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Original Article

PREVALENCE AND EPIDEMIOLOGICAL CORRELATES OF HYPERTENSION AMONG LABOUR POPULATION

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ABSTRACT

The average prevalence of hypertension in India is 25% in urban and 10% in rural inhabitants. Prevalence of hypertension has been found to increase in traditional populations undergoing modernization. There is a strong correlation between changing lifestyle factors and increase in hypertension. The objectives of the study were to find out Prevalence of hypertension and identification of associated risk factors amongst labour population of District Bareilly. The cross sectional field study involved 185 respondents, aged 18 years and above using simple random sampling technique. A study instrument which included behavioral risk factor questionnaire (Tobacco use, alcohol consumption and type of diet) and physical measurements of height, weight, waist circumference, hip circumference and blood pressure was used to collect data. Chi- square test and regression analysis were used to analyze data. The overall prevalence of hypertension was found to be 10.81%. Prevalence of hypertension was significantly higher among individuals, aged 40 years and above, with high body mass index and increased waist hip ratio, ($P<.05$). There is an increase in cases of hypertension amongst labour population of District Bareilly. Weight reduction may lead to decrease in blood pressure of an individual.

Key words: Prevalence, Hypertension, Risk factors, Lifestyle modifications

INTRODUCTION

Hypertension is the commonest cardiovascular disorder affecting about 20% adult populations worldwide. It is an important risk factor for cardiovascular mortality. (1) Reports suggest that the prevalence of hypertension is rapidly increasing in developing countries and is one of the leading causes of death and disability in developing countries. (2) Cardiovascular diseases are projected to cause 4.6 million deaths in India by 2020. (3)

The prevalence of hypertension in India is reported as ranging from 10 to 30.9 %. (4) The average prevalence of hypertension in India is 25% in urban and 10% in rural inhabitants. (5) There is a strong correlation between changing lifestyle factors and increase in hypertension. The rural populations being the marginalized and vulnerable communities in India face considerable disparity as compared to urban populations in terms of health facilities, education and economic pursuits. (6) Prevalence of hypertension has been found to increase in rural populations undergoing modernization. Recently, a study conducted among labour population of Gujarat reported prevalence of hypertension to be 16.9% as per WHO criteria. (7)

The prevalence will increase even further unless

broad and effective preventive measures are implemented. Epidemiological studies to assess the prevalence of hypertension are essential to plan preventive strategies and promote the health of these populations.

Though several studies have been carried out among the general population in India but very few studies have been conducted among labour population. Non exposure to risk factors like physical inactivity and obesity might be prevalent among the labourers but exposure to risk factors like smoking and alcohol consumption are on the rise in lower socioeconomic strata.

The literature on prevalence and risk factors of hypertension among labourers in Bareilly was scarce, thereby the present study was undertaken to find out prevalence of hypertension and to identify the risk factors associated amongst rural labour population aged 18 years and above of Bhojipura Block, district Bareilly.

MATERIAL AND METHODS

The cross sectional study was carried out in labour population of Bhojipura Block of Bareilly district, Uttar Pradesh. Simple random sampling was used to select the study subjects. Adults of age 18 years and above in the selected households were surveyed and comprised the study unit in the present study. A total of 185 individuals participated in the study. Those adults who were non cooperative or refused to provide the necessary information were not included in the study. Those individuals who were absent on two repeated visits were excluded from the study. Pregnant women were also excluded from the study.

A structured pretested and predesigned questionnaire was used to assess study subjects' self-reported behavioral and lifestyle risk factors (Smoked and smokeless tobacco use, alcohol consumption and type of diet) for hypertension, the measurement of subject's blood pressure and anthropometrical parameters.

Modified Prasad's classification was applied to measure the individual's socioeconomic status. [8]

Following **Operational Definitions** were put to use in the present study:

1. Current smoking- someone who at the time of survey, smoked in any form either daily or occasionally for last 6 months.
2. Current smokeless tobacco use- reported consumption of smokeless tobacco in any form at the time of the survey either daily or occasionally for last 6 months.
3. Current drinker-Those who consumed 30 ml. or more of any type of alcohol per day for last 6 months preceding the survey.
4. Hypertension- means systolic BP ≥ 140mmHg and/or mean diastolic BP ≥ 90mmHg or history of anti hypertensive treatment fifteen days before the survey.
5. Overweight/obesity- body mass index level of ≥ 25 Kg/m^2 and ≥ 30 Kg/m^2 respectively.

