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Original Research Article

The study of epidemiological correlates of hypertension among the rural population of Mehsana district of North Gujarat region, India

Nilesh Thakor[1], Pankaj B. Nimbalkar[2]*, Maulik D. Joshi[3]

[1]Department of Community Medicine, GMERS Medical College, Vadnagar, Gujarat, India
[2]Department of Obstetrics and Gynaecology, [2,3]Nootan Medical College and Research Centre, Visnagar, Gujarat, India

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***Correspondence:**
Dr. Pankaj B. Nimbalkar,
E-mail: researchforgoodhealth@gmail.com

ABSTRACT

Background: The changing lifestyle factors in rural population are associated with increase in hypertension. Objective was to find out the epidemiological correlates of hypertension among the rural population.
Methods: This was cross sectional study and conducted in rural areas of Mehsana district of Gujarat during January 2019 to June 2019. People living rural areas were selected by stratified random sampling. They were screened for hypertension by JNC VII criteria using sphygmomanometer and detailed personal, past and family history was taken after written and informed consent. Data was entered in Microsoft excel and analysis was done using SPSS statistical package.
Results: Out of total 602 subjects, 93 (15.4%) were hypertensive. Out of total 93 hypertensive subjects, 50 (53.8%) were females. A blood pressure category and gender difference were not statically significant (p=0.89). Out of 93 hypertensive subjects, 42 (45.2%) subjects were in the age group of ≥60 years. The difference between age groups and blood pressure category was significant (p<0.0001). Out of 93 hypertensive subjects' majority 85 (91.4%) had negative tobacco history while only 8 (8.6%) consumed tobacco in any form. The tobacco history and blood pressure category were not significantly associated (p=0.211). Out of total 93 hypertensive subjects, 54 (58.1%) subjects were (≥25) body mass index (BMI). Categories of BMI and hypertension were extremely significantly associated (p<0.0001).
Conclusions: Hypertension is significantly associated with age, socio economic class and BMI.

Keywords: Hypertension, BMI, Non-communicable disease, Gender, Socio economic class

INTRODUCTION

Among all cardiovascular disorders, hypertension is the commonest disorder affecting about 20% adult population worldwide and important risk factor for cardiovascular mortality.[1] 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 average prevalence of hypertension in India is in urban and rural inhabitants was 25% and 10% respectively.[4] The changing lifestyle factors are associated with increase in hypertension. The rural population 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.[5] As rural population is undergoing modernization prevalence of hypertension has been found to increase in these population.

According to the national heart lung and blood institute (NHLBI), the risk factors for high blood pressure are older age, race/ethnicity, gender, overweight or obesity and unhealthy lifestyle habits, such as lack of physical activity, smoking and eating too much salt. The NHLBI also considers that other risk factors are associated with high blood pressure, such as genetic predisposition and stress. Risk factor identification is an established strategy to apply primordial prevention to reduce the incidence of hypertension in the community. The association between the presence of risk factors and the development of the disease has been well documented.[6,7]

The present study was conducted to find out the epidemiological correlates of hypertension among the rural population of Mehsana district of North Gujarat region, India.

METHODS

This was cross sectional study and conducted in rural areas of Mehsana district of Gujarat from January 2019 to June 2019. People living rural areas were selected by stratified random sampling. They were screened for hypertension by JNC VII criteria using sphygmomanometer. After written and informed consent was obtained, detailed personal, past and family history was taken. Their anthropometric measurements and detailed physical and clinical examination were done. Before conducting the study, approval was obtained from institutional ethical committee for human research. Data safety and confidentiality was also given due consideration. The file containing identity related details was kept password protected and the filled Performa were kept in lock with key accessible only to researcher. Sample size was calculated with the following assumptions. The prevalence rate of hypertension was taken 22.8% from the previous study by Parikh et al.[8] Sample size was estimated at 5% level of significance with an allowable error of 20%. The calculated sample size was 602. Data was entered in Microsoft excel and analysis was done using SPSS statistical package. Parameters such as rate, ratio and percentages were calculated. In order to have valid interpretation of rates, 95% confidence intervals (CI) were calculated. To test the significance of the difference among the statistical parameters in different subsets of population, suitable statistical tests were applied. They included chi-square test and Z test.

