

ORIGINAL ARTICLE

Percolating Risk Factors for Cardiovascular Diseases in Rural North India

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CITATION

Mishra A, Bano T, Jain S, Singh G, Gautam N, Chaudhary P. Percolating Risk Factors for Cardiovascular Diseases in Rural North India. Indian J Comm Health. 2024;36(2):173-179.

<https://doi.org/10.47203/IJCH.2024.v36i02.004>

ARTICLE CYCLE

Received: 25/05/2023; Accepted: 09/03/2024; Published: 30/04/2024

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ABSTRACT

Background: World has seen a tremendous epidemiological transition in disease patterns from communicable to non-communicable diseases (NCDs). Currently cardiovascular diseases are a major cause of disability and premature deaths globally. **Objective:** (1) To know prevalence of various risk factors of cardiovascular diseases in the rural area of Meerut. (2) To find out the association of sociodemographic factors with hypertension. **Settings and design:** A cross-sectional study was conducted in Machchra village. **Methods:** The study was conducted among 315 study participants over time period of one year in which all the adults aged >30 years above residing in the ward of study area were included. Sampling technique used was systematic random sampling. **Results:** The prevalence of hypertension, diabetes and hypercholesterolemia was found to be 30.2%, 22.2% and 15.2% respectively. The prevalence of pre-obese and obese were 14.3% and 7.0% respectively. The maximum prevalence of hypertension was seen in the age group of 70 years (66.7%), in females (30.6%), SES as class IV (36.5%), secondary school completed population (42.9%) and among homemakers (40.9%). The prevalence of hypertension was found to be statistically significant in relation to age, educational status and occupation. **Conclusion:** In our study the prevalence of hypertension was found to be 30.2% (in males 29.6% while in females 30.6%).

KEYWORDS

Cardiovascular Diseases; Prevalence; Hypercholesterolemia; Mortality, Premature; Noncommunicable Diseases; Sociodemographic Factors; Hypertension; Risk Factors; Diabetes Mellitus; Obesity; Educational Status; Schools; Occupations

INTRODUCTION

World has seen a tremendous epidemiological transition in disease patterns since the early years of the twentieth century from communicable to non-communicable diseases (NCDs). The leading NCDs are cardiovascular

diseases, cancers, diabetes and chronic lung diseases. Presently more than three fourth of NCD deaths worldwide occur in low and middle income group countries with about half of deaths occurring before the age of 70 years. So

the problem is hitting developing countries more presently.(1)

Currently cardiovascular diseases are a major cause of disability and premature deaths globally. Out of total deaths (57 million) due to non communicable deaths globally in 2016, 44% (17.9 million) were due to cardiovascular related deaths¹. These diseases affect the most productive population i.e. 15-49 years. It is predicted that by 2030, CVD alone will be responsible for 52 million deaths globally. Most of these deaths occur in low and middle income countries thus indirectly contributing to the significant rising cost of healthcare.(2)

In India CVD risk factors were more prevalent in urban population initially. But as evidenced by some recent studies, the scenario is changing rapidly and the rural population is not far behind in terms of cardiovascular risk factors. Nowadays cardiovascular disease is the leading cause of death in urban as well as rural population.(3)

Hypertension is one of the major risk factors for cardiovascular diseases. It is a silent killer and does not produce any signs and symptoms by itself. However it damages end organs substantially and is a risk factor for stroke, IHD, CCF, ESRD and retinopathy. It has a direct role in causation of CAD and stroke. With the above background a study was planned in the rural field practice area of Lalajpat Rai Memorial Medical College, Meerut. The objectives of study to know the prevalence of various risk factors of cardiovascular diseases in the rural area of Meerut and to find out the association of sociodemographic factors with hypertension.

MATERIAL & METHODS

The study was conducted in Machhra village which is a rural field practice area of L.L.R.M.

