



STUDY OF ASSOCIATION OF HYPERTENSION AND DIABETES MELLITUS WITH CARDIOVASCULAR DISEASE IN A TERTIARY CARE HOSPITAL.

Dhekane Shrikant

Associate consultant, ICU cum AE Department, Inlaks & Budhrani Hospital, Pune

Jadhav Rajashri*

Assistant professor, Department of Pulmonary Medicine, MIMER Medical College, Talegaon D, Pune *Corresponding Author

ABSTRACT

In India there is accelerating epidemic of non-communicable diseases and 28% deaths were due to cardiovascular diseases (CVD). Instead of finding new risk factors for CVD, we studied association of comorbid conditions like hypertension, diabetes mellitus and dyslipidaemia with CVD in local community. Present case control study was carried out at tertiary care hospital. Newly-diagnosed 51 cases of coronary artery disease and 51 age, gender matched controls were studied. Data was analysed using Chi square test, Z test and odds ratio was calculated. We found strong significant association of hypertension (OR 3.56), diabetes mellitus (OR 2.70) and dyslipidaemia (OR 4.45) with CVD. From our results we could conclude that there is strong significant association of hypertension, diabetes and dyslipidaemia with CVD. Public awareness and lifestyle modifications in all patients with diabetes and hypertension should be encouraged for prevention of CVD.

KEYWORDS : coronary vascular disease (CVD), hypertension, diabetes, etc.

Introduction:

In India there is accelerating epidemic of non-communicable diseases. 53% of all deaths accounted to non-communicable diseases and cardiovascular disease (CVD) was responsible for 28% deaths.¹ There is shifting of disease burden from communicable diseases to non-communicable diseases. Among non-communicable diseases CVD, COPD, cancer and accidental injuries are four major diseases leading to this mortality.²

In Indians 70% of heart first attacks occur before the age of 60 years and 11.7% of heart attacks occur in less than 40 years of age as compared to 5.6% in rest of the world.³ Several hundred risk factors have been identified for CVD. Instead of finding new risk factors for CVD we studied association of comorbid conditions with CVD in local community.

We studied family history of CVD, comorbid conditions like hypertension, diabetes mellitus and dyslipidaemia in CVD patient group and age, gender matched controls in a tertiary care hospital in Pune which is located at western part of India. This could help to recommend suitable and effective measures to reduce morbidity and mortality due to CVD.

Materials & Methods:

This case control study was done during December 2014 to March 2015 in Inlaks & Budhrani Hospital, Pune.

Study Population:

Cases: Successive patients of newly diagnosed acute coronary syndrome (acute myocardial infarction or unstable angina or non-ST elevation myocardial infarction) presenting to hospital were enrolled as cases after taking written informed consent.

1. Acute myocardial infarction was diagnosed if patients fulfilled 2 of 3 criteria: typical chest pain, ECG changes and increased serum cardiac biomarkers,
2. Unstable angina was diagnosed if patient with chest pain develop ECG change of fresh ST segment depression, transient ST segment elevation and/or T wave inversion,
3. Non-ST elevation myocardial infarction was diagnosed if patient with chest pain develop ECG changes like unstable angina and positive cardiac biomarkers.

Control:

Controls were randomly selected age and gender matched individuals from general health check department and wards of hospital that were free from cardiovascular disease and informed written consent taken. We obtained 12 lead ECG in all controls and excluded those with abnormal ECG. We excluded subjects with

history of acute myocardial infarction or angina pectoris.

Matching:

For each case, 1 age and gender matched control was selected; age matching was done with the liability of ± 5 years of age.

Sample Size:

Total 102 subjects, 51 cases studied within period of three months and 51 age and gender matched controls from health department and wards.

Data Collection:

After written informed consent, we collected information regarding demographic data, family history and history of major illnesses such as coronary artery disease, hypertension, diabetes, stroke, smoking or tobacco intake. General Physical examination was performed to assess height, weight, and blood pressure (BP). Body mass index (BMI) was calculated as weight (kg) divided by square of height (m). After enrolling the patient according to inclusion exclusion criteria we collected data about following comorbid conditions.

1. Hypertension:

Blood pressure is taken by using a mercury manometer blood pressure apparatus and by using the standard adult size cuff on right arm. The patient is labelled as hypertensive when systolic BP ≥ 140 mm Hg and /or diastolic BP ≥ 90 mm Hg according to Joint National Committee Classification VII or if patient was a known hypertensive.⁴

2. Diabetes:

Fasting glucose was determined at a central laboratory after overnight fast of fourteen hours. Past history of diabetes is asked and whether patient is on any anti diabetic drugs. A patient is said to be diabetic according to ADA criteria when fasting glucose ≥ 126 mg/dl or if patient is already a known case of diabetes.⁵

3. Lipid Profile:

Patient is kept fasting over night for fourteen hours and blood sample was taken for lipid profile test. Dyslipidaemia defined by previous history of taking lipid lowering medicines or presence of high total cholesterol (≥ 200 mg/dl), high LDL cholesterol (≥ 130 mg/dl), low HDL cholesterol (< 40 mg/dl) or high triglycerides (≥ 150 mg/dl) according to NCEP guidelines.^{6,7}

4. Family History of Coronary Artery Disease:

A detailed history was taken of parents and siblings regarding presence of coronary artery disease based on patient/family report.

In cases of sudden death of parents a detailed history is asked regarding the association of chest pain / sweating, giddiness and dyspnea prior to death.

