## Original Research Article

# Strengthening opportunistic screening for hypertension: report from a tertiary care institution in a district of West Bengal, India

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**ABSTRACT**

**Background:** Hypertension is a major public health problem in India and considered as a silent killer disease. The national program for prevention and control of cancer, diabetes, CVD and stroke (NPCDCS) recommended opportunistic screening for hypertension at all levels health facility. The present study was conducted with the objectives to estimate the magnitude of hypertension among the General OPD attendees aged 18 years and above in tertiary care hospital in a district of West Bengal and to find out the factors influencing hypertension among them.
**Methods:** The study was a hospital based observational, descriptive study with cross sectional design and conducted among 244 study participants in 2018. Study variables included socio demographic factors and both modifiable and non-modifiable risk factors for hypertension.
**Results:** In this study 40.2% subjects had normal blood pressure, 18.4% were known hypertensive and 101 (41.3%) people were newly diagnosed as having high blood pressure. Among known hypertensive, 75% had poor control of hypertension. Age, religion, family history of hypertension, body mass index (BMI) and central obesity had significant association with hypertension.
**Conclusions:** The study recommended strengthening of opportunistic screening of all patients for hypertension at all levels of health care, especially through the village health nutrition day platform and providing treatment free of cost. Awareness generation and counselling for lifestyle modification should also be strengthened.

**Keywords:** Blood pressure, Hypertension, Opportunistic screening

## INTRODUCTION

According to WHO 2002 report, cardiovascular diseases (CVD) will be the leading cause of death and disability in India by 2020.[1] Currently Indians experience deaths due to CVD a decade earlier than their counterparts of the countries with established market economy. Nearly half of these deaths are likely to occur in young and middle aged individuals (30-69 years).[1] The contributing factors for this rising burden of CVDs are cardiovascular risk factors especially increasing occurrence of hypertension, dyslipidaemia, diabetes, overweight or obesity, physical inactivity and tobacco use.

Hypertension is a major public health problem in India and its prevalence is rapidly increasing among both urban and rural populations. It is estimated that the prevalence of hypertension ranges from 20-40% in urban adults and 12-17% among rural adults in Indian population.[2,3] But in considerable proportion of people, the disease remains undetected due its asymptomatic characteristics, thus considered as a silent killer.[4] Hypertension is readily

detectable and treatable, but unless done it can lead to serious complications. Other than coronary heart disease and stroke, its complications include heart failure, peripheral vascular disease, renal impairment, retinal haemorrhage, and visual impairment.[3]

The National Program for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NPCDCS) identifies hypertension as major risk factor for CVD and promotes opportunistic screening of blood pressure of all people above 30 years of age. The program also envisages free of cost treatment at all levels of heath care. A large number of prevalence studies have been conducted in India at community level in different regions covering both urban and rural areas.[2,3,4] However scant data is available about the undetected burden or missed cases of hypertension at OPD setting, where people present with several complaints or morbidity unrelated to hypertension.

The present study was conducted in the General OPD of a Government medical college situated in a district of West Bengal, catering to a huge footfall of patients daily. The objectives were to estimate the magnitude of hypertension among the General OPD attendees aged 18 years and above and to find out the factors influencing hypertension among them.

## METHODS

### Study setting

Murshidabad is a district situated in West Bengal about 180 kms away from Kolkata. As per official census 2011 and population data 2019 of Murshidabad district, Muslims are majority in this district. Total population of Murshidabad district is 7,103,807 as per census 2011. Muslims constitutes 66.27% of this district population.[5]

The only Medical College situated in this district has an average daily OPD census of 5000 to 6000 patients, who not only come from Murshidabad but also from the adjacent districts for seeking health care. The study was conducted in the general OPD of this Government medical college in the month of February 2018. The study was approved by the Ethics committee of the institution.

### Study design

This study was a hospital based observational descriptive study with cross sectional design.

### Study population

The study population was the 18 years and above adult attendees of the General OPD. The severely ill or non-responding attendees were excluded from the study.

### Study tools

The study population was interviewed with a schedule modified and pretested following WHO stepwise approach to chronic disease risk factor surveillance (STEPS), after obtaining informed consent. Study variables included socio demographic characteristics of the study participants and both modifiable and non-modifiable risk factors of hypertension.

