Study of Association of Modifiable Risk Factors and Hypertension by Community Based Case Control Study

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ABSTRACT
Background: *Hypertension is an important public health problem as it is common, asymptomatic, readily detectable and often leading to lethal complications if left untreated. As a consequence, high blood pressure is often called the "Silent Killer" by WHO. There is a strong correlation between changing lifestyle factors and increase in hypertension in India. Many of the studies done in this regard are mainly descriptive or cross sectional barring few being analytical. Here is an attempt to identify some of the modifiable risk factors for hypertension in the rural areas of Hassan Taluk, by conducting an analytical case control study.*
Objectives: *To assess the association of selected modifiable risk factors with hypertension by community based case control study in rural population of Hassan Taluk*
Methodology: *A community based case control study was carried out in the villages of Hassan Taluk from July 2013 to September 2013. A multi stage sampling procedure was used to select the subjects. 110 cases were divided equally among the 30 villages, approximately 4 cases from each village were randomly selected in the age group of >35 years. 1:1 pair matching has been done, 110 controls were selected from the same village, matching for age (+/-5 years) and sex.*
Results: *Summarily, the present study found obesity as risk factors for Hypertension with significant association, in the age group of > 35 years, in both sexes. Tobacco consumption and Alcohol consumption are found to be marginally associated with hypertension.*

INTRODUCTION

Considering hypertension as a most important preventable causes of premature death worldwide, The World Health Day theme of 2013 is "High Blood Pressure" and the slogan is "Blood Pressure- Take Control". It is an important public health problem as it is common, asymptomatic, readily detectable and often leading to lethal

complications if left untreated. As a consequence, high blood pressure is often called the "SILENT KILLER"[1] by WHO. According to WHO one in three adults worldwide has high blood pressure. The proportion increases with age, from 1 in 10 people in their 20s and 30s to 5 in 10 people in their 50s. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India [2]. The prevalence of raised blood pressure in low and middle income countries is more (40%) than the high income countries. In India, raised blood pressure is increased from 5% in 1960's, 12% in 1990's and more than 30% in 2008. It ranked fourth in the world by prevalence [3].

However, high blood pressure is both preventable and treatable. In India, impact of hypertension was perhaps not fully regarded due to high incidence of communicable diseases. Now, as communicable diseases are getting controlled and life expectancy has increased hypertension as a public health problem is now being felt.

Substantial research has been carried out in the natural history of hypertension as well as measures for treatment and control. These studies led to the concept of evolution of risk factors. Studies revealed vast range of risk factors in relation to essential hypertension ranging from genetic factors to lifestyle. There is a strong correlation between changing lifestyle factors and increase in hypertension in India. Many of the studies done in this regard are mainly descriptive or cross sectional barring few being analytical. Here is an attempt to identify some of the modifiable risk factors for hypertension in the

rural areas of Hassan Taluk, by conducting an analytical case control study. No such study exists in Hassan district of Karnataka state. Hence the study was carried out in a rural township of Hassan in Hassan district.

AIMS AND OBJECTIVES

To assess the association of selected modifiable risk factors with hypertension by community based case control study in rural population of Hassan Taluk.

METHODOLOGY

A community based case control study was carried out in the villages of Hassan Taluk from July 2013 to September 2013.

A multi stage sampling procedure was used to select the subjects. At first stage .Hassan taluk was divided into three diagonal sectors on the geographical map. Hassan Taluk consists of 12 Primary Health Centres. All the Primary Health Care (PHC) units falling in the sector were listed and every third PHC from each sector was chosen by systematic random sampling. In the second stage, by the method of simple random sampling 10 villages from each PHC were selected and listed. 10 village criteria was used as ample amount of data would be procured for the study, to overcome time limitation and population.

Sample size calculation was done by using epi tool software [4], by assuming odds ratio (OR) =3, proportion of exposure in controls 10%, power(80%) at 95% confidence interval is 110 in each group with total of 220 participants.