Medical College. It was a household-based cross-sectional study. The period of study was one year from June 2021 to July 2022 which was used for data collection, compilation and presentation of findings. All the adults aged >30 years above residing in the ward of study area were included as study population.

Sampling technique used was systematic random sampling. The sample size was calculated using following formulae $n = \frac{(1.96)^2 p q}{d^2}$ (where n- sample size, d-absolute precision, p - anticipated value of proportion in the population, q=(1-p)

By taking the prevalence of one of the CVDs risk factors i.e. hypertension 29.3% in the rural community with 5% absolute precision at 95% confidence interval, an optimal sample size for study is calculated to be 315.(4)

RESULTS

The study was conducted among 315 study participants. The maximum number of participants 40.3% were in the age group 30-39 years followed by 27.6% in 40 - 49 years while the minimum participants (1.9 %) were 70 years or above. Among 315 people, 57.1% were females and 42.9% were male. Most of the study participants (42.5%) were having Socio-economic status (SES) as lower middle class. Majority of population 86.7 % were married and most of them (68.9%) lived in nuclear family system. When education was evaluated, 34% of the participants had no formal education followed by graduation and above (24.7%), high school (17.1%), secondary school (13.3%), primary school (8.6%) and less than primary (2.2%).

In the occupational distribution it was seen that 36.5% were homemakers followed by self-employed (28.5%), Government employee (14.9%), non-Government employees (8.9%), Unemployed (9.9%) and minimum 1.3% as retired. (Table 1)

Table 1. Distribution of Study participants according to their demographic profile. (Total=315)

Variable		Total(n)	Percentage (%)
Age (years)	30-39	127	40.3
	40-49	87	27.6
	50-59	66	21.0
	60-69	29	9.2
	70 and above	6	1.9

Variable		Total(n)	Percentage (%)
Gender	Male	135	42.9
	Female	180	57.1
Socio-economic status	Upper class(I)	52	16.5
	Upper middle class (II)	26	8.3
	Middle class (III)	40	12.7
	Lower middle class (IV)	134	42.5
	Lower class (V)	63	20.0
Marital Status	Married	275	87.3
	Unmarried	40	12.7
Type of family	Nuclear	217	68.9
	Joint	98	31.1
Education	No formal education	107	34.0
	Less than primary	7	2.2
	Primary school completed	27	8.6
	Secondary school completed	42	13.3
	High school completed	54	17.2
	Graduate and above	78	24.7
Occupation	Government employee	47	14.9
	Non-government employee	28	8.9
	Self-employed	90	28.5
	Homemaker	115	36.5
	Retired	4	1.3
	Unemployed	29	9.9

The prevalence of various risk factors of cardiovascular diseases was as follows: Hypertension was found to be 30.2% while diabetes and hypercholesterolemia were found to be 22.2% and 15.2% respectively. The prevalence of pre-obese and obese were found to be 14.3% and 7.0% respectively. Inadequate

fruits and vegetable intake was 18.4% while sedentary lifestyle was prevalent in 58.1% of the participants. The prevalence of current use of tobacco products and alcohol intake were 20.0% and 13.3% respectively. The prevalence of high waist hip ratio was 49.5% (Table 2).

Table 2: Prevalence of risk factors among study population.

Risk Factors	Number of participants	Percentage (%)
Hypertension	95	30.2
Diabetes Mellitus	70	22.2
Hypercholesterolemia	48	15.2
Nutritional status		14.3
Pre- Obese	45	
Obese	22	7
Alcohol	42	13.3
Sedentary life style	183	58.1
Tobacco use	63	20
Inadequate fruits and vegetable intake	58	18.4
High waist hip ratio	156	49.5
Total		315

Multiple response

Present study reveals that the overall prevalence of hypertension was 30.2% in the studied population and the maximum prevalence of hypertension (66.7%) was seen in the age group of 70 years & above followed

by in 60-69 years (48.3%), 50-59 years (39.4%), 40-49 years (34.5%) and least in 30-39 years (16.5%). The prevalence of hypertension in relation to age was found to be statistically significant ($p < 0.05$). (Figure 1)