### Sampling and sample size determination

The sample size was calculated using the formula,

$$\frac{Z_{a/2}{}^2 \times p(1-p)}{l^2}$$

Considering the proportion (p) of hypertension as 44.46% from a similar facility based study in urban Lucknow, a relative precision (l) of 15% and 95% confidence interval, sample size came was estimated to be 231.[6] The ultimate sample size was calculated as 244, considering a non-response rate of 15%.

During pretesting of the schedule it was observed that data collection and examination of each patient took an average of 20 minutes to complete and roughly 10 patients could be covered in each day during OPD hours. In 25 consecutive OPD days, study sample was selected by taking the first 10 patients from the OPD register based on eligibility criteria.

### Study technique

The interview of the study participants was followed by anthropometric measurements by standard procedures and standardized instruments. Weight was measured by bathroom scale having an accuracy of 0.5 kg and height was measured by using a steel anthropometry rod with accuracy of 0.1 cm using standard techniques. BMI was calculated by the formula of weight (kg)/ height (m)[2]. For Asian Indian population, 18.5 to 22.9 BMI is normal, 23 to 24.9 is considered as overweight and BMI of ≥25 is considered as obesity.[7] Blood pressure was measured two times on the right arm of the study subjects using aneroid sphygmomanometer (OMRONHEM-7261). The average of two readings was used. Waist circumference (in cm) was measured using a non-stretchable measuring tape at the plane lying in between the lowest point of rib cage and the highest point of iliac crest. Waist circumference is an important measurement of central obesity and it should be <90 cm for men and <80 cm for women.[7]

Hypertension was defined as systolic BP level of ≥140 mmHg and/or diastolic BP level of ≥90 mmHg or being previously diagnosed as hypertensive by any health professional following JNC VIII classification. The people who were falling between 120-139 mmHg systolic BP and 80-89 mmHg diastolic BP was defined as pre-

hypertension. Those on anti-hypertensive medication were considered as hypertensive.[8]

Socio economic class categorization was done by using Modified BG Prasad classification according to all India consumer price index (AICPI) for the month of January 2014.[9] Physical activity was measured by taking the history of exercise in any form in last week and ≥150 minutes/week was considered as adequate.[7] Sleep was considered to be adequate if a subject slept 8 hours or more per day. Similarly intake of fruits and junk food were assessed by taking history of consumption in last week. Extra oil consumption was measured by household level per capita consumption of 30 ml or more per day.

*Data analysis and compilation*

The data were compiled in the master table in MS Excel in coded form and analyzed by SPSS (statistical package for the social sciences) 16 calculating simple proportions. Statistical tests like Chi-square and logistic regression were performed to find out the association of different variables with hypertension. A significance level of 0.05 was used.

## RESULTS

It was evident from the Table 1 that the study subjects were mostly in the age group of 30-59 years, females, Muslim by religion, illiterate, married and coming from rural background with lower socio economic status. By occupation most of them were homemakers as there was a preponderance of females in the study population.
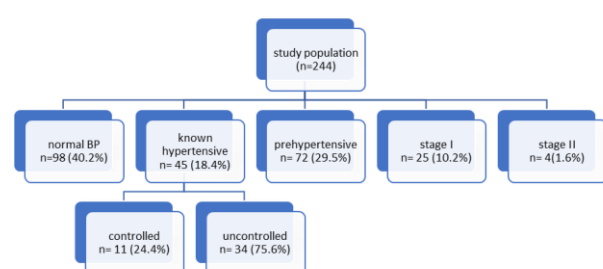


**Figure 1: Flow chart of the study population as per blood pressure status.**

Out of the total study population, 40.2% had normal BP and 18.4% were known hypertensive. In this study 101 (41.3%) people were newly diagnosed as having high blood pressure as per JNC VIII criteria detected by the opportunistic screening. Again among the known hypertensive patients, alarmingly BP was not controlled in 75% subject (Figure 1).

The proportion of pre-hypertension and hypertension were seen to be highest amongst the young people (18-29 years) and geriatric age group respectively (Table 2).

