# Epidemiological study of hypertension and its determinants in an urban population, Solapur

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## Abstract

**Background:** Hypertension is a chronic condition of concern due to its role in a causation of coronary heart disease, stroke and other vascular complications. It is one of the major risk factors for cardiovascular mortality, which accounts for 20-50 percent of all deaths. In India, the trend is increasing due to changes in lifestyle.
**Material and Method:** The present community based descriptive study with cross sectional design carried out among 400 individuals with an age 20 years and above. Predesigned & pretested Semi open-ended questionnaire was used to collect data, 200 individuals selected from urban slum and non-slum area each by simple random sampling.
**Result:** The prevalence of hypertension in urban area was 18.25%. Prevalence of hypertension was significantly more in elderly peoples (51.85%), class I socioeconomic status (28.23%), higher educational status i.e. Post- graduate (34.04%), widowed individuals (45%), obese (34.62%), smokers (39.58%) and alcoholics (35.18%), those with family history of hypertension (31.40%) and Diabetes (33.33%).
**Conclusion:** The prevalence of hypertension is high in certain high risk groups which can be easily identified and preventive actions can be taken.

**Keywords:** Alcohol Intake, Hypertension, Obesity, Smokers, Urban Area.

## Introduction

We live in a rapidly changing environment. Throughout the world, human health is being shaped by the some powerful forces: demographic ageing, rapid urbanization and the globalization of unhealthy lifestyles. One of the most striking examples of this shift is the fact that non-communicable diseases such as cardiovascular disease, cancer, diabetes and chronic lung diseases have overtaken infectious diseases as the world's leading cause of mortality.[1] One of the key risk factors for cardiovascular disease is hypertension - or raised blood pressure. Hypertension is a chronic condition of concern due to its role in a causation of coronary heart disease, stroke and other vascular complications. It is the commonest cardiovascular disorder, posing a major public health challenge to population in socioeconomic and epidemiological transition. It is one of the major risk factors for cardiovascular mortality, which accounts for 20-50 percent of all deaths.[2] Studies in India have shown an increasing trend in the prevalence of HTN among urban adults.[3] In India, between three and six decades, the prevalence of hypertension has increased by about 30 times among urban developers and by about 10 times among rural inhabitants.[4]

## Material and Method
**Study Area:** The present study was carried out in an area catered by Urban Health Center of the Department of Community Medicine of Dr. V. M. Govt. Medical College, Solapur.

**Study design:** Community based Descriptive study with cross-sectional design.
**Period of Study:** The period of study was from 1st May 2016 to 31st October 2016 (6 months).
**Sampling Unit:** Sampling unit was the household having adult with an age 20 years and above.
**Sample size[5]:** Based on 47.9% prevalence of hypertension [6] in adults in an urban area, the minimum sample size calculated was 384, so sample size was taken as 400. Total 400 individuals >20 years of age group were interviewed, 200 from slums and non-slums each.
**Data collection:** A house to house survey was carried out by simple random sampling method. The list of households was available from Urban Health Training Centre. During house visit detailed history was taken, clinical examination was done. The hypertension was defined according to seventh report of Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure.[7] Socioeconomic status was judged using modified B.G. Prasad classification for May 2016,[8] Body Mass Index was calculated by formula Weight (kg)/ Height$^2$ (m$^2$).

## Results

In the present descriptive cross sectional study of hypertension in an urban area catered by Urban Health Training Center of Community Medicine Department Solapur, 400 subjects were surveyed. Maximum age recorded was 89 years and male to female ratio was 1:1.16.

(Table 1) indicates that, overall prevalence of hypertension in the study population was 18.25%. Males had slightly more cases of hypertension [38 (20.54%)] compared to females [35 (16.28%)] and difference was found to be non-significant. There was rise in number of cases with increasing age which was statistically highly significant. Prevalence of Hypertension was maximum (51.85%) in >60 years age group. (Fig. 1) indicates maximum proportion (28.23%) of hypertensive cases were among socioeconomic class I and minimum (10.34%) among socioeconomic class V showing that there was rise in hypertensive cases with higher socioeconomic class and difference was found to be statistically significant. (Table 2) shows that number of hypertensive cases were highest among individuals educated up to postgraduate i.e. 34.04% followed by prevalence in individuals educated up to graduate i.e. 21.00% and was minimum in illiterate individuals i.e. 6.66%. The prevalence of hypertension also increased significantly with the increase in literacy status (p <

