THE IMPACT OF AGE AND SEX IN THE PATTERN OF CORONARY ARTERY DISEASE

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ABSTRACT

Coronary Artery Disease (CAD) is the primary cause of death in the world. Over the last three decades, invasive procedures such as coronary artery bypass grafting (CABG) and percutaneous coronary interventions (PCI) have resulted in significant improvements in survival and quality of life for patients. Besides traditional modifiable risk factors, it has been proved that some fixed, non-modifiable factors contribute in the behaviour of coronary involvement. To see whether the age and sex as a coronary risk factor contribute this differential coronary involvement, we conducted this study.

Objective: To determine the frequency of coronary artery disease (CAD) as it varies with age and gender.

Methods: It is a descriptive study carried out at NICVD Karachi. All the subjects were adults with previous history of ischemic heart disease and recommended coronary angiography based on history and non-invasive tests.

Results: There were 79.6% male patients and the mean age was 52 years (ranged from 28 to 85 year). In 80% of patient femoral artery access was used for performing the procedure. Right coronary artery was found dominant in 73% angiograms.

Left anterior descending artery was the most frequently involved artery(73.6%) among major coronary arteries and obtuse marginal was most frequently involved (20.4%) branche artery. Ramus intermedius was found diseased in 4.2%.The frequency of involvement of Left Main artery and distal segments of major coronary arteries was increased with advancing age but there was no significant association between age and sex and involvement of other coronary arteries.

Conclusion: In conclusion males have a higher recorded rate of coronary angiography and single vessel disease is the most common finding. Females and ages above 80 and below 40 had low incidence of angiographic events.

Key words: Coronary artery disease, coronary risk factor, Age, Gender.

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INTRODUCTION

Coronary artery disease (CAD) is the leading cause of mortality worldwide.[1] Its prevalence is decreasing in many developed countries, but is increasing in developing and transitional countries, partly as a result of increasing longevity, urbanization, and lifestyle changes. Coronary heart disease burden is projected to rise from around 47 million DALYs (Disability Adjusted Life Years) globally in 1990 to 82 million DALYs in 2020.[2] Coronary artery disease is looming as the new epidemic afflicting South East Asians at a relatively younger age with a severe and diffuse form of disease.[3,4]

The incidence of CAD in the Western population is upto 5% as compared to 12-16% in the South East Asians.[5,6]

Premature CAD is defined as that occurring below the age of 55 years in males and below 65 years in females, whereas CAD in the young is defined as CAD occurring in patients less than 40 years of age.[1-7] This global phenomenon of prematurity and severity suggests that the disease starts at an early age and has a malignant course.[7] The prevalence of CHD in younger subjects is difficult to establish accurately since it is frequently a silent process. More importantly patients do not present into clinics until actual episodes of chest pain or myocardial infarction. Patients younger than 40 years undergoing coronary artery bypass graft surgery have a high incidence of coronary risk factors, especially smoking; by angiography, a high proportion of these cases have left main (13.8%) and triple vessel disease (60%).[8] Another study affirmed that premature sudden coronary death below 40 years of age demonstrates a relatively high numbers of acute thrombi, especially erosions, a lesser degree of cardiomegaly and healed infarcts. It also proved that the necrotic core formation is associated with increasing age.[9]

The life time risk for developing CHD at the age of forty is two in three for men and one in three for women, and remains almost the same at the age of seventy, being one in three in men and one in four for women.[10] Since 1950, the incidence of coronary heart disease has risen among women while it has declined among men.[11] Recent studies have shown that the formation of CAD in women differs remarkably from that of men, and also the risk factors play different roles in both sexes, estrogen playing a key protective role in women. Women have worse prognosis than men once they have had a myocardial infarction, and they also face worse prognosis than men following surgical therapy for CAD.[12-14]

MATERIALS AND METHODS

A descriptive, prospective, cross-sectional study was carried out in the cath lab of National Institute of Cardiovascular Diseases, Karachi from January 2008 to July 2008.

A total number of 490 patients between the ages of 28 and 88 years of age with clinical and ECG features suggestive of ischemic heart disease visited to National Institute of Cardiovascular Diseases and scheduled for the procedure of angiography were included.

The study incorporated simple random sampling. All the data collected was used in formulating a comprehensive survey. All subjects were individually contacted, interviewed and the appropriate questions asked. Detailed clinical history and examination were also carried out with particular reference to smoking, socioeconomic status, lifestyle, family history of ischemic heart disease, obesity, waist to hip ratio and hypertension. ECG, fasting lipid profile, fasting and postprandial blood sugar and cardiac catheterization were done in every subject.

