Angiographic Profile and Prevalence of Risk Factors in Patients Who Underwent Coronary Angiogram in ICHRI

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ABSTRACT

Background & objective: This study summarizes the data of 6708 patients who underwent Coronary Angiogram (CAG) at Ibrahim Cardiac Hospital & Research Institute (ICHRI) between January 2005 to June 2009 with signs and symptoms suggestive of cardiac diseases particularly ischemic heart disease. The purpose of the study was to see the demographic pattern, risk factor distribution and clinical presentation.

Methods: This cross-sectional study was done by collecting information from the patients through interview, clinical examination and laboratory investigations. The investigations done to achieve a diagnosis were blood glucose, ECG, Echocardiogram and coronary angiogram. Recent lipid profiles (within past 3 months) and other relevant reports were also taken into account. Significant coronary lesions were considered if $\geq$ 50% of the luminal diameter of left main or $\geq$ 70% of the luminal diameter of other coronary arteries was found stenosed on CAG.

Result: The demographic characteristics of the subjects show that nearly 40% of them attended between 5th and 6th decades of life followed by 33.9% at 6th decade and onwards and 21.8% between 4th and 5th decades and 5.3% before 4th decade of life. The mean age of the subjects was 54.9 ± 10.1 years and male to female ratio was roughly 3:1. Over one-third (36.2%) was overweight (BMI 25 - 29.9 kg/m^2), 7.7% obese (BMI 30 - 39.9 kg/m^2). Morbid obesity was rare (0.5%). Most frequently observed risk factors were hypertension (62.7%) and diabetes (59.1%). Over one-third (36.3%) of the subjects exhibited dyslipidaemia. Current smoker was less common (6.4%) and family history of heart disease was even less (1.6%). More than 87% subjects had at least one risk factor Of the 6708 subjects studied, 536(8.1%) underwent Exercise Tolerance Test (ETT) before the CAG. Of them more than 90% was found positive. Out of 4905 patients who were evaluated echocardiographically, 2666(54%) had wall motion abnormality. About 85% of the subjects underwent CAG alone while 15% of the patients have had both CAG and PCI. Of the 6708 patients who underwent CAG, LAD was the prime vessel to be affected (50.8%) followed by RCA (42.1%), LCx (30.5%), OM (22.8%), diagonal (16.7%), PDA/PLV (9.7%), LM (4.8%).

Conclusion: Majority of the subjects presenting at ICHRI for CAG were in their 5th and 6th decades of life. Most frequently occurring risk factors were hypertension, diabetes and overweight /obesity. More than 50% of patients had wall motion abnormality on echo and ETT was positive in more than 90% of cases. LAD was the prime vessel invoved followed by RCA and LCx.

Introduction

The knowlege of crucial role of risk factors in the development of coronary heart disease (CHD) is one of the most significant advances in the understanding of this important disease. Extensive epidemiological research has established cigarette smoking,[1] diabetes,[2] hyperlipidemia,[3] and hypertension[4] as independent risk factors for CHD. In addition, treatment of these risk factors has been convincingly shown to reduce the risk of future cardiac events.[1,5] Although the importance of conventional risk factors is well established, it is commonly suggested that more than 50% of patients with CHD lack any of the conventional risk factors.[6-13] The present study was, therefore, intended to determine the prevalence of the conventional risk factors-cigarette smoking, diabetes, hyperlipidemia, and hypertension-in a

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broad population of patients (majority with signs and symptoms suggestive of cardiac diseases) who arrived at Ibrahim Cardiac Hospital & Research Institute between 2005 and 2009 for coronary angiogram.

Methods

This cross-sectional study was done by collecting information from the patients through interview, clinical examination and laboratory investigations. The laboratory investigations done were ECG, echocardiogram, ETT and coronary angiogram. Hypertension was considered if a patient had systolic blood pressure = 140 mmHg or diastolic blood pressure = 90 mmHg or if a patient was under antihypertensive drug. A patient was said to be diabetic if random blood sugar was found ≥ 11.1 mmol/L or fasting blood sugar ≥ 7.0 mmol/L or if a patient was on antidiabetic drug therapy. A patient was considered smoker if he or she was currently smoking. Dyslipidaemia was termed if serum total cholesterol was > 200 mg/dl or LDL-cholesterol > 130 mg/dl or triglyceride > 150 mg/dl or HDL-cholesterol < 40 mg/dl or any combinations of these four criteria and or taking antilipid drugs. BMI 25 - 29.9 kg/m² was defined as overweight and ≥ 30 kg/m² as obesity. Significant lesions were considered if there was ≥ 50% of the luminal diameter narrowing of left main (LM) or ≥ 70% of the luminal diameter narrowing of other coronary arteries or both.

