Original Research Article

Prevalence of pre-hypertension and hypertension and its correlates among rural adult population in district Jhansi, Uttar Pradesh

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ABSTRACT

Background: The prevalence of hypertension is on a rise in India, both in urban and rural areas. Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries. Aims and objectives was to find out the prevalence of pre-hypertension and hypertension among persons above 18 years of age in rural area of Jhansi and to assess the association of different risk factors with pre-hypertension and hypertension.
Methods: Study was conducted in the field practice area of Department of Community Medicine, MLB Medical College, Jhansi, Uttar Pradesh. Total 1100 participants were collected by house to house visit. Chi square and multivariate logistic analysis were used to assess the association.
Results: Prevalence of prehypertension and hypertension was 24.2% and 19.3% respectively in our study. The factors identified as increasing the risk of developing hypertension were increasing age, family history of hypertension, inadequate physical activity, excess salt intake, tobacco consumption, alcoholism, BMI >25 kg//m^2, less consumption of fruits and vegetables.
Conclusions: Awareness of the hypertension status among hypertensive cases, counselling of the pre-hypertensives and hypertensives on lifestyle modification as well as regular treatment of antihypertensive medicine were key recommendations to prevent hypertension.

Keywords: BMI, Hypertension, Prehypertension

INTRODUCTION

The percentage of people affected by non-communicable diseases (NCDs) is increasing among adults in both high income and developing countries. According to the world health statistics report 2018, analysis of the world wide mortality data of the year 2016, of the 57 million deaths in that year, 41 million (71%) were due to non-communicable diseases.[1] The case load due to these diseases is increasing unequally in developing and underdeveloped countries. Adults of low and lower income countries faced the highest risk 21% and 23% respectively, almost double the rate for adults in high income countries 12%.

Most of these deaths occurred before 70 years of age in these countries. Cardiovascular diseases causes most of the deaths (44%) due to non-communicable diseases.[2] Hypertension is a major risk factor for coronary heart disease, ischemic as well as haemorrhagic stroke. Hypertension has been shown to be continuously and positively related to the risk of diseases in heart. Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries.[3] Analysis of world wide data showed that in the year 2010, 9.4 million deaths and 3.7% of total DALYS were due to hypertension.[4] Previously communicable diseases were the most common pathological processes affecting the people of developing

countries especially of rural areas. With the rise of urbanization, there is increase in sedentary lifestyles, tobacco smoking, lack of physical activity, unhealthy diet intake, harmful use of alcohol etc., which are the risk factors of hypertension.[5] Hypertension is an asymptomatic condition, symptoms do not arise unless the complications develops which result in delayed diagnosis and treatment especially among the uneducated and unexplained social groups such as rural population.

The eighth report of Joint National Committee on Prevention, Detection, Evaluation and Treatment of high blood pressure (JNC-8) defines hypertension as blood pressure ≥140/90 mmHg. Persons with blood pressure above optimal levels, but not clinical hypertension (systolic blood pressure of 120-139 mmHg or diastolic blood pressure of 80-89 mmHg) are designated as having "prehypertension".

Pre-hypertension is not a disease category, it is a designation chosen to identify people with increased risk of developing hypertension. It alerts both patients and doctors to the risk of developing hypertension and motivates them to prevent hypertension from developing. Hypertension was diagnosed as per US Eighth Joint National Committee on Detection, Evaluation and Treatment of Hypertension (JNC VIII) criteria.[6]

The prevalence of hypertension is on a rise in India, both in urban and rural areas. Review of epidemiological studies in India shows that the percentage of people affected by hypertension in the last 60 years has increased from 2% to 25% among people living in urban areas and from 2% to 15% among people living in rural areas of India. Studies show that deaths due to cardiovascular disease are highly variable in various regions of India. Compared to Northern states it is higher among southern states. In India, hypertension awareness, treatment and control status is low, with about 35% of urban and 20-25% of rural hypertensive patients only are aware of its presence in India.

Essential hypertension, which is a grossly underestimated condition in rural communities, is likely to be an important public health problem. As many interventional programmes for controlling high blood pressure were implemented the mean blood pressure has decreased in many developed countries. Present study will help to improve awareness about hypertension, its risk and control. Present study details will help authorities to plan and implement interventional programmes aimed at reducing the burden of hypertension and its complications in the study area.

The objective of the study was to find out the prevalence of pre-hypertension and hypertension among persons above 18 years of age in rural area of Jhansi and to assess the association of different risk factors with pre-hypertension and hypertension.