RESULTS

Out of total 602 subjects, 320 (53.2%) were females. Out of 320 females, 270 (84.4%) had normal blood pressure or pre hypertension followed by 50 (15.6%) females had hypertension stage-1 or stage-2. Out of total 282 males, 239 (84.8%) had normal blood pressure or pre hypertension followed by 43 (15.2%) males had hypertension stage-1 or stage-2. Out of total 93 hypertensive subjects, 50 (53.8%) were females and 43 (46.2%) were males. Prevalence of hypertension stage 1 or 2 was almost equal among males and females. A blood pressure category and gender difference were not statically significant (p=0.89) (Table 1).

Out of total 93 hypertensive subjects, 42 (45.2%) subjects were in the age group of ≥60 years followed by 38 (40.9%) and 13 (14.0%) subjects were in the age groups of 40-59 years and 20-39 years respectively. The difference between age groups and blood pressure category was significant (p<0.0001). Out of total 602, majority 293 (48.7%) subjects had normal blood pressure with mean age of 25.28±16.62 years, 271 subjects (45.0%) had pre hypertension with mean age of 40.30±14.32 years. Out of total, 25 (4.2%) subjects had hypertension stage 1 with mean age of 45.82±11.48 years and 13 (2.2%) subjects had hypertension stage 2 with mean age of 53.77±16.02 years.

Out of 93 subjects, who had hypertension stage-1 or 2, prevalence (80.6%) was more among subjects from middle and upper socio-economic class. Difference between blood pressure category and socio-economic classes was statistically significant (p<0.05) (Table 2).

Out of total 246 subjects from joint family 205 (83.3%) were normal or pre hypertensive followed by 41 (16.7%) had hypertension stage 1 or 2. Out of total 356 subjects from nuclear family 304 (85.4%) were normal or pre hypertensive followed by 52 (14.6%) had hypertension stage 1 or 2. Type of family and blood pressure category were not significantly associated. (p=0.39) (Table 3).

Out of 509 subjects with normal blood pressure or pre hypertension majority 482 (94.7%) subjects had negative tobacco history while 27 (5.3%) consumed tobacco in any form. Out of 93 hypertensive subjects' majority 85 (91.4%) had negative tobacco history while only 8 (8.6%) consumed tobacco in any form. The tobacco history and blood pressure category were not significantly associated (p=0.211) (Table 4).

Out of 509 subjects with normal blood pressure or pre hypertension majority 366 (71.9%) subjects had negative family history of non-communicable diseases while 143 (28.1%) had positive family history of non-communicable diseases. Out of 93 hypertensive subjects' majority 62 (66.7%) had negative family history of non-communicable diseases while only 31 (33.3%) had positive family history of non-communicable diseases. The family history of non-communicable diseases and blood pressure category were not significantly associated (p=0.305) (Table 5).

Out of total 93 hypertensive subjects, 54 (58.1%) subjects were (≥25 BMI), 23 (24.7%) subjects had normal BMI followed by 13 (14.0%) and 83 3 (3.2%) subjects had 23 to 24.9 BMI and BMI of <18.5 respectively. Categories of BMI and hypertension were extremely significantly associated (p<0.0001) (Table 6).

Table: 1 Distribution of the study population according to their gender and categories of their systolic blood pressure.

Category blood pressure (mmHg), systolic diastolic	Gender (%)		Total (%)
	Females	Males	
Normal or pre hypertensive, (<140) (<90)	270 (84.4)	239 (84.8)	509 (84.6)
Hypertensive, (≥140) (≥90)	50 (15.6)	43 (15.2)	93 (15.4)
Total	320 (100)	282 (100)	602 (100)

Chi square: 0.016, degree of freedom: 1, p=0.89. *Here if systolic and diastolic blood pressure felled into different categories, the higher category had been selected to classify the individual's blood pressure.