**Table 1: Background characteristics of the study population (n=244).**

| Study variables | No. | % |
|---|---|---|
| **Age (in years)** | | |
| 18-29 | 48 | 19.60 |
| 30- 44 | 88 | 36.87 |
| 45-59 | 86 | 34.22 |
| ≥60 | 22 | 9.01 |
| **Gender** | | |
| Male | 105 | 43.03 |
| Female | 139 | 56.97 |
| **Religion** | | |
| Hindu | 60 | 24.59 |
| Muslim | 184 | 75.41 |
| **Residence** | | |
| Urban | 12 | 4.92 |
| Rural | 232 | 95.08 |
| **Educational status** | | |
| Illiterate | 130 | 53.28 |
| Up to middle school | 72 | 29.51 |
| Secondary and above | 42 | 17.21 |
| Marital status | | |
| Married | 218 | 89.34 |
| Unmarried/widow/separated | 26 | 10.66 |
| **Economic status** | | |
| Class I | 8 | 3.28 |
| Class II | 24 | 9.84 |
| Class III | 43 | 17.63 |
| Class IV | 90 | 36.88 |
| Class V | 79 | 32.37 |
| **Occupation** | | |
| Agriculture labour | 58 | 23.76 |
| Services | 9 | 3.69 |
| Business | 15 | 6.15 |
| Skilled worker | 15 | 6.15 |
| Unskilled worker | 15 | 6.15 |
| Homemaker | 125 | 51.29 |
| **Student and unemployed** | 7 | 2.81 |
| Addiction | | |
| Present | 153 | 62.7 |
| Absent | 91 | 37.3 |

While pre-hypertension decreased with age, hypertension was found to increase with age and the difference was noted to be highly significant. Hypertension and prehypertension combined was found to be more among Hindus (68%) compared to Muslims (59%) and the difference was significant. It was also found that hypertension was significantly more among the individuals having family history of hypertension, sedentary lifestyle and obesity with central obesity. No association was found with gender, literacy, economic status, physical activity and sleep hours.

**Table 2: Distribution of normal, pre-hypertension and hypertensive study population according to sociodemographic, anthropometric and behavioural risk factors (n=244).**