0.05). (Table 3) shows that the prevalence of hypertension was maximum in widowed individuals i.e. 45%. The prevalence of hypertension divorcee/separated individuals was 20%. The prevalence of hypertension was minimum in unmarried i.e. 3.77%. The difference was found to be statistically highly significant (P < 0.001). (Table 4) shows that prevalence of hypertension was minimum in individuals with Body Mass Index less than 18.5 i.e. 7.41%, The prevalence goes on increasing with increase in Body Mass Index and is maximum in individuals with BMI more than 30 (34.62%), The difference was statistically highly significant (P < 0.001). Table 5 and 6 shows that hypertension was found significantly more among individuals with family history of hypertension (31.40%) and family history of diabetes (33.33%). (Fig. 2 and 3) shows that prevalence of hypertension is more in smokers (39.58%) and alcoholics (35.18%), in both cases difference was highly significant.

**Table 1: Age and Gender wise distribution with prevalence of Hypertension in study subjects (%)**

| Age groups in years | Male | | | Female | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Normotensive | Hypertensive | Total | Normotensive | Hypertensive | Total | Normotensive | Hypertensive | Total |
| 20-29 | 50 (98.04) | 01 (1.96) | 51 (100) | 66 (100) | 00 (00) | 66 (100) | 116 (99.15) | 01 (0.85) | 117 (100) |
| 30-39 | 35 (92.11) | 03 (7.89) | 38 (100) | 48 (96.00) | 02 (4.00) | 50 (100) | 83 (94.32) | 05 (05.68) | 88 (100) |
| 40-49 | 26 (70.27) | 11 (29.73) | 37 (100) | 35 (81.40) | 08 (18.60) | 43 (100) | 61 (76.25) | 19 (23.75) | 80 (100) |
| 50-59 | 20 (66.67) | 10 (33.33) | 30 (100) | 21 (67.74) | 10 (32.26) | 31 (100) | 41 (67.21) | 20 (32.79) | 61 (100) |
| ≥ 60 | 16 (55.17) | 13 (44.83) | 29 (100) | 10 (40.00) | 15 (60.00) | 25 (100) | 26 (48.15) | 28 (51.85) | 54 (100) |
| Total | 147 (79.46) | 38 (20.54) | 185 (100) | 180 (83.72) | 35 (16.28) | 215 (100) | 327 (81.75) | 73 (18.25) | 400 (100) |

\* Parenthesis shows group wise percentage
Total $\chi^2 = 84.18$        d.f. = 4        p < 0.0000001        highly significant
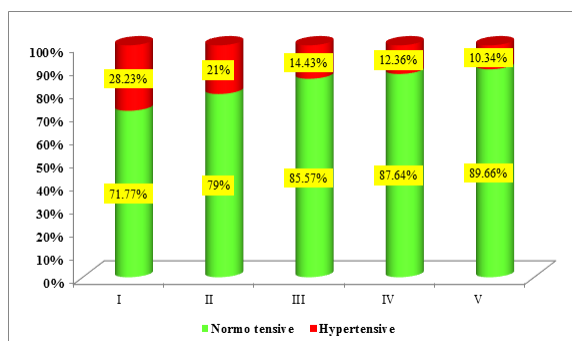Male vs Female $\chi^2 = 2.084$        d.f = 4        p = 0.7203        not significant



**Fig. 1: Distribution of study subjects according to socioeconomic status**
$\chi^2 = 10.42$        d.f. = 4        p < 0.05        significant

**Table 2: Distribution of study subjects according to literacy status (%)**

| Literacy status | Total | | Total |
|---|---|---|---|
| | Normo tensive | Hypertensive | |
| Illiterate | 28 (93.34) | 02 (6.66) | 30 (100) |
| Primary education | 22 (88.00) | 03 (12.00) | 25 (100) |
| Secondary Education | 63 (87.50) | 09 (12.50) | 72 (100) |
| S.S.C | 61 (82.43) | 13 (17.57) | 74 (100) |
| H.S.C | 43 (82.69) | 09 (17.31) | 52 (100) |
| Graduate | 79 (79.00) | 21 (21.00) | 100 (100) |
| Post- graduate | 31 (65.96) | 16 (34.04) | 47 (100) |
| Total | 327 (81.75) | 73 (18.25) | 400 (100) |