In the present study among all 315 study participants, the prevalence of hypertension in males and females was 29.6% and 30.6% respectively. The prevalence of hypertension in relation to gender of the studied population was not found to be significant ($p > 0.05$). (Figure 2)

Study also reveals class IV has the highest prevalence of hypertension (36.5%) followed by class III (35.0%), class II (25%), class I (23%) and class V (22.2%). The lowest prevalence of hypertension was found in class V. However this difference was not found to be significant ($p > 0.05$). (Figure 3)

In the study, the maximum prevalence of hypertension was seen in the secondary school completed population (42.9%) followed by less

than primary (42.8%), primary school completed (40.7%), High school completed (33.3%) and those with no formal education (30.8%). The minimum prevalence of hypertension was seen in graduates and above as 15.4%. The difference in prevalence of hypertension in relation to educational status was found statistically significant. (Figure 4)

As shown in the table above, maximum prevalence of hypertension was seen in home makers (40.9%) followed by Government employees (30.9%), self-employed (25.6%) and unemployed (22.6%). Minimum prevalence was seen in non-Government employees (7.1%). The prevalence of hypertension in reference to occupation was found statistically significant. (Figure 5)

Figure 1: Age wise distribution of hypertension among the study population.

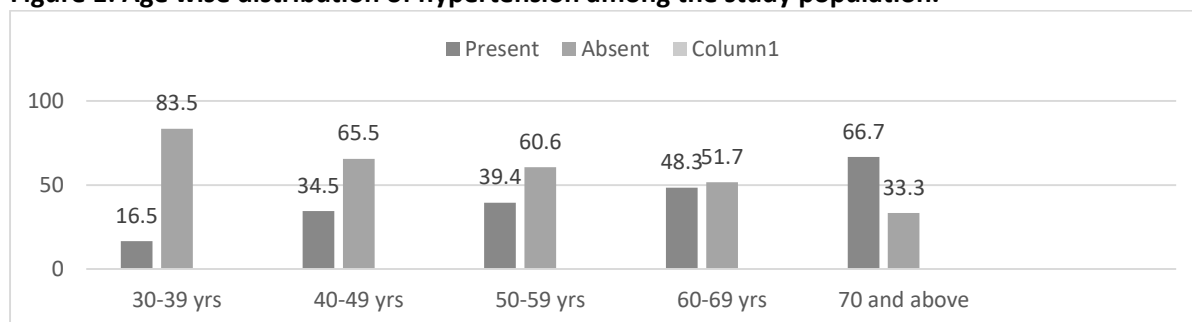


Figure 2: Gender wise distribution of hypertension among study population.

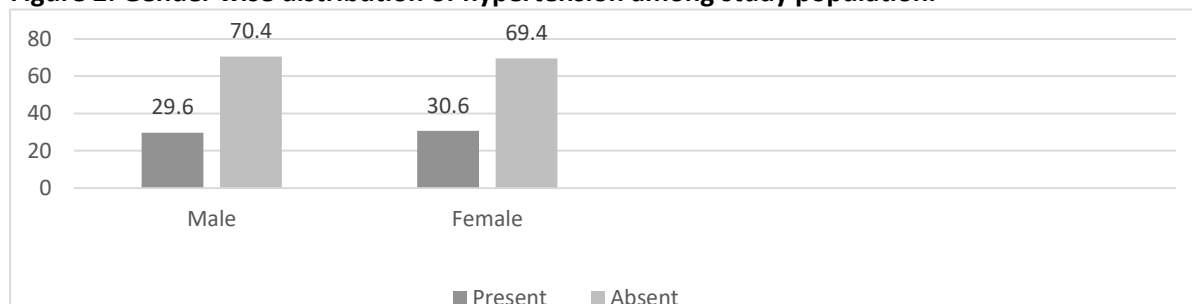


Figure 3: Distribution of hypertension according to socio-economic status.