METHODS

Study was conducted in the field practice area of Department of Community Medicine, MLB Medical College Jhansi U. P. Jhansi district has 8 blocks in which 3 blocks (Moth, Badagaon, Chirgaon) are under our field practice area, out of which one block Chirgaon has been selected randomly. Five village panchayats were selected randomly to cover the required sample size. House to house visit was done to find the study subjects. It was a cross-sectional study conducted from April 2018- March 2019.

Sample size calculation

Based on previous studies (Esam et al), prevalence of hypertension is 27.2%.[7] Sample size is calculated using the formulae $N= 4pq/d^2$

By substituting the values in the above equation, N=1071 was calculated and round off it to be 1100, which will be our final sample size.

Sample selection

Informed consent was taken from the participants. Pretested semi structured interview schedule was applied by the investigator and their blood pressure, height and weight were recorded. First stage was done by simple random sampling. Chirgaon block area was selected. The list of all village panchayaths obtained from Chirgaon block office. Second Stage was done by convenience sampling. Five village panchayaths which were nearby our field practice area in the block, were selected. The selected village panchayaths are: Gulara, Dhamna buzurg, Aupara, Jarayai, Chhirauna. Third stage- study subjects were recruited by house to house visit. Starting from the first house, each house was visited and adults present were invited to be part of the study. 220 persons were included in the study from each Village panchayat.

Inclusion criteria

Adults aged >18 years of both sexes, residents of the selected area for >6 months and already diagnosed cases of hypertension were included.

Exclusion criteria

Persons not willing to participate in the study, persons absent for more than 3 visits, bedridden/severely ill patient (renal failure, liver failure and other cardiac problems), person not able to walk, talk, and incomprehent and pregnant women were excluded.

Ethical consideration

Ethical clearance was obtained by ethical committee of the MLB Medical College, Jhansi.

Anthropometric measurement

Height

For measuring the height, a portable height measuring board was used. The participant was asked to remove the foot wear, head gear and to stand on the board facing me with feet together, heels against the back board and knees straight; to look straight ahead and not tilt their head up so that their eyes are the same level as the ears. The measure arm was moved gently down into the head of the participant and was asked to breathe in and stand still. Then the height in centimetres at the exact point was recorded.

Weight

The weight of the participant was measured using a portable weighing machine. Weighing machine was put on a firm, flat surface. The initial reading in the weighing machine was set to zero prior to each measurement. The participants were asked to remove their footwear and socks before weighing. The participants were asked to step into scale with one foot on each side of the scale.

Body mass index

It was calculated by using the formula weight in kg/height in m^2. BMI and was classified based on WHO BMI classification for analysis.

Blood pressure

Blood pressure was measured using a standard mercury sphygmomanometer. The participant was allowed to sit quietly and rest for at least 15 minutes in a room before measurement. The measurement was done in sitting position with patients arm fully supported at the level of heart. Left arm of the participant was placed on the table with the palm facing upward. Clothing on the arm was rolled up. The cuff was applied. Stethoscope earpieces was put to ear and set to bell. Pulse at either brachial or radial artery was palpated. Cuff was inflated until unable to feel pulse. Listen for pulse sounds while deflating cuff slowly. Systolic blood pressure was recorded when the pulse was first audible. The diastolic blood pressure was recorded when the pulse sound disappears. Three blood pressure measurements were taken. During data analysis the mean of the second and third readings was calculated. The participant was asked rest for Five minutes between each of the readings.

Data analysis

Data was entered in Microsoft excel spread sheet and analysed using SPSS Version 20.0 (trial version). Chi square test was performed for association with pre hypertension and hypertension. P value<0.05 considered as significant.

RESULTS

Following JNC VIII classification the prevalence of pre hypertension in the current study was 24.2% and prevalence of hypertension was 19.3%. 56.5% of participants had normal blood pressure readings.

Table 1: Distribution of study population according to socio demographic characteristics.

Variable	Frequency (%)
Age group (years)	
18-25	388 (35.3)
26-35	253 (23)
36-45	220 (20)
46-60	137 (12.4)
>60	102 (9.30
Sex	
Male	608 (55.3)
female	492 (44.7)
Religion	
Hindu	935 (85)
Muslim	165 (15)
Others	-
Marital status	
Single	220 (20)
Married	805 (73.2)
Widow	75 (6.8)
Occupation	
Unemployed	102 (9.3)
Employed	202 (18.4)
Skilled	135 (12.3)
Unskilled	150 (13.6)
Housewife	260 (23.6)
Student	190 (17.3)
Retired	61 (5.4)
Socio economic status	
Class I	90 (8.2)
Class II	130 (11.8)
Class III	580 (52.7)
Class IV	256 (23.3)
Class V	44 (4)
Family type	
Nuclear	685 (62.3)
Joint	358 (32.5)
Third generation	57 (5.2)
Education	
Illiterate	68 (6.2)
Primary school	179 (16.3)
Secondary school	198 (18.3)
High school	156 (14.2)
Intermediate	302 (27.4)
Graduate and above	197 (17.9)

*Modified BG Prasad Classification 2018.