* Parenthesis shows group wise percentage

$\chi^2$=13.37      d.f.= 6      p < 0.05      significant

**Table 3: Distribution of study subjects according to marital status (%)**

| Marital status | Normo tensive | Hypertensive | Total |
|---|---|---|---|
| Married | 246 (82.83) | 51 (17.17) | 297 |
| Unmarried | 51 (96.23) | 02 (03.77) | 53 |
| Widowed | 22 (55.00) | 18 (45.00) | 40 |
| Divorcee/ Separated | 08 (80.00) | 02 (20.00) | 10 |
| Total | 327 | 73 | 400 |

(Chi Square=26.88, d.f.= 3, P < 0.001; highly significant)

**Table 4: Distribution of study subjects according to Body Mass Index (%)**

| Body Mass Index | Total | | Total |
|---|---|---|---|
| | Non-hypertensive (%) | Hypertensive (%) | |
| < 18.5 | 25 (92.59) | 02 (07.41) | 27 |
| 18.5-24.9 | 186 (92.08) | 16 (07.92) | 202 |
| 25-29.9 | 82 (58.91) | 37 (31.09) | 119 |
| ≥ 30 | 34 (55.38) | 18 (34.62) | 52 |
| Total | 327 | 73 | 400 |

(Chi Square=39.06, d.f.= 3, P < 0.001; highly significant)
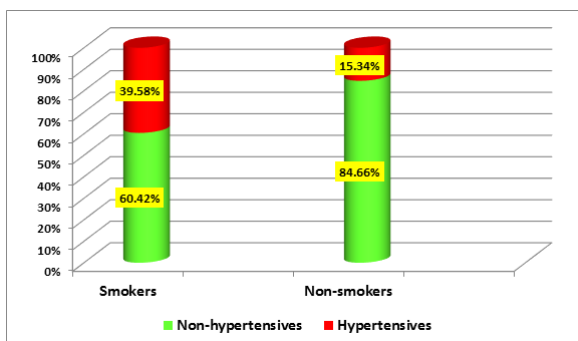


**Fig. 2: Association between smoking and hypertension**

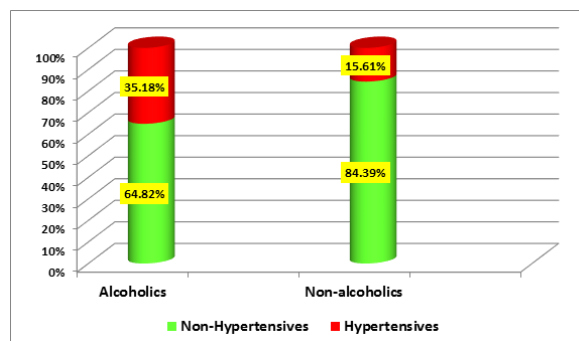(Chi Square=16.64, d.f.= 1, P < 0.001; highly significant)



**Fig. 3: Association between alcoholism and hypertension**

(Chi Square=12, d.f.= 1, P < 0.001; highly significant)

**Table 5: Distribution of study subjects according to family history of hypertension (%)**

| Family history of hypertension | Total | | Total |
|---|---|---|---|
| | Non-hypertensive (%) | Hypertensive (%) | |
| Yes | 83 (68.60) | 38 (31.40) | 121 |
| No | 244 (87.46) | 35 (12.54) | 279 |
| Total | 327 | 73 | 400 |

(Chi Square=20.12, d.f.= 1, P < 0.001; highly significant)

**Table 6: Distribution of study subjects according to family history of diabetes (%)**

| Family history of diabetes | Total | | Total |
|---|---|---|---|
| | Non-hypertensive (%) | Hypertensive (%) | |
| Yes | 30 (66.67) | 15 (33.33) | 45 |
| No | 297 (83.66) | 58 (16.34) | 355 |
| Total | 327 | 73 | 400 |