Inclusion criteria:
All male and female candidiates between the set age limit 28 and 88 years presenting with symptoms of ischemic heart disease were taken into account. Care was taken to include all patients with hypertension, diabetes mellitus, dyslipidemia, cardiac failure, stable angina, unstable angina and patients who had suffered from acute myocardial infarction, both symptomatic and silent, in the past week.

Exclusion criteria:
All patients with coagulopathy, decompensated congestive heart failure, uncontrolled hypertension, recent history of CVA, refractory arrythmia, GI haemorrhage, pregnancy, active infection, renal failure, contrast medium allergy or showing refusal to give informed consent were excluded from the study.

With the aid of a precise questionnaire, many important variables including age and gender were extracted, which were linked to the patients' number of blocked arteries. In addition, the questionnaire was designed to gather information pertaining to the subject's risk factors.

The study did not involve any follow-up on the subjects and the data from every individual was collected only during their first episode of undergoing coronary angiography.

The coronary angiography was performed using either the radial or the femoral approach. Coronary stenosis of 70% of the arterial luminal diameter (in any view) was considered significant lesion; stenosis of the large diagonal or marginal branches was counted as lesions of the left anterior descending and circumflex coronary arteries, respectively. Right coronary disease in a left-dominant circulation was not considered. Left main coronary lesions were counted as two-vessel disease and were considered present when the luminal diameter was reduced by 50% (as three-vessel disease in case of non-dominant RCA). Left main equivalent coronary disease was considered when a luminal stenosis, 70% was present in the left anterior descending coronary artery before the first septal branch and in the proximal circumflex coronary artery before the first obtuse marginal branch in the absence of left main coronary artery disease.

The data collected was sorted and analyzed on MS Excel and SPSS. Frequencies of all variables were generated and standard deviation of quantitative variables like age was also generated. Categorical variables were given in number (percentages/ frequencies).

RESULTS

A total of 490 patients with clinically diagnosed coronary heart disease (CHD) and undergoing invasive coronary angiographic evaluation were selected.

Age as a subset:
Of the total of 490 patients undergoing invasive coronary angiographic evaluation, 141(28.77%) were between the ages of 20 and 40 years. 160 patients(32.65%) were between the ages of 40 and 60

years. 164(33.67%) were between the ages of 60 and 80 years and 24(4.89%)were above 80 years.

Out of the 141 of (20<Age<40), 69(48.9%) were diagnosed with single vessel disease, 45(31.9%) were diagnosed with two vessel disease, 24(17.02%) diagnosed with three vessel disease and 3(2.12%) diagnosed with left main or other vessel disease.

Out of the 160 of (40<Age<60), 37(23.1%) were diagnosed with single vessel disease, 40(25%) were diagnosed with two vessel disease, 74(46.25%) diagnosed with three vessel disease and 9(5.63%) diagnosed with left main or other vessel disease.

Out of the 165 of (60<Age<80), 13(7.87%) were diagnosed with single vessel disease, 37(22.4%) were diagnosed with two vessel disease, 104(63.03%) diagnosed with three vessel disease and 11(16.9%) diagnosed with left main or other vessel disease.

Out of the 24 of (Age>80), 3(12.5%) were diagnosed with single vessel disease, 4(16.7%) were diagnosed with two vessel disease, 11(45.8%) diagnosed with three vessel disease and 6(25%) diagnosed with left main or other vessel disease.

When analyzed as a whole, of the 122(24.9%) patients that were diagnosed with single vessel disease (SVD), 69(56.5%) were (20<Age<40); 37(30.3%) were (40<Age<60); 13(10.6%) were (60<Age<80) and 3(2.45%) were (Age>80).

Of the 126 patients (25.71%) who were diagnosed with 2 vessel disease (2VD)45(35.7%)were (20<Age<40); 40(31.7%)were (40<Age<60); 37(29.3%)were (60<Age<80) and 4(3.17%)were (Age>80).

Of the 213 patients (43.47%) who were diagnosed with 3 vessel disease (3VD)24(11.2%) were (20<Age<40); 74(34.7%)were (40<Age<60); 104(48.8%) were (60<Age<80) and 11(5.16%) were (>80)

Of the 29 patients (5.92%) whom were found to have left main disease (and other findings), 3(10.3%)were (20<Age<40); 9(31.03%)were (20<Age<40); 11(37.9%)were (20<Age<40); 6(20.6%) were (Age>80).