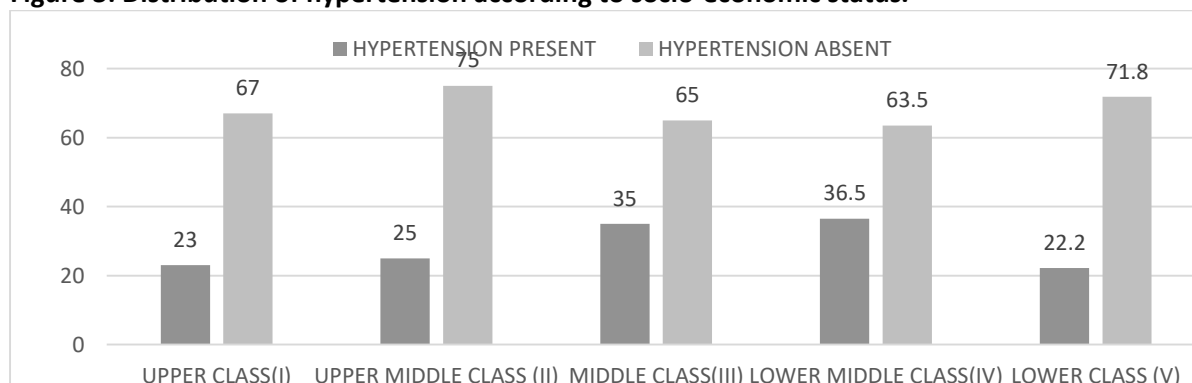


Figure 4: Distribution of hypertension according to Educational status.

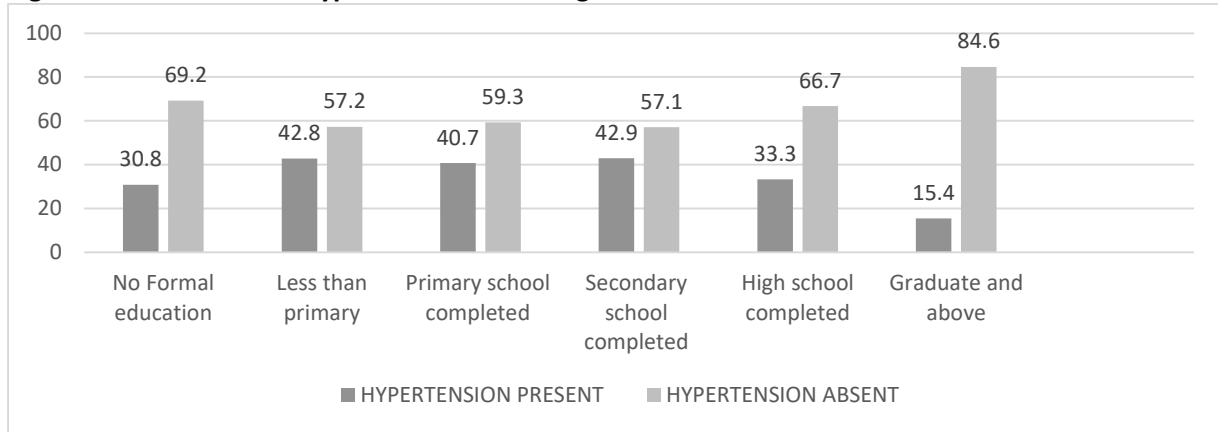
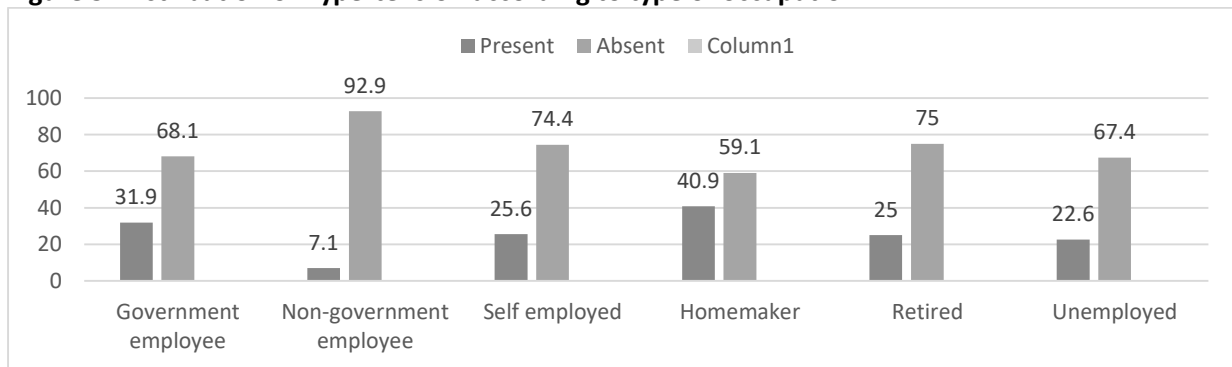