(Chi Square=7.732, d.f.= 1, P < 0.05; significant)

## Discussion

In the present study, the overall prevalence of hypertension in study subject was found to be 18.25%. The prevalence of hypertension increased gradually with increasing age. The difference was found to be highly significant (P < 0.001). Prevalence of hypertension in urban area was reported different in different studies. Pooja et al[9] reported the overall prevalence of hypertension was 38.5% in an Urban Area of Uttarakhand. Chandwani H et al[10] reported prevalence of 24% among adults in the urban area of Jamnagar, Gujarat. Mandal PK et al [11] reported prevalence of hypertension of 19.8% among adult in an urban area of Kolkata. Our findings are comparable with these studies. Similar finding of statistically significant increase in prevalence of hypertension with increasing age was observed in other studies. Gupta M et al[12] found that the percentage in the age group of 20 to 30 years was lowest (15.7%) among hypertensive population whereas this percentage increased as the age advanced. The trend between increasing age and hypertension was found to be statistically significant. Mahmood S E et al[13] found that the proportion of hypertension also showed an increasing trend with age. Prevalence of hypertension was significantly (P < 0.05) higher among individuals aged 40 years and above (20.0%) as compared to those aged below 40 years (7.4%). In our study we observed that prevalence of hypertension was slightly higher in males (20.54%) than in females (16.28%). However the findings were statistically not significant. Similar findings were also reported by Reddy SS et al.[14] He reported that proportion of hypertension in males was slightly higher (9.6%) compared to that in females (7.6%) but the difference was not statistically significant.

Undhad AM et al[15] also found that sex was not significantly associated with prevalence of hypertension. Mahanta TG et al[16] found that association of sex with hypertension was found to be insignificant. In the present study the number of hypertensive cases increased gradually with higher socioeconomic class. The difference was found to be statistically significant (P < 0.05). Similar findings were observed in study done by Khadilkar HA et al.[17] Similar significant association between socioeconomic status and prevalence of hypertension found in study done by Rajasekar VD et al.[18] In other studies done by Mahmood SE et al[19] and Kalavathy MC et al,[20] insignificant association between prevalence of hypertension and socioeconomic status was found. We noticed that number of hypertensive cases were highest among individuals educated up to postgraduate i.e. 34.04% followed by prevalence in individuals educated up to graduate i.e. 21.00% and was minimum in illiterate individuals i.e. 6.66%. The prevalence of hypertension also increased significantly with the increase in literacy status (p < 0.05). The reason for higher prevalence of hypertension among highly educated people could be the related stress and tension due to sophisticated job. Similar findings were reported by Khadilkar HA et al.[17] He observed that the prevalence of hypertension also increased significantly with the increase in literacy status as prevalence of hypertension was highest (33.33 %) among postgraduate and least (3.38%) among Illiterate. In contrast to our findings, Manimunda SP et al[21] found that increasing trend in the prevalence of hypertension with decreasing educational status ($\chi^2$ for linear trend = 25.55, P< 0.001) was statistically significant. He found that prevalence of hypertension among illiterate subjects was 59.8% and it was 10.2% among subjects who went to college. Gupta PC et al[22] also observed significant decrease in hypertension with educational status in females (P < 0.01), while the trend is not significant in males. Table 3 shows that hypertensive cases were maximum in widowed individuals i.e. 45% while in divorcee/separated individuals were 20% and least in unmarried i.e. 3.77%. The difference was found to be statistically highly significant (P < 0.001). The possible reason for higher prevalence of hypertension among widowed subjects could be combined effect of tension due to loss of spouse and stress of familial problems on single parent. Similar significant increased the risk of hypertension in subjects not living with spouse was observed by Hazarika NC et al.[23] Also Mandal PK et al[11] found that marital status was significantly associated with hypertension (p< 0.011). In contrast to above studies, Midha T et al[24] found no significant association between marital status and hypertension (p = 0.213). Table 4 shows that prevalence of hypertension was minimum in individuals with Body Mass Index less than 18.5 i.e. 7.41%, The prevalence goes on increasing with increase in Body Mass Index and is maximum in individuals with BMI more than 30 (34.62%), The