Age		SVD	2VD	3VD	LM	Total
20<Age<40	Count	69	45	24	3	141
	% within Set	48.9%	31.9%	17.02%	2.12%	100.0%
	% within Diagnosis	56.5%	35.7%	11.2%	10.3%	28.77%
40<Age<60	Count	37	40	74	9	160
	% within Set	23.1%	25%	46.25%	5.63%	100.0%
	% within Diagnosis	30.3%	31.7%	34.7%	31.03%	32.65%
60<Age<80	Count	13	37	104	11	165
	% within Set	7.87%	22.4%	63.03%	16.9%	100.0%
	% within Diagnosis	10.6%	29.3%	48.8%	37.9%	33.67%
Age >80	Count	3	4	11	6	24
	% within Set	12.5%	16.7%	45.8%	25%	100.0%
	% within Diagnosis	2.45%	3.17%	5.16%	20.6%	4.89%
Total	Count	122	126	213	29	490
	% within Set	24.9%	25.7%	43.5%	5.9%	100.0%
	% within Diagnosis	100.0%	100.0%	100.0%	100.0%	100.0%
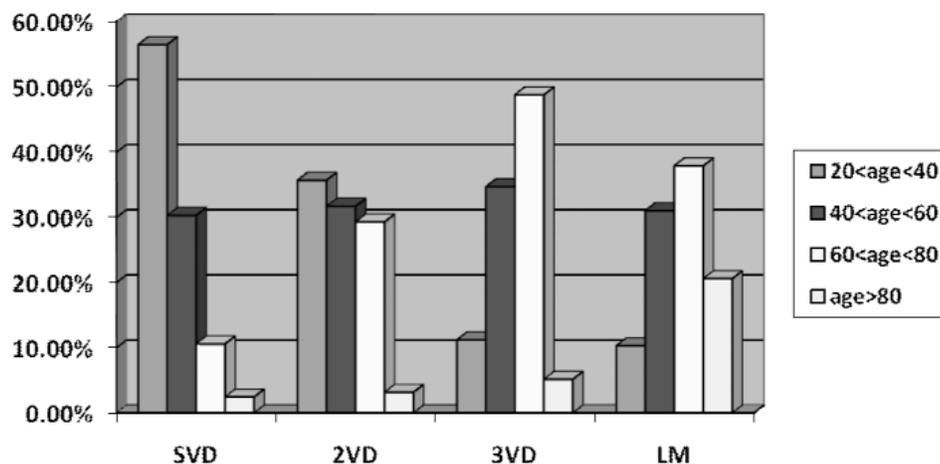
Gender as a subset:

Gender as a subset:

Of the total of 490 patients undergoing invasive coronary angiographic evaluation 390 patients (79.6%) were male and 100 patients (20.4%) were females.

Out of the 390 males, 106(27.2%) were diagnosed with single vessel disease, 96(24.6%) were diagnosed with two vessel disease,164(42.1%) diagnosed with three vessel disease and 24(6.2%) diagnosed with left main or other vessel disease.

Out of the 100 females, 16(16.0%) were diagnosed with single vessel disease, 30(30.0%) were diagnosed with two vessel disease,49(49.0%) diagnosed with three vessel disease and 5(5.0%) diagnosed with left main or other vessel disease.

When analyzed as a whole, of the 122 patients (24.89%) were diagnosed with single vessel disease (SVD). Of these 86.9% were male and 24.9% were female.
126 patients (25.71%) were diagnosed with 2 vessel disease (2VD). Of these 76.2% were male and 25.7% were female.

213 patients (43.47%) were diagnosed with 3 vessel disease (3VD). Of these 77% were male and 23% were female.