For physical examination, standardized calibrated mercury column type sphygmomanometer; stethoscope, common weighing machine and measuring tape were used.

During the course of the interview, two measurements of blood pressure on each study participant with a mercury column sphygmomanometer were made using a standardized technique 30 minutes apart in sitting position. Blood pressure measurements were made on the left arm of each study subject, using a cuff of appropriate size at the level of the heart. In case where the two readings differed by over 10 mm of Hg, a third reading was obtained, and the three measurements were averaged. The pressures at which sound appeared and disappeared were taken as systolic blood pressure (SBP) and diastolic blood pressure (DBP) respectively.

Blood pressure was classified as normal (SBP <120 and DBP <80 mmHg), pre-hypertension (SBP = 120-139 and/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 > 100 mmHg) as per US Seventh Joint National Committee on Detection, Evaluation and Treatment of Hypertension (JNC VII) criteria. [9]

Body weight was measured (to the nearest 0.5kg) with the subject standing motionless on the weighing scale, feet about 15cm apart and weight equally distributed on each leg. Subjects were instructed to wear minimum outwear (as culturally appropriate) and no footwear while there weight was being measured.

Height was measured (to the nearest 0.5cm) with the subject standing in an erect position against a vertical surface, and the head positioned so that the top of the external auditory meatus was level with the inferior margin of the bony orbit (Frankfurt's plain).

Body Mass Index was calculated as weight in kilograms divided by weight in meters squared. Based on their BMI, individuals were classified into four groups: thin (BMI <18.5), normal (BMI=18.5-24.9), overweight (BMI = 25.0-29.9) and obese (BMI > 30.0) as per WHO. [10]

Waist circumference was measured with a standard measuring tape, while subjects were lightly clothed, at a level midway between the lower margin of the last rib and iliac crest in centimeters (to the nearest 0.1cm). Waist circumference (WC) cut-offs were taken as 90 cms for males and 80 cms for females to define abdominal obesity using South Asia Pacific Guidelines. [11]

Hip circumference (HC) was measured at the maximum circumference over the buttocks in centimeters (to the nearest 0.1cm) with the subject in standing position.

Waist hip ratio was calculated as waist circumference divided by hip circumference. The cut-off used for the waist-hip ratio (WHR) for males was 0.9 and for females it was 0.8 to define obesity. [11]

Data entry and statistical analysis were performed using the Microsoft Excel and SPSS windows version 14.0 software. Tests of significance like Pearson's Chi- square test and F-test were applied to find out the results. P values <0.05 were considered significant for the identified risk factors and outcome variables. Univariate logistic regression analysis was done using systolic and diastolic blood pressure as the dependent variable and the various risk factors identified as independent variables.

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Univariate logistic regression analysis was done using systolic and diastolic blood pressure as the dependent variable and the various risk factors identified as independent variables. Multivariate logistic regression analysis was done using systolic and diastolic blood pressure as the dependent variable and the risk factors identified significant in univariate analysis as independent variables.

RESULT

Out of 185 respondents studied, 47 (25.40%) respondents were found pre hypertensive and 20 (10.81%) were found hypertensive (Table 1).

Table 1: Gender wise distribution of respondents according to their blood pressures measured as per JNC-VII criteria report

Gender (n=185)	Normal (%)	Pre Hypertension (%)	Stage I Hypertension (%)	Stage II Hypertension (%)
Male (n=86)	55(63.95%)	24(27.90%)	2(2.32%)	5(5.81%)
Female (n=99)	63(63.63%)	23(23.23%)	7(7.07%)	(6.06%)
Total	118(63.78%)	47(25.40%)	9(4.86%)	11(5.94%)
Chi-Square (df)	2.531(3) P Value 0.470			