Table 2: Distribution of the study population according to social class and categories of their systolic blood pressure.

Category, blood pressure (mmHg), systolic diastolic	Social-economic class (%)			Total (%)
	Lower	Middle	Upper	
Normal or pre hypertensive, (<140) (<90)	167 (90.2) (32.8)	190 (82.2) (37.3)	152 (81.7) (29.8)	509 (93.6) (100)
Hypertensive, (≥140) (≥90)	18 (9.8) (19.4)	41 (17.8) (44.1)	34 (18.3) (36.5)	93 (6.4) (100)
Total	185 (100)	231 (100)	186 (100)	602 (100)

Chi square: 6.709, Degree of freedom: 2, p=0.035.

Table 3: Distribution of the study population according to their type of family and categories of their blood pressure.

Category, blood pressure (mmHg), systolic diastolic	Type of family (%)		Total (%)
	Joint family	Nuclear family	
Normal or pre hypertensive, (<140) (<90)	205 (83.3)	304 (85.4)	509 (84.6)
Hypertensive, (≥140) (≥90)	41 (16.7)	52 (14.6)	93 (15.4)
Total	246 (100)	356 (100)	602 (100)

Chi square: 0.473, Degree of freedom: 1, p=0.49

Table 4: Distribution of the study population according to their tobacco history and categories of their blood pressure.

Category, blood pressure (mmHg), systolic diastolic	Tobacco history (%)		Total (%)
	Yes	No	
Normal, (<120) (<80) or pre hypertension, (120-139) (80-89)	27 (5.3)	482 (94.7)	509 (100)
Hypertension stage-1, (140-159) (90-99) or hypertension stage-2, (≥160) (≥100)	8 (8.6)	85 (91.4)	93 (100)
Total	35 (5.8)	567 (94.2)	602 (100)

Chi square: 1.56, Degree of freedom: 1, p=0.211.

Table 5: Distribution of the study population according to family history of NCD and categories of their blood pressure.

Category, blood pressure (mmHg), systolic diastolic	Family history of NCD (%)		Total (%)
	Yes	No	
Normal, (<120) (<80) or pre-hypertension, (120-139) (80-89)	143 (28.1)	366 (71.9)	509 (100)
Hypertension stage-1, (140-159) (90-99) or hypertension stage-2, (≥160) (≥100)	31 (33.3)	62 (66.7)	93 (100)
Total	174 (28.9)	428 (66.7)	602 (100)

Chi square: 1.05, Degree of freedom: 1, p=0.305

Table 6: Distribution of the study population according to categories of their BMI and categories of their blood pressure.

BMI (kg/m^2)	Category, blood pressure (mmHg), systolic diastolic		Total (%)
	Normal or pre hypertensive, (<140) (<90) (%)	Hypertensive (≥140) (≥90) (%)	
<18.5, (Chronic energy deficient)	88 (17.3)	3 (3.2)	91 (15.1)
18.5-22.9, (Normal)	161 (31.6)	23 (24.7)	184 (30.6)
23-24.9, (Overweight)	83 (16.3)	13 (14.0)	96 (15.9)
≥25, (Obese)	177 (34.8)	54 (58.1)	231 (38.4)
Total	509 (100)	93 (100)	602 (100)

Chi square: 22.895, Degree of freedom: 3, p<0.0001

DISCUSSION

According to world health report 2002, cardiovascular diseases (CVDs) will be the largest cause of death and disability by 2020 in India. In 2020 AD, 2.6 million Indians are predicted to die due to coronary heart disease which constitutes 54.1% of all CVD deaths. Nearly half of these deaths are likely to occur in young and middle-aged individuals (30-69 years). Currently Indians experience CVD deaths at least a decade earlier than their counterparts in countries with established market economies (EME).