			Diagnosis at Angiography				Total
			SVD	2VD	3VD	LM or LM equivalent	
SEX	male	Count	106	96	164	24	390
		% within SEX	27.2%	24.6%	42.1%	6.2%	100.0%
		% within Diagnosis at Angiography	86.9%	76.2%	77.0%	82.8%	79.6%
	female	Count	16	30	49	5	100
		% within SEX	16.0%	30.0%	49.0%	5.0%	100.0%
		% within Diagnosis at Angiography	13.1%	23.8%	23.0%	17.2%	20.4%
Total		Count	122	126	213	29	490
		% within SEX	24.9%	25.7%	43.5%	5.9%	100.0%
		% within Diagnosis at Angiography	100.0%	100.0%	100.0%	100.0%	100.0%
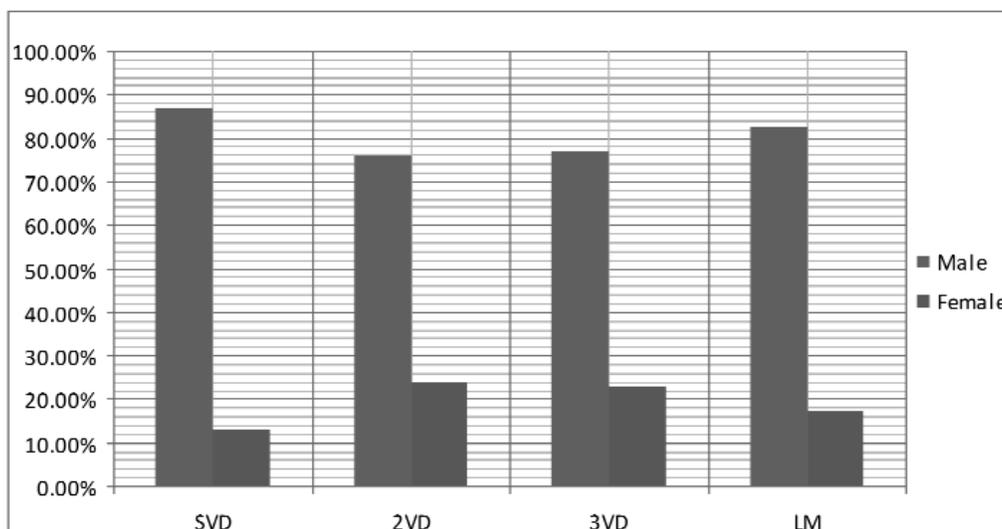
29 patients (5.92%) were found to have left main disease (and other findings). Of these 82.8% were male and 17.2% were female.

DISCUSSION

Coronary Heart Disease (CHD) is a group of closely related syndromes resulting from myocardial ischemia. It is estimated that 3.8 million men and 3.4 million women worldwide die from coronary heartdisease every year. Out of this, more than 60% of the global burden of coronary heart disease occurs in developing countries.[2] Over the last decade, its recognition and treatment has undergone considerable changes.

The median age of the group, 53 years, is the age when coronary heart disease begins to reach clinical importance as observed in our clinical setup. In spite of the rather wide age span, age as such did not give any overrepresentation of coronary changes. There is vast evidence that coronary heart disease increases with increasing age and is most frequent in patients with a history of myocardial infarction.[15] Angiographic studies have also shown that the extent of disease and severity is also less in younger population with comparatively fewer number of coronary arteries affected than that of older age groups.[18-19] The main culprits in the presentation of involvement of more diseased vessels with increasing age are wall thickening and prominent structural changes involving large elastic arteries,[20] these changes were well indicated in Postmortem studies as well.[21] Studies have shown that vessel wall thickening with aging due to hyperplasia of intima leads to development of atherosclerosis.[22] Age-associated stiffening of arteries, dysfunction of endothelium, arterial stiffening,and arterial pulse pressure widening

are all factors leading to atherosclerosis.[23] Diet, diabetes, dyslpidemia, high blood pressure, smoking, genetic factors all interrelate with process of aging of vessels and set in motion the formation of atherosclerotic plaque. Experimental studies provided evidence that atherogenic diet resulting in the same elevation of plasma lipids caused markedly more severe atherosclerotic lesions in older versus younger rabbits.[23]

Among the 490 patients, one- two- and three-vessel and left main disease occurred in 24.89%, 25.71%, 43.47% and 5.92% of the population, respectively. In these patients, as seen, the prevalence of three-vessel disease is the most widespread in almost all age-subsets, although there is evidence that asymptomatic survivors of myocardial infarction who are 40 years of age or less rarely have left-main or 3-vessel coronary artery disease.[5] Our result also showed that only 4.89% of the people suffering from acute coronary syndrome were above the age of 80, most probable reason maybe the life expectancy of people in Pakistan which is 66.9 years.[24] Extreme elderly patients even suffering from coronary disease rarely seek medical attention and are undertreated as well due to associated severe comorbidities which lead to the refusal of invasive treatment due to predictable complications.

Also, the prevalence of leftmain coronary disease is less common in women than in men.[15] This was reflected in our results wherein it was observed that only 100 females underwent coronary angiography out of the 490 patients that were taken for the study. And only 5% females reported of Left Main disease as compared to males with 6.2%. two vessel disease and three vessel disease was however, was found more common finding in females as compared to single vessel disease which was a significant finding in males.

In conclusion, rate of coroangiography is more common between 40-80 years and male have higher recorded rate of coroangiography. LM disease is more common in patients above 80 years and more common in male then female. Triple vessel disease is common angiographic finding between aged 40-80 years both male and female patients.

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