Original Article

First Degree Relatives Of Hypertensives: How Much At Coronary Artery Disease (CAD) Risk?

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Abstract: Background: The prevalence of Coronary Artery Disease (CAD) has doubled in both rural and urban Indians during the last 20 years. Hypertension is directly responsible for 57% of all stroke deaths & 24% of all CHD deaths in India .Epidemiological studies have highlighted that around 30% to 50% of the interindividual blood pressure variation in the population is genetically determined, hence focusing on first degree relatives of hypertensives is important. Considering the association between HTN & CAD, it is important to identify & manage the risk factors. This study is undertaken with the aim of determining the distribution of cardiovascular risk factors in first degree relatives of patients, to calculate 10 years risk factors for CAD using Framingham Risk Score, to compare the risk in males and females and to identify its relation with age. Material And Methods: A cross sectional analytical study was carried out in the medicine Out- Patient Department (OPD) of the Lata Mangeshkar Hospital. Risk factors profiling was done using Framingham risk score 2008 to calculate 10-year CAD risk based on Framingham risk score evaluation. Result: Risk assessment showed that overall 6.45% of the study population had > 10 % risk of developing CAD in next 10years The overall absolute risk was found higher in males (5.6%) than females (3.3%). The overall absolute risk (26.3%) was found significantly (P=0.0001) more in participants aged >40 years as compared to those up to 40 years of age (1.35%). Conclusion: The most frequent predisposing risk factors towards CAD in the first degree relatives of Hypertensives are age, gender and Hypercholesteremia [Gade S Natl J Integr Res Med, 2020; 11(5):35-40]

Key Words: Framingham Risk Score, Hypertensives , First Degree relatives

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Introduction: Cardiovascular diseases cause millions of deaths per year around the world[1]. Cardiovascular diseases have become a leading cause of morbidity and mortality in adult population of Indian subcontinent also. The prevalence of Coronary Artery Disease (CAD) has doubled in both rural and urban Indians during the last 20 years[2]. There are many reasons attributable to this scenario like rising prosperity, rapid urbanization all leading to unhealthy lifestyle (altered food habits, addictions, lot of stress and lack of physical exercise). All these factors lead to hypertension. Hypertension is ranked as the third most important risk factor for the attributable burden of disease in South Asia[3].

Hypertension also exerts a substantial public health status and healthcare systems in India[4,5]. Hypertension is directly responsible for 57% of all stroke deaths & 24% of all CAD deaths in India[6]. Epidemiological studies have highlighted that around 30% to 50% of the inter individual blood pressure variation in the population is genetically determined; hence focusing on first degree relatives of hypertensives is important[7]. The family history data in one of the studies appeared to provide a strong basis for the conclusion that premature symptomatic vascular disease is significantly more prevalent in family members of patients with premature Peripheral Vascular disease (PVD) than in family members of healthy individuals in the general population[8]. Considering the association between HTN & CAD, it is important to identify & manage the risk factors and hence this study is undertaken with the objective of determining the distribution of cardiovascular risk factors in first degree relatives of patients of Hypertension. Present study was undertaken to assess the distribution of risk factors for CAD among first-degree relatives of patients with Hypertension.

Aim: To study the prevalence of risk factors in causing CAD in the first-degree relatives of patients of Hypertension by using Framingham Risk Score

Objectives: To calculate 10 years risk for CAD using Framingham Risk Score. To co mpare the risk in males and females. To identify the relation with age. A cross sectional analytical study was carried out in the medicine Out- Patient Department (OPD) of the Lata Mangeshkar Hospital.

Study Design: Cross Sectional.

Duration: 1st May 2018 to 30th June (2 months).

Sample Size: Convenient sampling. All the first degree relatives of patients with Primary Hypertension, above 18 years of age attending Medicine OPD in the above period were included in the study. Ethical clearance was obtained from the Institutional Ethics Committee. Informed consent was obtained from the participants

Inclusion Criteria: Male and female first-degree relatives of patients with Primary hypertension and above 18 years of age. Those who are willing to participate and give written informed consent.

Exclusion Criteria: Diagnosed cases of CAD, CKD, Stroke, CVD, PVD, MI. Secondary Hypertension. Thyroid disorders. Pregnant women. Patients on OCPs and on Androgen therapy. The subjects not willing to continue with the study.