Table 2: Age wise distribution of individuals identified with hypertension

Age group (years)	Mean SBP (mmHg)		Mean DBP (mmHg)	
	Mean	± SD	Mean	± SD
18-30	117.93	12.821	77.00	8.267
31-40	122.42	12.321	80.32	6.775
41-50	120.48	11.932	77.81	7.718
51-60	129.53	15.533	85.06	10.176
>60	130.00	11.282	85.00	6.686
Total	120.53	13.402	78.75	8.637
F –value	5.000		6.358	
P-value	0.001		0.000	

The overall, mean blood pressures were 120.53 ± 13.40 / 78.75 ± 8.63mm Hg respectively. The mean systolic as well as diastolic blood pressures were found to steadily increase with

age, being lowest in age group 18-30 years (117.93 ± 12.82/ 77.00 ± 8.26) and highest in age group 51-60 years (130.00 ± 11.28/85.00 ± 6.68) (Table 2).

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%). Though the proportion of hypertension was higher among females (13.13%) as compared to males (8.13%), it was not statistically significant (P >0.05). Similarly the differences observed in the subjects belonging to the lower socioeconomic class (11.53%) as compared to the lower-middle socioeconomic class (6.89%), and between illiterate respondents (11.17%) as compared to the literate ones (0.0%) were insignificant (P >0.05) (Table 3).

Table 3: Hypertension in relation to socio-demographic characteristics

Socio demographic Characteristics	Total (n=185)		Chi-Square(df), P-value
	No. Studied	No. of Hypertensive	
Age group (years)			
18-30	116	7 (6.03%)	12.434 (4)
31-40	19	3 (15.78%)	**0.014**
41-50	21	2 (9.52%)	
51-60	17	4 (23.52%)	
> 60	12	4 (33.33%)	
Gender			
Males	86	7 (8.13%)	1.189 (1)
Females	99	13 (13.13%)	0.275
Socio-economic class			
Lower	156	18 (11.53%)	0.546 (1)
Lower-middle	29	2 (6.89%)	0.460
Educational status			
Illiterate	179	20 (11.17%)	0.752 (3)
Read and write	1	0 (0.0%)	0.861
Less than primary school	4	0 (0.0%)	
Primary school completed	1	0 (0.0%)	

Although a higher proportion of respondents (14.45%) with a smoking habit were found hypertensive as compared to those who did not smoke (7.84%), difference was not statistically significant (P >0.05). Similarly the prevalence of hypertension did not differ significantly between smokeless tobacco users (14.49%) and non smokeless tobacco users (8.62%), and between alcoholics (12.69%) and non-alcoholics (9.83%). Also the prevalence of hypertension did not differ significantly between non vegetarians (11.23%) and vegetarians (0.0%) (Table 4).

Significant differences (P <0.05) in the prevalence of hypertension were seen between respondents with a high BMI (18.75%) as compared to those with a normal or low BMI (10.05%), and among respondents with a high waist hip ratio (19.04% men and 14.94% women) as compared to those with a normal or low waist hip ratio (4.61% men and 0.0% women) (Table 4).

Age, body mass index and waist hip ratio were found significant on univariate analysis. Age and waist hip ratio were found to be significant predictors to hypertension in the study population in the multivariate model (Table 5).

DISCUSSION

The prevalence of hypertension has been increasing in India. The average prevalence of hypertension in India is 25% in urban and 10% in rural inhabitants. [5] Factors which are attributable to these changes are rapid urbanization, lifestyle changes, and dietary changes and increased life expectancy. [12]

The overall prevalence of hypertension was found to be 10.81% in the present study. Similar prevalence of hypertension (16.9 per cent) has also been reported in the study conducted among labour population of Gujarat. [7] A higher prevalence (20.6%) was reported in the study conducted among adult population at rural

Wardha. [13] This is probably because our study was carried among labourers belonging to low socioeconomic strata while the Wardha study had a mix of subjects with all different professions from the general population. The prevalence of pre-hypertension (25.40%) in the present study is similar to the trends reported worldwide. [2]

