Karan caste of Bhubaneswar city was surveyed for the prevalence of hypertension. The recommendations of JNC-V were followed for classifying people into different types of hypertension. A substantial proportion (50.5% of men, 32.5% of women) possesses various stages of hypertension. The mean SBP as well as DBP are more among men than among women. There are considerable sex differences in the prevalence of hypertension as well as in mean blood pressure levels. There is a steady increase in blood pressure levels along with the age.

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