Material & Methods: Detailed history about family composition was obtained. History of smoking was obtained. BP was measured in the sitting position after 15 minutes of rest. Three consecutive readings were taken with the interval of 5 minutes each on right arm. Average of the three readings was taken.

Clinical Investigations: Blood samples were obtained after minimum 10 hours of fasting and subjected to serum cholesterol.

Variables: The study variables were age, gender, BP, H/O smoking, & Serum cholesterol levels and Serum HDL.BP ≥140 systolic and ≥90 diastolic was considered as hypertension. A history of smoking was obtained in terms of frequency of smoking either daily or occasionally and the duration.

Smokers who smokes one cigarette daily for more than 5 years are included in the study. Risk factors profiling was done using Framingham risk score 2008 to calculate 10-year CAD risk based on risk score evaluation

Instrument: Framingham Risk Score: The Framingham risk score was calculated using a previously reported algorithm, which takes into account age, sex, total cholesterol, HDL-cholesterol, systolic and diastolic blood pressure, smoking. Framingham risk score is a gender specific algorithm used to estimate the 10 year cardiovascular risk of an individual.

Cardiovascular risk scoring system gives an estimate of the probability that a person will develop Cardio vascular disease within a specified time usually 10 to 30 years[9].

Nearly 30% of CAD events in both men and women were significantly attributed to blood pressure level that exceeded normal (>/ 130/85) showing that blood pressure management and monitoring is paramount both to cardiovascular health & prediction of outcomes.

Coronary Artery disease risk at 10 years in % can be calculated with the help of Framingham score.

Individual with low score will have 10% or less risk CHD at 10 years, with intermediate risk 10-20% and with high risk 20% or more[9].

Why To Assess Risk? Patients with low or very low 10-year risk can be reassured and encouraged to maintain healthy lifestyles (eg, regular exercise, healthy diet, etc). Patients with intermediate 10-year risk can be engaged in discussions about possible lifestyle changes and/or primary preventive therapies and may also be considered for additional screening.

Patients with high 10-year risk (≥20 percent) can be started on appropriate primary preventive therapies[10].

Results: A total of 93 first degree relatives of the hypertensives were included in the study. 63.4% were males and 34.5 % were females.

Mean age of the participants was 34.8 years .The selected socio demographic parameters of the participants are presented in Table 1.

First degree relatives were divided into 2 groups . Group I with age group 18 -40 years and group II more than 40 years of age .Group I represented 79.5 % of the relatives and group II represented 20.4% .

Table 1 shows the baseline characteristics of study population. In group I males had slightly higher systolic and diastolic pressure but it was within normal range. In group 2 females had slightly higher systolic and diastolic pressure but again the figures were within normal range. 59.6% males in group I weresmokers and 28.6% females in group II .

Table – 1 Baseline Characteristics Of The Study Participants

Variables	Group I (Age 18-40 Years)(N=74)		Group II (> 40 Years)(N=19)	
	Female(N=27)	Male(N=47)	Female (N=7)	Male(N=12)
Mean (± SD) age in years	31.5 (±3.9)	30.3(±5.0)	47.7(±7.1)	52.6(±9.3)
Smoking prevalence(%)	3/27 (11.1%)	28/47 (59.6%)	2/7 (28.6%)	2/12 (16.7%)
Mean systolic pressure in mm/Hg	121.7 (±7.4)	128.7 (±10.9)	130.6 (±13.6)	120.2 (±16.3)
Mean diastolic pressure in mm/Hg	79.3 (±5.8)	82.9 (±5.9)	84.3 (±3.9)	78.5 (±7.7)
Mean total cholesterol in mg%	170.6 (±32.9)	170.5 (±28.3)	222.9 (±54.7)	211.5 (±50.1)
Mean HDL in mg%	40.0 (8.2)	41.2 (±8.9)	30.7 (±6.1)	33.7 (±7.8)

Table 2 shows the prevalence of risk factors in the study group. The prevalence of these variables was found to be in the following order in Group I , 41.9% Smoking , 18.9 % Hyper cholesteremia, 2.7 % hypertension . In group II the prevalence of risk factors was found to be 57.9% age, 47.4% Hypercholesteremia and 21% smoking. On comparing the risk factors in the two groups, Prevalence of smoking is 41.9% and 21% without significant difference in both

groups. HC> 200mg% was 18.9% in group I and 47.4% in group II which is significant with p < 0.01% . Mean total Cholesterol of the study sample was around 170.5 mg% - 170.6 mg% in group I and 211 mg% -222 mg% in group II. Mean HDL Cholesterol of the study sample was 40 mg% - 41mg% in group I and 30mg%-33 mg% in group II. Prevalence of Hypertension was 2.7% and 5.2% without significant difference in both groups and lastly age was highly significant factor with a p value of 0.0001.