difference was statistically highly significant (P < 0.001). This shows strong and statistically significant association between obesity and prevalence of hypertension. Similar findings were reported by Midha T et al.[25] She found that, 6.8% of the underweight subjects and 16.7% of the normal subjects (BMI = 18.5-25 kg/m²) were hypertensive, as compared to 50.0% of Grade I overweight and 68.4% of Grade II overweight subjects. These differences were statistically significant (p < 0.0001). Also Gothankar JS[26] found association of obesity and hypertension statistically significant as out of 22 individuals with BMI ≥ 25, 14 (63.64%) were hypertensives and among 31 individuals with BMI < 25, 9 (29.03%) were hypertensives. Sagare SM et al[27] found significant association between hypertension and BMI. In his study, 18.79 % of hypertensives were having BMI > 25 and 81.21% of hypertensives were having BMI ≤ 25. (Table 5 and 6) shows that hypertension was found significantly more among individuals with family history of hypertension (31.40%) and family history of diabetes (33.33%). This can be attributed to common genetic background, shared environment and lifestyle habits. Similar findings of significant association were observed by Singh RB et al.[28] In his study, family history of hypertension was significantly greater among subjects with prehypertension and hypertension when compared with those with normal blood pressure (p < 0.01). He found that, 1.7% of normotensive females, 9.8% hypertensive females, 3% of normotensive males and 9.8% hypertensive males have family history of hypertension. Also Kamlesh Kumar et al[29] found that family history of elevated BP is one of the strongest risk factors for the future development of hypertension in individuals. Chandra SK et al[30] and Pooja et al[9] found insignificant association of family history of hypertension in contrast to our finding. Similar significant association with family history of diabetes was observed by Mandal PK et al.[11] In his study, family history of diabetes was present in 75.9% of hypertensives and 24.1% of normotensives. Family history of diabetes was absent in 13.9% hypertensives and 86.1% of normotensive. Prevalence of hypertension was high among the persons who had family history of diabetes (75.9%). Family history of diabetes was significantly associated with hypertension (p < 0.0001). Figure 2 and 3 shows that prevalence of hypertension is more in smokers (39.58%) and alcoholics (35.18%), in both cases difference was highly significant. Similar significant association was observed in study done by Tiwari RR,[31] Das SK et al[32] and Gupta S et al.[33] Contrast findings have been reported on smoking and hypertension (insignificant association) by Undhad AM et al[15] and Mandal CR et al.[34] Significant association between hypertension and alcohol intake were reported by various studies like Sagare SM et al[27] and Chandwani H.[10] While Kokiwar PR[35] and Chandra Sekhar K[30] reported no significant association between alcohol intake and hypertension.

## Conclusion

The overall prevalence of hypertension in study was 18.25%. It was 22% in non-slum & 14.5% in slum population. Prevalence of hypertension was maximum in ≥ 60 years (51.85%) & minimum in 20-29 years (0.85%). Prevalence of hypertension was higher in males (20.54%) than females (16.28%). Prevalence of hypertension goes on increasing with socioeconomic status, lowest in class V (10.34%) & highest in class I (28.23%). Prevalence of hypertension was highest among individuals educated up to postgraduate (34.04%) &minimum in illiterate individuals (6.66%). The prevalence of hypertension was maximum in widowed individuals (45%), minimum in unmarried (3.77 %). Only 7.41% individuals amongst those with BMI < 18.5 were Hypertensive, while 34.62 % of those having BMI of ≥ 30 were Hypertensive. Hypertension was found significantly more among individuals with family history of hypertension (31.40%) and family history of diabetes (33.33%).

## Recommendation

'High risk' screening programmes should be implemented, especially targeting at individuals at risk of developing hypertension like elderly people, diabetic individuals, smokers, alcoholic, individuals with family history of hypertension, etc. Awareness campaign through good quality Information Education and Communication (I.E.C) activities should be carried out to sensitize the hidden hypertensive's to get themselves examined, detected as hypertensive and treated at appropriate time. People with higher socio-economic status, high educational status, smokers and living in families with distorted relations should be kept under surveillance for early detection of hypertension.

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