Results

In this study we analyzed the data of 6708 subjects (patients) who attended at ICHRI between January 2005 to June 2009 with signs and symptoms suggestive of cardiac diseases and underwent CAG. Year-wise distribution of the patients attended at ICHRI is shown in fig. 1.
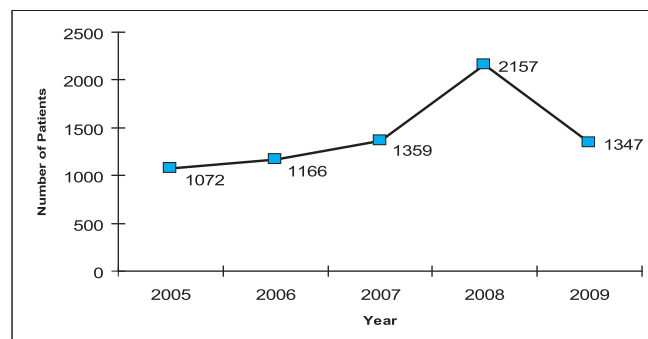

Fig.1: *Year-wise distribution of subjects attended at ICHRI.*

Demographic characteristics

The demographic characteristics of the subjects show that nearly 40% of them attended between 5th and 6th decades of life followed by 33.9% in 6th decade and

onwards and 21.8% between 4th and 5th decades. Some 4.8% presented between 3rd and 4th decades and very few (0.5%) below 3rd decade of life. The mean and median ages (54.9 and 55 years respectively) were almost same indicating that age was distributed normally (Table I & Fig. 2). A male preponderance (73%) was observed among the subjects (Fig. 3).

Table I. Distribution of patients by age (n = 6708).

Age (years)	Frequency	Percentage
< 30	31	0.5
30-40	322	4.8
40-50	1467	21.8
50-60	2615	39.0
⩾60	2273	33.9

* *mean age = (54.94 ± 10.15) years; median age = 55(8 - 92) years.*

Body Mass Index

Using weight and height data Body Mass Index (BMI) was calculated which was then extrapolated to determine the obesity status. Over half of the subjects (53%) was of normal weight (BMI 18.5 - 24.9 kg/m²), 36.2% was overweight 7.7% was obese. Morbid obesity was rarely observed (0.5%) (table II).
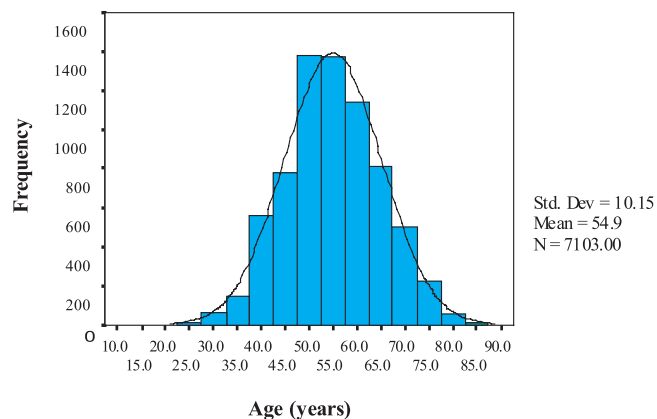

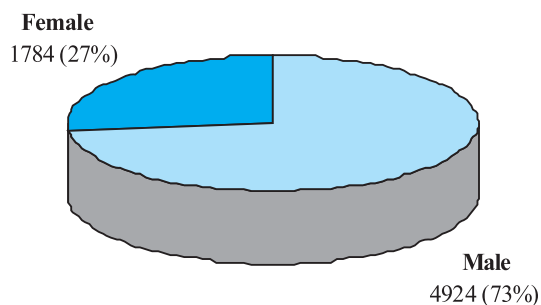**Fig. 2:** *Frequency polygon showing distribution of age*