Table – 2 Prevalence Of Risk Factors In The Study Groups

Variables	Group – I (n=74)Number (%)	Group – II (n=19)Number (%)	P value
Old Age (>45 years)	0 (0.0)	10 (57.9)	0.0001, Significant
Smoking	31 (41.9)	4 (21.0)	0.0940, Not Significant
Hyperchlosterimia	4 (18.9)	9 (47.4)	0.01, Significant
Hypertension	2 (2.7)	1 (5.2)	0.573, Not Significant
Absolute Risk (Mean ± SD) in % at 10 years	3.3 (±4.9)	8.6 (±6.7)	0.0038, Significant
Absolute risk (Mean ± SD) in % in males	3.4 (±5.0)	10.6 (±6.9)	0.0007, Significant
Absolute risk (Mean ± SD) in % in females	<1	3.8 (±2.7)	Indeterminable

Table 3 shows the average value of score for each factor in each of these groups and % Absolute Risk (AR) at 10 years in each study group .The risk score was based on age, tobacco use, gender, blood pressure levels and serum cholesterol and HDL. Males in group II have greater (10.6%) risk of suffering coronary events than females.

Males in group II are at more risk because of the age and Hypercholesteremia factor. In males in group I major risk factor contributing to AR were smoking and Hypercholesteremia. Even in Group I males had higher risk (3.2%) of developing CHD.

Overall males in both the groups were more at risk of suffering coronary events.

To Calculate 10 Years Risk Factors For CAD Using Framingham Risk Score: Overall Risk assessment showed that overall 6/93 (6.45%) of the study participants had > 10 % risk of developing CAD in next 10years Gender, age and Hypercholesteremia are identified as significant risk factors by Framingham Risk Score in the study participants.

To Compare The Risk In Males And Females: The overall absolute risk was found higher in males

(5.6%) than females (3.3%). Among younger participants (age <=40 years) females reported years) males have much higher (10.6%) risk as compared to females (3.8%).

To Identify The Relation With Age: The overall absolute risk (26.3%) was found significantly (P=0.0001) more in participants aged >40 years as

with <1% risk while males had 3.4% risk. However, among older participants (age >40 compared to those up to 40 years of age (1.35%). A significant (P=0.0001) positive and strong (r=0.64) linear relationship between age of the participant and percent risk of CAD was observed.

Table – 3 Average Value Of Scores Per Risk Factor And 10-Year Risk Percentage In Each Study Groups

Variables	Group I (Age 18-40 Years)(N=74)			Group II (> 40 Years) (N=19)		
	Female(N=27)	Male(N=47)	P-Value	Female(N=7)	Male(N=12)	P- Value
Age	-6.3	-8.4	0.0001	3.1	5.3	0.3029
Smoking	0.6	4.8	0.0001	1.4	0,8	0.5652
Hyperchlosterimia	3.6	3.2	0.5721	4.0	2.6	0.1096
Hypertension	0.6	0.9	0.1699	1.7	0.7	0.0933
Total points	2.3	3.1	0.6255	-0.2	1.0	0.3474
Absolute Risk % at 10 years	1.0	3.2	>0.05	3.8	10.6	<0.05

Discussion During the past 30 years a large decline in the cardiovascular diseases has been experienced in the West and substantial increase has been experienced in the developing countries. If this trend continues there will be enormous consequences of cardio vascular diseases / CAD. Hypertension is a risk factor for CAD. According to the WHO 2008 estimates, the prevalence of raised BP in Indians was 32.5% (33.2% in men and 31.7% in women)[11].

Various epidemiological studies, clinical correlation & genetic studies have identified number of cardiovascular risk factors like high levels of cholesterol, triglycerides, hypertension, low levels of HDL, tobacco smoking and sedentary life styles amongst many others. Few studies have been carried out in India to study cardiovascular risk factors in coronary events at JIPMER and Jaipur in the first degree relatives of CAD events but none according to available resources has studied 1[0] degree relatives of Hypertension to study Cardio vascular risk factors leading to CAD in the coming 10 years.