Selection of the Cases and controls

A complete list of hypertensive people was obtained by using the previous study data which was done to know the prevalence of hypertension in these villages as part of World Health Day 2013. 110 cases >35yrs of age were divided equally among the 30 villages, approximately 4 cases from each village were randomly selected. 1:1 pair matching has been done, 110 controls were selected from the same village, matching for age (+/-5 years) and sex. Cases are those who recorded mean BP of $\geq$ 140/90 mm of Hg and also the known hypertensives. Controls are those who recorded normal blood pressure and the subjects who are not a known hypertensives.

Data is collected by the interns posted in the Department of Community medicine. They explain the subjects regarding the purpose of visit, brief the subject about hypertension and take their informed consent. A standard semi structured questioner was administered for study subjects. Both the cases and the control were interviewed with the same intensity to eliminate the bias. The questionnaire contains socio demographic data, physical activity, Habits – Drugs/smoking / Alcohol, Family h/o hypertension, CHD, stroke etc

Measurements and definitions used in study

Smokers were defined as those who had smoked almost every day at least one pack [20 cigarettes] per week for at least one year [3]. For drinking habits, drinkers were defined as those who had drunk at least 50 grams of alcohol per day once a week or more for at least one year. H/o of any non communicable disease like diabetes and any medications used were also recorded. The measurements such as BP, waist circumference, height and weight were taken.

BP readings were taken by single observer for each individual, with same standard sphygmomanometer. After taking informed verbal consent from the participants, total of three readings were performed on each participant at 5 min interval in sitting position, by auscultatory method using standard cuff. The first readings taken after a rest of 10 mins.SBP measured on phase I and DBP on Phase V korotkov's sounds. Mean of three readings were considered as the representing BP of the individual. The readings are made to close 2mm Hg mark on scale. Classification was done based on JNC VII criteria [5]. Participants on anti hypertensive medication were also considered as hypertensives. Weight was measured in the upright position to the nearest 0.1 kg using calibrated weighing scale. Height was measured without shoes to the nearest 0.1 cm using calibrated stadiometer (Seca). Waist circumference (WC) was measured to the nearest 0.1 cm at the narrowest point between lower end of the rib cage and iliac crest maintaining appropriate privacy.'

Anthropometric measurements were done by recommended methods taking height in meters and weight in kg and body mass index was also calculated. Waist and hip circumference were measured with the standard non - stressable tape. Subjects with BMI > 25 [5]. And Waist circumference > 50% height is also considered as obese [6].

Odds ratios (OR) and 95% confidence intervals (95% CIs) for the risk factors of hypertension were calculated by a logistic regression model controlling possible confounding factors such as sex and age using the SAS statistical package .Multivariate analysis was done on the basis of univariate analysis for the risk factors of Hypertension. P values <0.05 were considered statistically significant.

RESULTS

A total of 220 subjects were studied with 110 cases and 110 controls.

Males and females are equally distributed in both the group with more number of females. Majority of the study subjects are between the age 55-65yrs in both the groups. Approximately 65% of the study subjects are farmers. More than 70% of the study subjects are illiterates in both the groups. Socio demographic variables are almost equally distributed in both the groups and there is no significant difference seen.

Mean SBP among the cases is 147.36mmHg and among the control is 121.52mmhg. Mean DBP among the cases is 93.98mmhg and among the control is 78mmhg.