Fig.3: *Distribution of patients by sex (n = 6708)*

Table II. Distribution of patients by BMI (n = 6708).

| BMI (kg/m^2)	Frequency	Percentage
< 18.5 (Under weight)	180	2.7
18.5 - 24.9 (Normal)	3573	53.0
25.0 - 29.9 (Over weight)	2426	36.2
30.0 - 39.9 (Obese)	517	7.7
40 (Morbid)	32	0.5

Risk factors distribution

Study of risk factors for cardiac diseases revealed that over 60% of the subjects had hypertension and nearly 60% had diabetes. A substantial proportion of the subjects (36.3%) exhibited dyslipidaemia. Smoking history was less common (6.4%) and family history heart disease was even less (1.6%) (table III). More than 30% of the patients had at least one risk factor and about 40% had two risk factors. Presence of three risk factors was observed in 17.8% of the cases but concurrent occurrence of four risk factors was a rarity (0.2%) (Fig. 4). Different combinations of risk factors as illustrated in fig. 5. Accordingly 37.9% of patients had hypertension and diabetes together and approximately one-quarter (24.2%) had diabetes along with dyslipidaemia. Diabetic smoker, hypertensive smoker and dyslipidaemic smoker were less frequently found.

Table III. Distribution of patients by risk factors (n = 6708).*

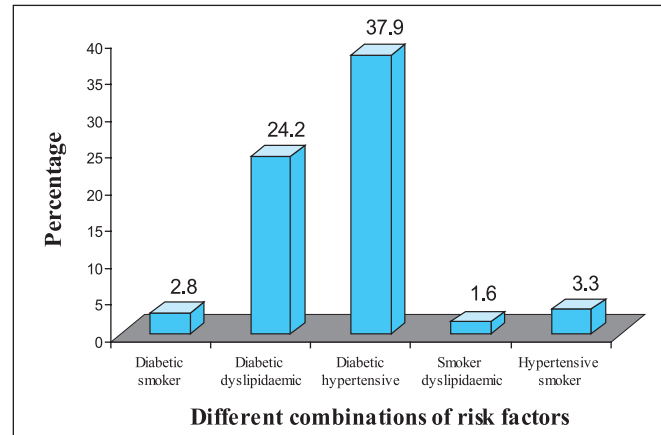| Risk factors	Frequency	Percentage
Diabetes	3967	59.1
Hypertension	4208	62.7
Dyslipidaemia	2433	36.3
Smoking	429	6.4
Family history of IHD	104	1.6

* Multiple response
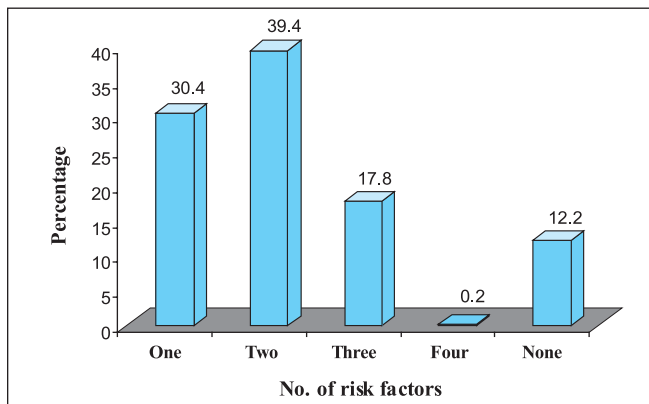
Fig. 4: *Distribution of patients by number of risk factors (n = 6708)*

ECG finding

ECG shows about one-third (32.2%) exhibited Q wave MI and another one-third (32.8%) ST-segment changes. Bundle branch block was found in 5.8% of the cases. Other ECG diagnoses were AV block, AF and bifascicular block (Table IV).

Fig. 5: *Different combinations of risk factors present (n = 6708).*

Table IV. Distribution of patients by ECG findings and/or diagnoses (n = 6241).