A family focus is considered as an important and appropriate in identifying and preventing cardiovascular events , because epidemiological studies have manifested that around 30-505 of the inter individual blood pressure variation in the population is genetically determined[7]. Through this study we describe the prevalence of risk factors and absolute risk factors of suffering CAD at 10 years in the first degree relatives

hypertensive patients in the first degree consanguity. Several studies show that the heredity part for hypertension varies between

35-65%[12]. This has been attributed to sharing the same exposure to environmental factors and common genetic components. Hypertension is the most important risk factor for chronic disease burden in India.

Studies from various parts of India have reported high prevalence of hypertension. These studies have also reported that hypertension is increasing and there is low awareness and control. Two recent studies have been conducted with uniform tools and nationwide sampling to determine the true prevalence of hypertension in the country. Fourth National Family Health Survey evaluated hypertension in a large population based sample (n = 799,228) and reported hypertension in 13.8% men vs. 8.8% women (overall 11.3%) aged 15–49 and 15–54 respectively. More representative data (age > 18 years, n = 1,320,555) in Fourth District Level Household Survey reported hypertension in 25.3% with greater prevalence in men (27.4%) than women (20.0%)[13].

J D Berry tested the ability of the Framingham Risk Score (FRS) and the online ATP III risk estimator to estimate risk and to predict 10-year and longer term coronary heart disease (CHD) death in younger adults (age 18–39 years). The Framingham Risk Score remained below 10% for

all deciles of CHA-predicted risk in the 18 to 29 year old cohort. Framingham-predicted risk reached 12% only in the 30 to 39 year old cohort in the highest decile of CHA-predicted risk, despite substantial risk factor burden[14]. In one of the study conducted under the department of Preventive and Social Medicine and patients were enrolled from the Department of Cardiology of GMC Hospital, Kota to screen the first- degree relatives of the patients suffering from premature CAD, for the presence of risk factors. Hypertension was present in 29.7 % of the relatives suffering from Premature CAD. Diabetes mellitus and high lipid levels affected 13.0 % and 10.1 % relatives respectively. 47.5% of the relatives were either obese or leading a sedentary life style while 27.7% were smokers[15].

In an study conducted in Columbia to study the prevalence of cardiovascular risk factors and Absolute Risk (AR) was calculated in the first degree relatives of hypertensive patients. The author concluded that The AR was high in the young relatives and thereby discussed the need of programs for weight, smoking, sedentary and dyslipidaemia control to prevent or delay in development of CAD in relatives[16].

To assess the prevalence of Cardiovascular Disease (CVD) risk factors and to estimate the cardiovascular risk among first degree relatives of CAD patients a cross-sectional study was performed in first degree relatives of coronary artery disease patients in cardiology ward of JIPMER a tertiary care hospital in Puducherry. Around 10% of the participants had more than 10% risk for the occurrence of cardiovascular events by using WHO/ISH risk prediction charts.

In addition, cardiovascular risk factors like physical inactivity, smoking, alcohol abuse, obesity, hypertension, diabetes abnormal lipid profile were found in 22.5%, 19.2%, 16.1%, 12.4%, 33%, 29% and 13.8% study participants, respectively[17].

Another observational, cross sectional study of 1,066 adults older than 20 years in the was carried out in the Brazilian state to study the prevalence of risk factors for coronary artery disease. It was reported that prevalent risk factors were sedentary life style, familial antecedence, overweight/Obesity, Smoking and.

Hypertension in the descending order[18]. It is quite obvious that percentage of hypertension, overweight, high cholesterol levels ,increases in old age , even percentage of smoking and hypertension also increases with age . That could probably explain linear relationship of risk with age[18].

Limitations: The study population included in this study was those first degree relatives who were available with the patient or those who were contacted telephonically and showed willingness to participate after explaining the study. This population can be a healthier one as compared to those who are not involved in this study. This can result in selection bias.

Conclusions: 6.4 % of study population is at risk for CAD at 10 years. The overall absolute risk was found higher in males (5.6%) than females (3.3%). Absolute risk (26.3%) % risk is observed in population more than 40 years of age. The population studied is subjected to low and medium risk of suffering CAD disease at 10 years.

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