Out of 1100 respondents, 388 (35.3%) were less than 25 years of age. 253 (23%) belonged to the age group 26-35, 220 (20%) to the age group 36-45 and 137 (12.4%) belonged to the age group 46-60 years. 102 (9.3%) were

more than 60 years of age. Males constituted 608 (55.3%) and females 492 (44.7%) (Table 1). Majority of the study population belonged to the class III socio economic status. Most of the participants (62.3%) belonged to nuclear family. Majority had an educational qualification upto intermediate 302 (27.4%). There were 68 (6.2%) respondents who were illiterate. Most of the participants [260 (23.6%)] were housewives. Only 366 (33.3%) participants had more than 2 times intake of fruits and vegetables per day. 570 (51.8%) subjects have salt intake of >5 gm/day while 530 (48.2%) have <5 gm/day salt intake. Only 312 (28.4%) participants took extra salt during eating while 788 (71.6%) didn't take.

Table 2: Prevalence of prehypertension and hypertension and its association with different demographic variables.

Variable	Total (n=1100)	Normal (%)	PHTN (%)	HTN (%)	Test of significance
Sex					
Male	608	313 (51.5)	165 (27.1)	130 (21.4)	χ^2=14.21, p=0.0008*
Female	492	309 (62.8)	101 (20.5)	82 (16.7)	
Age group (years)					
18-25	388	298 (76.8)	58 (14.9)	32 (8.2)	
26-35	253	177 (67)	53 (20.9)	23 (9.1)	
36-45	220	94 (42.7)	71 (32.3)	55 (25)	χ^2=236.19, p=0.00001*
46-60	137	31 (22.6)	49 (35.8)	57 (41.6)	
>60	102	22 (21.6)	35 (34.3)	45 (44.1)	
Marital status					
Single	220	154 (70)	50 (22.7)	16(7.3)	
Married	805	426 (52.9)	204 (25.3)	175 (21.7)	χ^2=33.57, p=0.00001*
Widow	75	42 (56)	12 (16)	21 (28)	
Occupation					
Unemployed	102	53 (52)	30 (29.4)	22 (21.6)	
Employed	202	83(41.1)	68 (33.7)	51 (25.2)	
Skilled	135	78 (52)	46 (30.7)	26 (17.3)	
Unskilled	150	90 (66.7)	30 (22.2)	15 (11.1)	χ^2=97.1, p=0.000*
Housewife	260	151 (58.1)	49 (18.8)	60 (23.1)	
Student	190	149 (78.4)	27 (14.2)	14 (7.4)	
Retired	61	15 (29.5)	19 (31.3)	24 (39.3)	
Education					
Illiterate	68	43 (63.2)	18 (26.5)	7 (10.3)	
Primary school	179	133 (74.3)	24 (13.4)	22 (12.3)	
Secondary school	198	120 (60.6)	36 (18.2)	42 (21.2)	
High school	156	77 (49.3)	48 (30.8)	31 (19.9)	χ^2=76.9, p=0.000*
Intermediate	302	121 (40.1)	95 (31.4)	86 (28.5)	
Graduate and above	197	128 (64.9)	45 (22.9)	24 (12.2)	
Socio economic status					
Class I	90	61 (67.8)	18 (20)	11 (12.2)	
Class II	130	60 (46.1)	48 (36.9)	22 (16.9)	
Class III	580	345 (59.5)	115 (19.8)	120 (20.7)	χ^2=27.7, p=0.0005*
Class IV	256	129 (50.4)	75 (29.3)	52 (20.3)	
Class V	44	27 (61.4)	10 (22.7)	7 (15.9)	
Religion					
Hindu	935	516 (55.2)	237 (25.3)	182 (19.5)	
Muslim	165	106 (64.2)	29 (17.6)	30 (18.2)	χ^2=5.65, p=0.06
Others	0	0	0	0	
Family type					
Nuclear	685	387 (56.5)	165 (24.1)	133 (19.4)	
Joint	358	200 (55.9)	85 (23.7)	75 (20.4)	χ^2=4.12, p=0.3887
Third generation	57	35 (61.4)	18 (31.6)	6 (10.5)	

*Significant at p <0.05 level, PHTN = Prehypertension, HTN = Hypertension , χ^2= Chi square.