Figure 5: Distribution of hypertension according to type of occupation.



DISCUSSION

In the present study, out of 315 participants, 40.3% subjects were in the age group of 30-39 years, 27.6% in 40-49 years, 21% in 50-59 years, 9.2% in 60-69 years and 1.9% were more than 70 years of age. The findings are similar to study done by, Josh P.C. et al in Kinnaur, Himachal Pradesh, who enrolled 14.7% in age group 20-29 years and 25.8%, 26.8%, 18.8%, 12.3% and 1.7% in age group 30-39 years, 40-49 years, 50-59 years, 60-69 years and more than 70 years respectively.(5) In contrast, Arun Kokhane et al in Madhya Pradesh, did study in four age-group strata i.e. 18-29, 30-44, 45-59 and 60-69 years and enrolled study subjects were 24.2%, 36.9% 25.7% and 13% respectively.(6) So our study results are comparable with results of study done in north India.

This study showed that 42.9% participants were male and 57.1% were females. Similarly Geekar Z et al enrolled 40% male while 60% females(7). However in a study by Bhagyalakshmi A. et al, they enrolled 52.7% males while 47.3 % females(8). The reason

behind our such results are due to the fact that most of the female participants were homemakers and were easily available at home when we visited the particular home for the interview schedule.

This study reported that according to the modified BG Prasad socioeconomic scale, 16.5%, 8.3%, 12.7%, 42.5% and 20.0% were found in the upper class (I), upper-middle class (II), middle class (III), lower middle class (IV) and lower class (V) respectively. In contrast to our study PratyushaKadaliya et al in rural Karnataka reported that 5%, 4.8%, 12.3%, 34% and 48% of the study participants belong to upper class (I), upper-middle class (II), middle class (III), lower middle class (IV) and lower class (V) respectively(9). This difference in population composition in relation to socioeconomic class was observed due to the reason that our study was conducted in North India while other two studies were conducted in South India.

Our study showed that 34% of the participants had no formal education followed by graduation and above (24.7%), high school

(17.1%), secondary school (13.3%), primary school (8.6%) and less than primary (2.2%). Similar to our results, Mandeep Singh et al in rural Chittoor reported 29% as illiterate, 28.2% primary and middle school completed, 18% as senior secondary and 23.9% as graduate and above¹⁰. In contrast to our study Prakash Chand Negi et al in Himachal Pradesh observed 80.9% illiterate and 19% literate¹¹. However this study was done in a tribal area. The study of Mandeep Singh et al was in rural settings and our results were comparable to this study. The present study showed that out of 315 participants, overall prevalence of hypertension was 30.3%. We found a statistically significant increase in hypertension prevalence in relation to age. Maximum prevalence of hypertension 66.7% were seen in the age group of 70 years & above followed by 48.3% in 60-69 years. In contrast to our study SE Udayar used a different age group (25-34 years, 35-44 years, 45- 54 years, 55-65 years, and more than 65 years) and calculated that there was an increasing trend of hypertension with increasing age (0.6% in 25-34 years and 16.2% in age more than 65 years¹². Similar to our study, Aroor B. et al reported that there was an increased blood pressure in association with increased age¹³. The findings in our study are in concurrence to the physiological facts that hypertension increases with age (age probably represents an accumulation of environmental influences and genetically programmed senescence in our body system).