Statistical Analysis:

Statistical analysis was done by using graph pad prism software. Association of the comorbid conditions under study were assessed by applying Chi-Square test .To assess the strength of association, the odds ratio was calculated. For the purpose of study $P < 0.05$ was considered statistically significant.

Result:

Table 1: Association of Hypertension in Case & Control Groups

HT	Case Group (n=51)	Control Group (n=51)	χ^2 -value	p-value	OR
Yes	38(74.51%)	23(45.10%)	9.18	P=0.0025 p<0.05*	3.56 (1.54-8.22)
No	13(25.49%)	28(54.90%)			

Table 2: Association of Diabetes mellitus in Case & Control Groups

Diabetes	Case Group (n=51)	Control Group (n=51)	χ^2 -value	p-value	OR
Yes	27(52.94%)	15(29.41%)	5.83	0.016 p<0.05*	2.70 (1.19-6.10)
No	24(47.16%)	36(70.59%)			

Table 3: Association of Dyslipidaemia in Case & Control Groups

Dyslipidaemia	Case Group (n=51)	Control Group (n=51)	χ^2 -value	p-value	OR
Yes	47(92.16%)	37(72.55%)	6.75	P=0.009 P<0.05*	4.45 (1.35-14.64)
No	4(7.84%)	14(27.45%)			

Table 4: Association of Family history of CVD in Case & Control Groups

Family history CVD	Case Group (n=51)	Control Group (n=51)	χ^2 -value	p-value	OR
Yes	16(31.37%)	12(23.53%)	0.79	P=0.375 p>0.05 NS	1.49 (0.62-3.57)
No	35(68.63%)	39(76.47%)			

Discussion:

In the present study we observed that hypertension was significantly associated with CAD. Person with hypertension is at 3.56 time's higher risk of CVD than normotensive subjects. Hypertension is important factor in development of CVD.^{8,9} Experimental evidences supported that hypertension predisposes to atherosclerosis through a mechanism involving inflammation and oxidative stress in the arterial wall.¹⁰

Diabetes was significantly associated with CVD. In our study, 52.94% of our CVD cases had diabetes compared to 29.41% of controls. Increased CVD risk in diabetes occurs through multiple pathways and different mechanisms which include oxidative stress, endothelial dysfunction and platelet dysfunction, coagulation and lipoproteins.¹¹

Dyslipidaemia was significantly associated with CVD with significant dyslipidaemia among CVD cases. Dyslipidaemia is well known risk factor of CVD.¹²

In our study we found no significant association of family history of CVD with development of CVD. Epidemiological studies suggest that family or parental history of myocardial infarction is risk factor for coronary heart disease.^{13,14}

From our results we conclude that there is strong significant association of hypertension, diabetes and dyslipidaemia with development CVD.

Public awareness should be done regarding increasing epidemic of non- communicable diseases. People should be encouraged to avoid unhealthy behaviours to prevent diabetes and hypertension.

Lifestyle modifications are of paramount importance for all patients with diabetes and hypertension for prevention of CVD.

REFERENCES:

- Reddy KS, Shah B, Varghese c, et al. Responding to the threat of chronic diseases in India. *The Lancet*. 2005; 336:1744-9
- Gupta R, Gupta S, Joshi R, Xavier D. Translating evidence into policy for cardiovascular disease control in India. *Health Res Policy Plan*. 2011; 9:8.
- Joshi P, Islam S, Pais P, Reddy KS, et al. Risk factors for Early myocardial infarction in South Asians compared with individuals from other countries. *JAMA*. 2007; 297: 386-394
- National High Blood Pressure Education Program. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Classification of Blood Pressure. Bethesda (MD): National Heart, Lung, and Blood Institute (US); August, 2004. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK9633>.
- Gavin JR, Alberti KGMM, Davidson MB, et al. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 2002; 25:5-20.
- Expert panel on detection, evaluation and treatment of high blood cholesterol in adults: summary of the second report of the National Cholesterol Education Program (NCEP). (Adult Treatment Panel II). *JAMA*. 1993; 269: 3015-23.
- Expert panel on detection, evaluation and treatment of high blood cholesterol in adults. National Cholesterol Education Program: second report (Adult Treatment Panel II). *Circulation* 1994; 89:1329-45.
- Miyake, Yoshihiro. Risk factors for non-fatal acute myocardial infarction in middle-aged and older Japanese. *Fukuoka Heart Study Group. Japanese circulation journal*. 2000; 64(2): 103-109.
- Panwar, Raja Babu, et al. Athero-thrombotic risk factors & premature coronary heart disease in India: A case-control study. *Indian journal of medical research*. 2011; 134(1):26.
- Li JJ, Chen JL. Inflammation may be a bridge connecting hypertension and atherosclerosis. *Med Hypotheses*. 2005; 64:925-929
- Sowers JR. Diabetes mellitus and cardiovascular disease in women. *Arch Intern Med*. 1998; 158: 617-21.
- Mohan V, Deepa R, Shanthirani S, Premalatha G. Prevalance of coronary artery disease and its relationship to lipids in a selected population in south India. *The Chennai Urban Population Study (Cups No.5). J Am Coll Cardiol*. 2001; 38: 682-87
- Snowden EB, Macnamara PM, Garrison RI et al. Predicting Coronary artery disease in siblings-multivariate assessment. *The Framingham Study. Am J Epidemiol*. 1982; 115: 217-22
- Schächinger, Volker, et al. A positive family history of premature coronary artery disease is associated with impaired endothelium-dependent coronary blood flow regulation. *Circulation*. 1999. 100(14): 1502-1508.