673 (61.2%) had inadequate level of physical activity while 427 (38.8%) had adequate level. Family history of hypertension was present in 381 (34.6%) participants while 719 (65.4%) had not. Most of the participants were not using tobacco in any form [872 (79.3%)] while 228 (20.7%) were tobacco users. Out of 228 tobacco users; 92 (40.3%) used cigarettes, 82 (36%) used beedi and 54 (23.7%) used smokeless tobacco such as khaini (surti), gutkha etc. 290 (26.4%) subjects were current alcohol drinker while 810 (73.6%) were non alcoholics.

Maximum proportion of hypertension was seen in the age group of >60 years. Prehypertensives have higher prevalence in the age group of 46-60 years. Prevalence of hypertension has increasing trend with age and this was statistically significant (p value<0.00001). Significant association of class II socioeconomic status was seen with

prehypertension. Prevalence of pre hypertension and hypertension was higher among the males and it was statistically significant (p=0.0008) (Table 2). Statistical association was also seen when adjusted effect of gender on prehypertension (p=0.0005) and hypertension (p=0.007) was observed by binary analysis. Participants who took added salt other than used for cooking have higher prevalence of pre hypertension and hypertension compared to those participants who didn't take added salt and it was statistically significant (p<0.00001).

A significant association was seen with tobacco users and alcoholics with prehypertension and hypertension (p= 0.00007, and 0.00003) respectively. Pre hypertension and hypertension was higher among the overweight and obese people compared to people with normal BMI and it was statistically significant (p= 0.03) (Table 3).

Table 3: Prevalence of prehypertension and hypertension and its association with different behavioral risk factors.

Variable	Total (n=1100)	Normal (%)	PHTN (%)	HTN (%)	Test of significance
Tobacco user					
Yes	220	100 (43.8)	70 (30.7)	58 (25.4)	χ^2=18.91, p=0.00007*
No	872	522 (59.9)	196 (22.4)	154 (79.3)	
Alcohol intake					
Yes	290	131 (45.2)	87 (30)	72 (24.8)	χ^2=20.82, p=0.00003*
No	810	491 (60.6)	179 (22.1)	140 (17.3)	
Physical activity					
Adequate	427	265 (62.1)	98 (23)	64 (14.9)	χ^2= 10.83, p=0.004*
Inadequate	673	357 (53)	168 (25)	148 (22)	
Salt intake					
Less than 5 gm per day	530	342 (64.5)	101 (19.1)	87 (16.4)	χ^2=26.97, p=0.00001*
More than 5 gm per day	570	280 (49.1)	165 (28.9)	125 (22)	
Fruit and vegetable intake					
Less than 2 times a day	734	339 (46.2)	220 (30)	175 (23.8)	χ^2= 96.36, p=0.00001*
More than 2 times a day	366	283 (77.3)	46 (12.6)	37 (10.1)	
BMI					
Underweight	114	60 (52.6)	39 (34.2)	15 (13.1)	χ^2= 13.3, p=0.03*
Normal	721	426 (57.4)	158 (22)	137 (19)	
Overweight	192	101 (52.6)	49 (25.5)	42 (21.9)	
Obese	73	35 (48)	20 (27.4)	18 (24.6)	
Family history of hypertension					
Yes	381	176 (46.2)	95 (25)	110 (28.8)	χ^2=39.04, p=0.00001*
No	719	446 (62)	171 (23.8)	102 (14.2)	

*Significant at p <0.05 level, PHTN = Prehypertension, HTN = Hypertension , χ^2= Chi square.

DISCUSSION

Following JNC VIII classification prevalence of prehypertension is 24.2% and hypertension is 19.3%. About 56.5% of study population had normal blood pressure reading. The finding of the study is comparable to the WHO estimates which gives the prevalence of hypertension in India as 24%. Meta-analysis of studies published from 1950 to April 2013 on hypertension found that the overall prevalence of hypertension in India was 29.8% with significant urban and rural differences.[8] Esam et al found prevalence of prehypertension 27.2% and

prevalence of hypertension 27.4% which is slightly higher than present study.[7] A study done by Jindal et al in Barabanki showed overall prevalence of hypertension was 18%.[9] Zafar et al showed overall prevalence 17.7% (males 18.8%, females 15.2%) in Saifai which is comparable to present study.[10]