| Study variables | Normal BP (n=98) | Pre-hypertension (n=72) | Hypertension (n=74) | $\chi^2$ ;df; p value |
|---|---|---|---|---|
| **Age in years** | | | | |
| 18-29 | 24 (50) | 22 (45.84) | 2 (4.16) | |
| 30-44 | 42 (47.74) | 23 (26.13) | 23 (26.13) | |
| 45-59 | 29 (33.71) | 21 (24.41) | 36 (41.8) | $\chi^2$=33.7; df=5; |
| ≥60 | 3 (13.63) | 6 (27.28) | 13 (59.09) | p=0.000 |
| Total | 98 (40.16) | 72 (29.51) | 74 (30.32) | |
| **Gender** | | | | $\chi^2$=0.13; df=2; |
| Male (n=105) | 42 (40) | 30 (28.57) | 33 (31.42) | p=0.937 |
| Female (n=139) | 56 (40.28) | 42 (30.21) | 41 (29.49) | |
| **Religion** | | | | $\chi^2$=8.10; df=2; |
| Hindu (n=60) | 19 (31.67) | 14 (23.33) | 27 (45) | p=0.01 |
| Muslim (n=184) | 79 (42.93) | 58 (31.52) | 47 (25.55) | |
| **Literacy status** | | | | $\chi^2$=1.82; df=2; |
| Illiterate (n=130) | 51(39.23) | 35 (26.92) | 44 (33.85) | p=0.401 |
| Literate (n=114) | 47 (41.23) | 37 (32.45) | 30 (26.32) | |
| **Economic status** | | | | |
| Upper (n=33) | 13 (39.4) | 9 (27.27) | 11 (33.33) | $\chi^2$=1.10; df=4; |
| Middle (n=43) | 20 (46.51) | 12 (27.9) | 11 (25.59) | p=0.894 |
| Low (n=168) | 65 (38.69) | 51 (30.35) | 52 (30.96) | |
| **Family H/O hypertension** | | | | $\chi^2$=16.99; df=2; |
| Present (n=45) | 10 (22.22) | 10 (22.23) | 25 (55.55) | p=0.000 |
| Absent (n=199) | 88 (44.22) | 62 (31.15) | 49 (24.63) | |
| **Type of work** | | | | |
| Heavy (n=37) | 15(40.5) | 10 (27.1) | 12 (32.4) | $\chi^2$=15.8; df=4; |
| Moderate (n=138) | 62(44.9) | 47 (34.1) | 29(21.0) | p=0.003 |
| Sedentary (n=69) | 21 (30.44) | 15 (21.74) | 33 (47.82) | |
| **BMI normal and under** | | | | |
| Weight (n=100) | 45 (45) | 28 (28) | 27 (27) | $\chi^2$=15.77 df=4 |
| Obese (n=97) | 28 (28.87) | 28 (28.87) | 41 (42.26) | p=0.003 |
| Overweight (n=47) | 25 (53.19) | 16 (34.05) | 6 (12.76) | |
| **Waist circumference** | | | | $\chi^2$=13.11; df=2; |
| Normal (n=147) | 68 (46.2) | 47 (32) | 42 (28.3) | p=0.001 |
| Abnormal (n=97) | 30 (30.9) | 25 (25.8) | 42 (43.3) | |
| **Physical activity** | | | | |
| <150 mins/week (n=55) | 20 (36.36) | 17 (30.92) | 18 (32.72) | $\chi^2$=0.437; df=2; p=0.804 |
| ≥150 mins/week (n=189) | 78 (41.27) | 55 (29.10) | 56 (29.63) | |
| **Sleep** | | | | $\chi^2$=5.13; df=2; |
| <8 hrs (n=163) | 60 (36.8) | 46 (28.3) | 57 (34.9) | p=0.07 |
| >=8 hrs (n=81) | 38 (46.9) | 26 (32.2) | 17 (20.9) | |
| **Associated co morbidity** | | | | $\chi^2$=4.25; df=2; |
| Present (n=40) | 11 (27.5) | 12 (30.0) | 17 (42.5) | p=0.119 |
| Absent (n=204) | 87 (42.6) | 60 (29.5) | 57 (27.9) | |
| **Tobacco use** | | | | $\chi^2$=2.554; df=2; |
| Present (n=78) | 28(35.9) | 21(26.9) | 29(37.2) | p=0.279 |
| Absent (n=166) | 70(42.2) | 51(30.7) | 45(27.1) | |
| **Alcohol use** | | | | $\chi^2$=2.38; df=2; |
| Present (n=16) | 8 (50) | 2 (12.5) | 6 (37.5) | p=0.304 |
| Absent (n=228) | 90 (39.47) | 70 (30.70) | 68 (29.83) | |

Though hypertension was seen to be more common among the tobacco users (both smoking and non-smoking) than non-users and with associated co morbidities like diabetes and cardiovascular diseases, however the difference was not statistically significant.

Table 3 depicted the relationship of hypertension with dietary pattern of the study population, but no association was found with intake of extra salt, oil and junk food.

**Table 3: Distribution of normal, prehypertension and hypertensive study population according to dietary pattern (n=244).**

| Study variables | Normal BP (n=98) | Pre-hypertension (n=72) | Hypertension (n=74) | $\chi^2$; df; p value |
|---|---|---|---|---|
| **Extra salt** | | | | |
| Yes (n=62) | 24 (38.7) | 16 (25.8) | 22 (35.5) | $\chi^2$=1.15; df=2; p=0.560 |
| No (n=182) | 74 (40.66) | 56 (30.76) | 52 (28.58) | |
| **Extra oil** | | | | |
| Yes (n=64) | 28 (43.85) | 17 (26.57) | 19 (29.68) | $\chi^2$=0.545 df =2; p=0.762 |
| No (n=180) | 70 (38.6) | 55 (30.7) | 55 (30.7) | |
| **Junk food** | | | | |
| Yes (n=139) | 58 (41.72) | 45 (32.38) | 36 (25.9) | $\chi^2$=3.18; df=2; p=0.203 |
| No (n=105) | 40 (38.1) | 27 (25.71) | 38 (36.19) | |
| **Fruits** | | | | |
| Yes (n=43) | 17 (39.54) | 14 (32.56) | 12 (27.90) | $\chi^2$=0.271; df=2; p=0.873 |
| No (n=201) | 81 (40.29) | 58 (28.86) | 62 (30.85) | |

The explained variation in the model ranged from 9.0% to 12.2% (Table 4). Age (p=0.008) and family history of hypertension (p=0.046) contributed significantly to the model prediction while high BMI or waist circumference, sedentary lifestyle and religion did not add significantly to the same. The odds of having high BP were 2.23 and 1.2 times higher among those with a positive family history and engaged in sedentary type of activity respectively, compared to those who did not. However it was not contingent as far as the other variables were concerned.