Table 4: Hypertension in relation to modifiable risk factors**:**

Risk factors	Total (n=185)		Chi-Square (df) P-value
	No. Studied	No. of Hypertensive	
Smoking habit			
Present	83	12 (14.45%)	2.077 (1)
Absent	102	8 (7.84%)	0.150
Smokeless tobacco use:			
Present	69	10 (14.49%)	1.547 (1)
Absent	116	10 (8.62%)	0.214
Alcohol consumption			
Present	63	8 (12.69%)	0.353 (1)
Absent	122	12 (9.83%)	0.552
Type of diet			
Vegetarian	7	0 (0.0%)	0.882 (1)
Non Vegetarian	178	20 (11.23%)	0.348
Body mass index:			
<18.5	57	5 (8.77%)	8.596 (3)
18.5-24.9	112	12(10.71%)	**0.035**
25-30	15	2(13.33%)	
>30	1	1 (100.0%)	
Increased Waist hip ratio:			
Men (>0.9)	21	4 (19.04%)	4.422 (1)
Women (>.08)	87	13 (14.94%)	**0.035**
Men (<0.9)	65	3 (4.61%)	
Women (<.08)	12	0 (0.0%)	

The proportion of hypertension was found to increase steadily with the increase in age. These findings are coherent with study carried in rural Wardha [13]. Such changes of blood pressure with age might be due to changes in vascular system i.e. atherosclerotic changes in blood vessels.

Although the proportion of hypertension was higher among females as compared to males but the difference was not statistically significant. Similar observations were reported in the Gujarat study [7].

Table 5: Multivariate logistic regression analysis of predictors of hypertension in the total study sample modify

Predictor	β coeff.	Odd's ratio	95% CI	P-value
Age (< 40 yrs=1, >40 yrs=2)	1.182	3.262	1.231-8.644	0.017
Body mass index (High=1, Normal=2)	-0.269	0.764	0.341-1.713	0.514
Waist hip ratio (Increased=1, Normal=2)	1.456	4.290	1.204-16.706	0.029

The percentage of hypertensives among the illiterate respondents was observed higher as compared to the literate ones. However there was no significant association with education in the present study. Obviously the level of education is related to the protection of hypertension. Education was found to be significantly associated to hypertension in the Wardha study [13].

Socioeconomic status was not significantly associated with hypertension in our study. This is in contrast to the WHO report which says that societies that are in transitional stage of economic and epidemiological change have

higher prevalence of hypertension among upper socioeconomic groups.[1] This is possibly because most of our respondents belonged to lower income class.

BMI more than or equal to 25 was found to be significantly associated with hypertension. Similar findings were observed by a cross sectional study conducted among laborers in Madhya Pradesh. [6]

High proportions of respondents with a higher waist hip ratio were found hypertensive. Similar observations were reported in a study conducted in rural Wardha [13]. 85% of hypertensives had a waist-hip ratio equal to or more than the cut-off point, i.e. 0.8 for females and 0.9 for males. Central obesity indicated by increased waist-hip ratio has been positively correlated with high blood pressure in several populations. [1]

Type of diet (vegetarian verses non-vegetarian) was not found to be significant associated to hypertension in this study. Diet and nutrition have been linked to high blood pressure. Composite diets have been demonstrated to reduce the risk of hypertension.[14, 15]

In our study, a higher proportion of smokers were found hypertensive as compared to non smokers. However there was no significant association with smoking in our study. This result is not consistent with that of the Gujarat study, i.e. smokers have a significantly higher BP than non-smokers [7].

Smokeless tobacco use was not significantly associated with hypertension prevalence. This finding in our study did not match with the finding of a study conducted amongst rural population of Maharashtra [16].

We did not find any relationship between alcohol consumption and hypertension. Possibly majority of our respondents did not consume alcohol. Alcohol consumption has been consistently related to high blood pressure in cross-sectional as well as prospective observational studies in several populations.[1] Moderate alcohol consumption was agreed to be an important lifestyle measure recommended to lower blood pressure [17].

Weight reduction may lead to decrease in blood pressure of an individual. This study also emphasizes the need for epidemiological studies among labour populations as presently there is an increase in cases of hypertension among them.

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