Age is an important non modifiable risk factor for development of hypertension. The prevalence of hypertension was 8.2% in participants less than 25 years, which increased to 44.1% in adults more than 60 years. There was an increase in prevalence of hypertension after the age of 45 years. According to Singh et al the

prevalence of hypertension has increasing trend with increasing age.[11] Hasan et al conducted a study on prevalence of hypertension in Haridwar and found that prevalence of hypertension increased with age.[12]

34.6% participants had a family history of hypertension. The occurrence of hypertension was significantly higher in participants with family history of hypertension. Prevalence of hypertension was 23.8% among participants who had a family history of hypertension and 10.1% among who did not have family history of hypertension. Similar finding was observed in a study done by Bartwal et al found family history to be significantly associated with hypertension.[13] Mandal et al also found family history of hypertension as a risk factor for developing hypertension.[14]

49.1% of the participants were consuming salt >5 gm/day. Extra salt intake is found to be an important risk factor for development of hypertension. The prevalence of pre hypertension was 28.9% among people consuming >5 gm salt/day compared to 19.1% among people consuming <5 gm salt/day. The prevalence of hypertension was 22% among people consuming >5 gm salt/day compared to 16.4% among people consuming <5 gm salt/day. Similar finding was observed in a study conducted by Kumar et al in which consumption of extra salt was associated with hypertension.[15] A study done by Srivastava et al found that 72% of hypertensives were consuming more than 5 gm salt per day.[16]

In this study 20.7% of the participants are current tobacco users. 40.3% used cigarettes, 36% used beedi and 23.7% used smokeless tobacco [such as khaini (surti)] among total tobacco users. The prevalence of pre hypertension was 30.7% among tobacco users compared to 22.4% among non-users. The prevalence of hypertension was 25.4% among users when compared with 17.1% of among non-users and this association was statistically significant. Similar finding was observed in a study done by Guptha et al showed smoking was significantly associated with higher prevalence of systemic hypertension.[17] According to Mahmood et al in Lucknow overall prevalence of hypertension was 14.67%. Prevalence was higher among those who consumes tobacco products.[18]

In present study alcohol consumption was found to be an important risk factor for development of pre hypertension and hypertension. The prevalence of pre hypertension was 30% among alcoholics compared to 22.1% among non-alcoholics. The prevalence of hypertension was 24.8% among alcoholics compared to 17.3% among non-alcoholics and this association was statistically significant. Mittal et al conducted a study on prevalence of hypertension and its determinants in an urban area of Uttarakhand.[19] They found alcohol consumption was significantly associated with prevalence of hypertension (p value=0.008. People who were engaged in regular physical activity (Engage in regular aerobic physical activity such as brisk walking at least 30 minutes/day, at least 5 days/week) had less chance of developing hypertension compared to people who rarely do any physical activity. The prevalence of hypertension was 14.2% among participants who are physically active compared to 22% among participants who are inactive and this association was statistically significant. Sivaprasad et al found the prevalence of hypertension was significantly higher among the subjects with low physical activity (43.6%) than those having moderate or vigorous activity (p=0.01).[20]

The current study found that people who consume fruits and vegetables >2 times/day had less chance of developing pre hypertension and hypertension compared to people who consume fruits and vegetables <2 times/day and this association was statistically significant.

In the current study significant association was found between BMI and pre hypertension and hypertension. The prevalence of pre hypertension was 27.4% among obese participants compared to 22% among participants with normal BMI. The prevalence of hypertension was 24.6% among obese participants compared to 19% among participants with normal BMI. This association was statistically significant. Similar finding were found by Naveen et al in Allahabad district.[21] The significant predictors were upper socioeconomic class, mixed food habits, and obesity.

CONCLUSION

It can be concluded that the prevalence of both prehypertension and hypertension is very high in rural Jhansi. This shows that people of this area are vulnerable to several chronic diseases and other unbearable health issues. Specifically men are at more risk of being hypertensive than female. Increasing age, tobacco chewing, alcohol intake, inadequate physical activity etc. are proved to be an independent risk factor for hypertension. Programs are needed to improve the surveillance systems and implementation of community based screening programs for early detection of hypertension is also needed. As the awareness of the hypertension status among hypertensive cases was very poor, improving health literacy to increase the awareness of hypertension is also the need of the hour. Interventions like weight management, increased physical activity, increased fruits and vegetables consumption, and reduction in tobacco and alcohol use are required and recommended.

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