This study showed that out of 315 study participants, we found prevalence of hypertension in males as 29.6% and in 30.6% females. National Family Health Survey-4 (NFHS-4), the prevalence of hypertension was low compared to our study. NFHS-4 data has revealed that 11% of women and 14.8% of men aged 15–49 have hypertension¹⁴. Findings of NFHS-5 also reported a prevalence of 17.6% in rural areas of Uttar Pradesh (14.1% males and 9.7% of females)¹⁵. However the age group in NFHS-4 and in NFHS-5 was 15-45 years while the age group in our study was more than 30 years that's why we have found a higher prevalence.

In the present study, association of hypertension with socio-economic status was not significant and other studies also reported the similar findings. Like our study (max prevalence of hypertension in lower middle class 36.5%) Vinja et al in rural Varanasi¹⁶ and S E Udayar (rural Chittoor) reported increased prevalence of hypertension in lower socioeconomic groups¹⁷. The reason behind such results are due to the fact that higher socioeconomic class people have more awareness regarding risk factors of cardiovascular diseases and have better access to healthcare facilities.

This study showed lower prevalence of hypertension in subjects having high education i.e. graduates and above (15.4%). This difference was statistically significant. Similar trends were observed by S.E. Udayar et al in rural Chittoor who reported lower prevalence in graduates and above¹⁸. This observation is due to the fact that with higher education, awareness regarding healthy lifestyle increases.

When comparison was made between hypertension and type of occupation, it was observed that maximum prevalence of hypertension was seen in homemakers (40.9%) followed by Government employees (31.9%) with least in non-government employees (7.1%). This difference was significant. Similar to our study Mandeep Singh et al reported a highest prevalence in homemakers (46%) in comparison to our group¹⁹. In comparison S.E. Udayar in his study found maximum prevalence in business owners (29%) followed by house wife (24.6%)²⁰. These finding stress on the need for female education and empowerment for improved healthcare of homemakers.

CONCLUSION & RECOMMENDATION

In our study the prevalence of hypertension was found to be 30.2% (in males 29.6% while in females 30.6%). To prevent and control the widely prevalent hypertension in the community special efforts should be done. Lifestyle modifications should be made such as regular exercise and changes should be made in food habits like decreasing fat intake and restrict the high salt intake among individuals

at high risk. The salt intake should be restricted to <5 grams per day to all individuals including hypertensives.

Non-communicable diseases should be handled at village level and sub center level by the healthcare functionaries (ANM, ASHA and CHO) and this should be evaluated through monthly progress reports by Primary Health Centre Incharge or Chief Medical Officer.

In the rural area strong health education activities should be conducted by health workers such as ANMs and ASHAs with support of Primary Health Centre Incharge, which include Behaviour Change Communication activities during health education camps.

AUTHORS CONTRIBUTION

All authors have contributed equally.

RECOMMENDATION

Screening program for non-communicable diseases should be intensified in rural population.

Health education for prevention of non communicable diseases should be incorporated in school curriculum.

LIMITATION OF THE STUDY

Smaller sample size of study.

RELEVANCE OF THE STUDY

The study is very much relevant in current era of industrialization where non communicable diseases are spreading rapidly.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

ACKNOWLEDGEMENT

We acknowledge the support offered by Staff of central lab LLRM Medical College and various Asha Workers of village Machhra during study.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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