ECG findings/diagnoses	Frequency	Percentage
Normal	977	15.7
Q wave MI	2010	32.2
ST segment-changes	2049	32.8
BBB	361	5.8
Others	884	13.5

ETT & Echo findings/diagnoses

Of the 6708 subjects attended, 536(8.1%) underwent Exercise Tolerance Test (ETT) before CAG. Of them 90.1% were found positive, 4.7% negative and 5.2% equivocal (table V). Of the 4905 patients who were subjected to echocardiographic evaluation, 2666(54%) exhibited wall motion abnormality (Fig. 6).

Table V. Distribution of patients based on ETT findings (n = 536).

ETT findings	Frequency	Percentage
Positive	483	90.1
Negative	25	4.7
Equivocal	28	5.2

Echo ejection fraction

Echocardiographic estimate shows that 57% of the patients had left ventricular ejection fraction ≥ 55%

followed by 21.2% between 45 - 54% and 20.9% 30 - 44%. Very few (0.9%) had critical ejection fraction (< 30%) (Table VI).
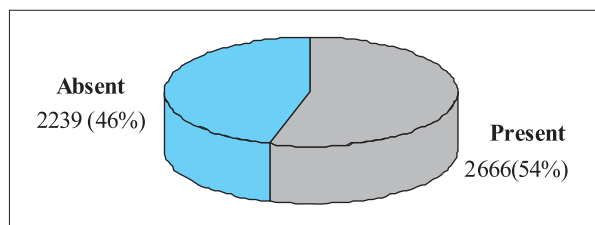

Fig. 6: *Echocardiographic wall motion abnormality (n = 4905).*

Table VI. *Left ventricular ejection fraction on echocardiography (n = 4872).*

LVEF (%)	Frequency	Percentage
< 30	45	0.9
30 - 44	1016	20.9
45 - 54	1035	21.2
≥ 55	2776	57.0

Significant lesions detected on coronary angiogram (CAG)

Significant lesions (≥ 50% lesions in LM and ≥ 70% in other coronary arteries) detected in different coronary arteries through coronary angiogram are outlined in table VII. LAD was affected in more than half of the cases (50.8%). RCA was next predominant vessel to be affected (42.1%). Then comes in descending order, LCx (30.5%), OM (22.8%), diagonal (16.7%), PDA/PLV (9.7%), LM (4.8%) and RI (4.2%). Of the 6708 patients who underwent CAG, 5835(87.0%) had significant lesion in one or more major vessels or their branches (table VII). Of them 977(14.6%) had triple vessel disease (TVD).

Table VII. *Significant lesion detected in different coronary arteries.*

Coronary arteries	Significant lesion	
	Frequency	Percentage
LM	321	4.8
LAD	3408	50.8
LCx	2048	30.5
RCA	2824	42.1
Diagonal	1119	16.7
OM	1531	22.8
PDA/PLV	653	9.7
RI	281	4.2
Any coronary arteries	5835	87.0

Comment

Majority (87%) of the subjects presenting at ICHRI (a tertiary level hospital) with signs and symptoms of cardiac diseases had at least one of the four conventional risk factors (cigarette smoking, diabetes, hyperlipidemia, and hypertension) and signs of ischemic heart disease. Quite consistent with these findings, Khot and associates in a similar study demonstrated that majority CHD patients (84.6% of women and 80.6% of men) carry at least 1 of the 4 conventional risk factors.[14] Risk factors for major ischaemic heart disease (acute myocardial infarction or sudden death) have been investigated in a prospective study of 7735 men aged 40-59 years drawn from general practices in 24 British towns. Although univariate estimates showed that serum total cholesterol, LDL-cholesterol and triglyceride concentrations, systolic and diastolic blood pressures, cigarette smoking and body mass index were all associated with increased risk of ischaemic heart disease, multiple logistic models revealed only serum total cholesterol, blood pressure and cigarette smoking to be highly significant independent risk factors whereas overweight, above average levels of LDL-cholesterol and serum triglyceride were not predictive of risk after allowance for the above factors.[15] About 40% of patients with complaints of ischemic heart diseases presented between 5th and 6th decades of life and majority of the patients carried at least one risk factors. Of the risk factors, hypertension, diabetes and overweight/obesity were commonly encountered.

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