**Table 4: Binary logistic regression showing relationship of some selected variables with hypertension.**

| Study variables | B | S.E. | Wald | df | Sig. | Exp (B) |
|---|---|---|---|---|---|---|
| **Age** | -0.426 | 0.161 | 6.983 | 1 | 0.008 | 0.653 |
| **Type of activity** | -0.186 | 0.336 | 0.307 | 1 | 0.580 | 1.204 |
| **BMI** | -0.196 | 0.312 | 0.397 | 1 | 0.529 | 0.822 |
| **Waist circumference** | -0.492 | 0.331 | 2.206 | 1 | 0.138 | 0.612 |
| **Religion** | -0.425 | 0.336 | 1.602 | 1 | 0.206 | 0.654 |
| **Family H/O hypertension** | -0.805 | 0.404 | 3.968 | 1 | 0.046 | 2.236 |
| **Constant** | -0.169 | 0.627 | 0.072 | 1 | 0.788 | 1.184 |

## DISCUSSION

This hospital based cross sectional study had detected large number of pre-hypertensive and hypertensive cases (101) among the adult population of 18 years and above by opportunistic screening in the general OPD. Out of total 101 newly diagnosed cases, 72 were pre-hypertensive and 29 had hypertension. Moreover the study also identified 45 known hypertensive cases among whom 34 (75%) were having uncontrolled hypertension. NPCDCS has also recommended opportunistic screening for NCDs at all facility levels of health care.[7]

### *Burden of hypertension*

The present study observed 30.2% population as hypertensive, which was seen to be lower than the study conducted in the urban health centre at Kolkata.[10] (46%) and in the same setting of Lucknow (44.5%).[6] In community based studies conducted in urban Varanasi and urban Raichur in Andhra Pradesh, the prevalence was shown to be 32.7% and 33.6% respectively.[11,12] The reason for the variation of the findings might be due to the rural background and lower age group of the study population in the present study. Although increasing trend of hypertension had been reported worldwide, but a systematic review and meta-analysis on hypertension in

India done in 2014 revealed significant difference in prevalence of hypertension between rural and urban parts of India [27.6% (23.2- 32.0) and 33.8% (29.7- 37.8), p= 0.05].[13] Regional estimates had also shown the prevalence as 31.7% (30.2- 33.3) in rural eastern part of India. This corroborates the findings of the present study, although it is not a prevalence study.

The present study revealed 29.2% of cases of prehypertension. This is also compatible with studies conducted in Lucknow (29.3%), but not at par with urban Varanasi and Raichur (nearly 42-45%).[6,11,12] Among the known hypertensives about 75% had uncontrolled blood pressure. This is enormously high in comparison to the meta-analysis results showing the pooled estimate for percentage of hypertensive patients having their BP under control in rural and urban India was 10.7 (6.4-15.0) and 20.2 (11.6-28.8), respectively.[13] Two studies conducted in Varanasi found the percentage of control as 35% and 40%.[11,14] Jaipur heart study had highlighted that the treatment and control of blood pressure was largely dependent on the age, gender, economic status and educational level of the study population. In the present study poor economic status and low educational level might be the contributing factors for poor control.[15]

### Socio demographic risk factors

In the present study proportion of hypertension increased with advancing age and seen to be highest among the geriatric age group (59%) and the difference was found to be significant. This finding is also coherent with the study in Lucknow and other community based studies conducted in Raichur and Varanasi, who also had shown the increase of blood pressure with age.[6,11,12] Such changes might be due to the changes in the vascular system. But a hospital based study in Dhaka had observed hypertension being highest among 35- 54 years (49%).[16]

Proportion of hypertension was seen to be little higher among males compared to females (31% vs 29%) in the present study. Comparable observations were also reported from the studies in urban Mumbai, Lucknow and Dhaka, whereas proportion was more in males in the community based studies of Raichur[12] and Lucknow.[6,12] [16-18] The variation of findings in different places might be due to difference in socio-cultural, behavioural and lifestyle factors.