In our study, out of total 602 subjects, 320 (53.2%) were female while 282 (46.8%) were male. Out of total 320 females, 270 (84.4%) had normal blood pressure or pre hypertension followed by 50 (15.6%) females had hypertension stage 1 or stage 2. Out of total 282 males, 239 (84.8%) had normal blood pressure or pre hypertension followed by 43 (15.2%) males had hypertension stage 1 or stage 2. Out of total 93 hypertensive subjects, 50 (53.8%) were females and 43 (46.2%) were males. Prevalence of hypertension stage 1 or 2 was almost equal among males and females. A blood pressure category and gender difference were not statically significant (p=0.89).

In Parikh et al there was no significant difference between prevalence among the male (23.2%) was higher than females (22.5%) (Z value 0.06, p>0.05).[8] Prevalence of hypertension among males (23.2%) and females (22.5%) was lower than as reported by Gupta et al (males-30%; females- 33%) in the same age group.[9]

In present study, out of total 93 hypertensive subjects, 42 (45.2%) subjects were in the age group of ≥60 years followed by 38 (40.9%) and 13 (14.0%) subjects were in the age groups of 40-59 years and 20-39 years respectively. The difference between age groups and blood pressure category was significant (p<0.0001). In our study, the proportion of hypertension was found to increase steadily with the increase in age. These findings are coherent with study carried in rural Wardha.[10] Such changes of blood pressure with age might be due to changes in vascular system i.e., atherosclerotic changes in blood vessels.

In present study, out of 93 subjects, who had hypertension stage-1 or 2, prevalence (80.6%) was more among subjects from middle and upper socio-economic class. In our study, difference between blood pressure category and socio-economic classes was statistically significant (p<0.05).

In Singh et al the prevalence of hypertension (140/90) and its risk factors were significantly associated with level of socio-economic class in a cohort of rural population in North India.[11] Upper and middle social classes were associated with a higher prevalence of JNC V hypertension. This relation persisted after adjustment of age but declined after the addition of other lifestyle characteristics in a multivariate analysis. Over-weight and obesity and sedentary lifestyle were also prevalent among upper and middle social classes subjects. However, physical activity was greater among subjects of lower socio-economic class.

In our study, out of total 246 subjects from joint family 205 (83.3%) were normal or pre hypertensive followed by 41 (16.7%) had hypertension stage 1 or 2. Out of total 356 subjects from nuclear family 304 (85.4%) were normal or pre hypertensive followed by 52 (14.6%) had hypertension stage 1 or 2. Type of family and blood pressure category were not significantly associated. (p=0.39) Similar results were obtained in Kutty et al.[12] In Kutty et al prevalence was higher in the person living in the joint family (31.7%) than nuclear family (18.3%), but the difference was statistically not significant (p>0.05).[12]

In our study, out of 93 hypertensive subjects' majority 85 (91.4%) had negative tobacco history while only 8 (8.6%) consumed tobacco in any form. The tobacco history and blood pressure category were not significantly associated. (p=0.211). 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 was not consistent with that Tiwari et al i.e., smokers have a significantly higher BP than non-smokers.[13] 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.[14]

In present study**,** out of total 93 hypertensive subjects, 54 (58.1%) subjects were (≥25 BMI), 23 (24.7%) subjects had normal BMI followed by 13 (14.0%) and 83 3 (3.2%) subjects had 23 to 24.9 BMI and BMI of <18.5 respectively. Categories of BMI and hypertension were extremely significantly associated (p<0.0001). Similar results were reported in urban areas of Chandigarh, there 86.8% of hypertensive was in sedentary activity group and risk of developing hypertension was 35% in person who did not engage in vigorous exercise.[15] 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.[16,17]

However, study done in single district of Gujarat limits us to generalize the results. There is definitely a need for well-planned, large-scale studies to understand the epidemiological correlates of hypertension among rural population.

CONCLUSION

Hypertension is significantly associated with age, socio economic class and BMI. High prevalence of hypertension among rural population needs great attention and health education.

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