Table 1. Distribution of socio demographic characteristics among cases and control

Demographic characteristics	cases	controls	P value
Sex			
Male	52(47.2%)	52(47.2%)	p>0.05
female	58(52.7%)	58(52.7%)	
Age			
35-45yrs	8(0.07%)	15(0.13%)	
45-55yrs	12(11%)	16(14.5%)	
55-65yrs	42(38%)	46(42%)	p>0.05
65-75yrs	35(32%)	26(23.6%)	
>75yrs	13(12%)	7(0.06%)	
Education			
Illiterate	90(81.5%)	85(77%)	
Primery &middle school	12(11.1%)	14(12.6%)	p>0.05
High school & above	8(7.4%)	11(10.4%)	
Occupation			
Farmers	69(62%)	73(67%)	p>0.05
others	41(38%)	37(33%)	
Family income			
Class1	11(21.6%)	17(78.4%)	
Class2	36(32.9%)	33(67%)	
Class3	26(24.4%)	35(75.6%)	p>0.05
Class4	23(35.4%)	19(64.6%)	
Class5	14(52.6%)	6(47.4%)	

P<0.05 is significant

Table 2. Results of Univariate analysis of modifiable risk factors for hypertension among the study subjects

Risk factors		Cases(n=110)	Controls(n=110)	OR	95%CI	P Value
obesity	Yes	44(54.2%)	16(45.8%)	3.91	2.03-7.52	P<0.001
	no	66(24%)	94(76%)			
H/o smoking	Yes	52(57%)	38(43%)	1.69	0.98-2.92	P=0.05
	no	58(41.4%)	72(58.6%)			
Alchohal consumption	yes	30(44.6%)	23(55.4%)	1.41	0.76-2.64	p>0.05
	no	80(29%)	87(71%)			
BMI	>25	45(70.3%)	19(29.7%)	3.31	1.77-6.18	P<0.001
	<25	65(41.6%)	91(58.4%)			

P<0.05 is significant, OR=Odds ratio,

Table 3: Results of multivariate analysis of risk factors for hypertension from a 1:1 pair matched case control study

Risk factors	OR	95%CI	X^2	P value
Obesity	3.45	1.730 to 7.493	13.79	<0.001
h/o tobacco consumption	1.71	0.852 to 3.585	2.132	>0.05
Alchohal consumption	1.53	0.728 to 3.366	1.09	>0.05
BMI	2.92	1.523 to 5.980	11.29	<0.001

P<0.05 is significant, OR=Odds ratio, X^2 = Chi-square value.

Obesity and increased BMI found to have significant association with hypertension with odds ratio around 3, even with the multivariate analysis. Alcohol consumption and tobacco consumption is not found to be significantly associated with the hypertension in the present study.

DISCUSSION

Majority of hypertensive cases were in the age group of 55-65 years. Most of them belong to socio economic class 2 and 3 .78.4% of the cases were illiterate. Alcohol consumption was found to be more in the age group 35-45 years, tobacco consumption was more common in the age group 65-75 years, and obesity was more common in the age group 55-65 years.

Present study found statistically significant association between hypertension and obesity. Study by H M Swami et al[7] in Chandigarh also showed p<0.001. Present study findings are supported by N. K. Goel et al [8] and S. Mishra et al [9] who quoted findings of Manitoba Cohort study followed for 26 years in which BMI was a significant predictor of cardiovascular diseases including hypertension. Statistically significant association has been observed between hypertension and BMI. Odds ratio was found to be 2.9, indicating 2.9 times more risk of developing hypertension in overweight and obese persons. Present study findings are supported by Sagare et al [10] and Midha et al [11] with odds ratio of around 2.2.

The risk of developing hypertension was found to be marginally more among tobacco users

(OR=1.7). Study conducted by Sagare et al [10] in Sangli district of Maharashtra also found significant association with tobacco consumption and hypertension with OR of 2.2. Similar findings were also found in study by Midha et al [11], with odds ratio of 2.7. Gopinath N. et al [12] and Gupta R. et al [13] shows significant association between smoking habit and hypertension.

The risk of developing hypertension was found to be marginally more among alcohol consumers (OR=1.5). Study by Sagare et al [10] confirmed relationship of high blood pressure to alcohol use.

CONCLUSION

Summarily, the present study found obesity as risk factors for Hypertension with significant association, in the age group of > 35 years, in both sexes. Tobacco consumption and Alcohol consumption are found to be marginally associated with hypertension.

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