The present study observed hypertension as significantly more among Hindus (45%) compared to Muslims (25%), although three fourth of the OPD attendees were Muslims. Similar picture was seen in the study conducted in Aurangabad, whereas higher proportion of hypertension among Muslims was shown in Lucknow.[6,19] The study also found higher proportion of hypertension among illiterates. Several studies had similar findings.[11, 20,21] It can be speculated that higher education imparts awareness among individuals which ultimately inculcates healthy lifestyle. Few studies had found higher economic status that is affluence as a risk factor for hypertension, where the present study did not find any relation of hypertension with economic status.[11,20] This is corroborating with the findings of the studies conducted in rural Delhi and Aurangabad.[19,22] Like almost all other studies, the present study observed significant association of hypertension with presence of family history among the study population.[12,20]

Modifiable risk factors like obesity as detected by BMI and central obesity as revealed by waist circumference were seen significantly more among the hypertensive patients in the present study. The study at Varanasi, Delhi had also same observations.[11,22] The study also found significantly more hypertension among sedentary workers than moderate and heavy, but astonishingly did not find any relation with physical activity. The study at Raichur had similar observation, where Varanasi has found inverse relationship of hypertension with activity. Unlike the study at Aurangabad, the present study did not observe any relationship with the hours of sleep.[11,12,19]

As per WHO report, alcohol consumption was the third largest risk factor in the developed countries and tobacco use was being the second major cause of death worldwide.[23] Tobacco consumption in the form of smoking and chewing as well as alcohol intake are considered as risk factors for hypertension in several studies in last decade.[11,12,20] The present study however did not find any relationship with tobacco use like the study of Aurangabad, Jammu and rural Delhi.[19,21,22] The current study also tried to assess association of co morbidities like diabetes or cardiovascular diseases with hypertension, but did not note any such relationship. But study conducted in Kathmandu municipality found significant association with diabetes.[20]

The present study also made an effort to find out the association of several dietary factors like vegetarian or non-vegetarian diet, extra salt or oil intake, junk food consumption and intake of fruits with hypertension. Study in urban Varanasi had found vegetarian food as protective for hypertension and the study in Kathmandu found no association with type of food.[11,20] Dietary pattern of the present study population was predominantly non vegetarian type, hence no inference could be drawn here. But the present study also didn't find any association with extra salt or oil, junk food or fruits intake. However study conducted in Mysore, Raichur and Aurangabad had found association with salt.[12,19,24]

Multivariate logistic regression in the present study showed significant association of hypertension with age and family history, similar to the study in Lucknow.[6] Study in Kathmandu had seen significant relationship with smoking, alcohol, physical activity and presence of diabetes, where as a study in rural Delhi had found association only with age, education and cholesterol level.[20,22]

## CONCLUSION

Opportunistic screening of hypertension cases has been given stress in all facility levels in NPCDCS. The present study also had identified large number of high blood pressure cases at the OPD setting and arranged treatment of them. Regarding modifiable and non-modifiable risk factors, age, religion, family history, obesity, type of work and central obesity were significantly associated with hypertension here.

### *Recommendations*

A more elaborate study with greater sample size in the OPD setting or at community level might highlight more information about the hypertension cases in this district of West Bengal. National Family Health Surveys and National Statistical Survey Organization Surveys should focus on hypertension screening and referral. All attendees of the General OPD should be screened for hypertension and managed accordingly. For routine measurement of blood pressure, an OPD assistant or G.N.M may be deployed. A trained counselor may be deployed in the General OPD to counsel the high risk individuals and those with raised blood pressure regarding lifestyle modifications and regular monitoring of Blood pressure. Hypertension is a lifestyle disease-thus awareness generation regarding the risk factors and health promotion can be done through display of IEC materials in the OPD. Primary health care infrastructure for prevention and management of hypertension needs to be strengthened as envisaged in the National Program with provision for opportunistic screening through village health and nutrition day (VHND) platform because a rural preponderance of patients were observed in the study. This will help to reduce the tremendous burden on the tertiary health care and ensure a better control of this colossal problem.

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