

Coronary Artery Disease in Young versus Older Adults in Hilla City: Prevalence, Clinical Characteristics and Angiographic Profile

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Abstract

B **Background:** Coronary artery disease, is a major cause of mortality and morbidity worldwide .It's incidence among young age groups is increasing rapidly.

Objectives: Coronary artery disease is now frequently encountered in young adult population. However, not many studies are available in this regard. Therefore, the present study was designed to evaluate the prevalence, clinical characteristics and angiographic features of patients ≤ 40 years of age with Coronary artery disease and compare them to patients >40 years.

Methods: this study was conducted at shaheed al muhrab cardiac center in Hilla city, all patients who had underwent coronary angiography in the catheterization laboratory were included in the study during the period april 2008 to July 2011. Patient who had history of revascularization procedure were excluded from the study. The patients were divided into two groups on the basis of age. The first group (group A) include patients 40 years and younger, while the second group (group B) include patients older than 40 years.

Results: of the total 803 patients , 58(7.2%) were ≤ 40 years old (group A) and 745 (92.8%) were older than 40 years (group B).Smoking , premature CAD and hyperlipidemia were statically significant risk factors in patients ≤ 40 years old (group A) 24.2%,19% ,17.2% respectively compared to 13.2%,10.3%, 10.7% in patients older than 40 years (group B), whereas hypertension, diabetes mellitus and obesity were more prevalent in(Group B), 27%,22.8%, 16% respectively, compared to (Group A) , 15.5%,13.8%, 10.3% respectively ($p < 0.001$) .7.2% of patient who have evidence of CAD proved by coronary angiography were in age group ≤ 40 years. Younger patients (group A) tends to have single vessel disease 56.9% compared to older patients (group B) 24.4%, and the reverse is true in regards to three vessel disease 44.2% vs19%.

Conclusions: 7.2% of angiographically documented cases of coronary artery disease patients were 40 years & younger in age, this percentage was high among our studied population. Smoking, family history of premature Coronary artery disease & hyperlipidemia were significantly associated with Coronary artery disease in young patients ($p < 0.001$) Young patients tends to have single vessel disease while older ones tends to have three vessel disease ($p < 0.001$).

Introduction

Coronary artery disease (CAD) is usually a disease of old age, however, it is infrequently encountered in young adults, some histopathological studies have shown that in young patients, atherosclerotic plaques are characterized by a large amount of lipid containing foam cells and relative lack of fibrous tissues, suggesting that the plaque may have been present for

a short period than in older patients which have a large content of fibrous tissue.⁽¹⁻²⁾In recent years, whereas the mean age of coronary artery disease (CAD) has decreased, its prevalence seems to have been on the increase.⁽³⁾The conventional risk factors namely hypertension(HTN),diabetes mellitus (DM), hypertriglyceridaemia, low levels of HDL-C, central obesity, lipoprotein-a (Lpa), high LDL-C, low levels of antioxidants (vitamin A, E, beta -

carotene), rapid modernization associated with sedentary but stressful lifestyle in summation are suggested as additional risk factors for CAD⁽⁴⁾. Reddy reported that mortality from cardiovascular (CVD) disease was projected to decline in developed countries from 1970 to 2015 while it was projected to be almost double in the developing countries⁽³⁾ Patients who seeks medical attention owing to symptomatic disease may represent the “tip of the iceberg” when considering manifest and subclinical disease together, because young, asymptomatic patients usually do not undergo medical investigations leading to the discovery of CAD, the true prevalence of the disease has been grossly underestimated. Indeed, when a intravascular ultrasound-based investigation was undertaken in a cohort of recently transplanted hearts (mean donor age 33.4 ± 13.2 years) by Tuzcu et al. the prevalence of disease was >50%, with one in six teenagers manifesting coronary lesions⁽⁵⁾. CVD is posing a major public health hazard and clinical problem in South Asia (India, Pakistan, Bangladesh, and Nepal), estimates from the Global burden of Disease Study suggest that by the year 2020 this part of world will have more individuals with atherosclerotic cardiovascular disease than any other region⁽⁶⁾. There is documented evidence that South Asian people develop CAD at a higher rate and also at an early age. This higher incidence of CAD and excess mortality rates in this population cannot be fully explained on the basis of conventional risk factors⁽⁷⁾. Even though CAD event rates have decreased by 50% in the US and other developed countries over the past 30 years, rates have doubled in South Asians people with ancestors from the Indian subcontinent (i.e. India, Pakistan, Bangladesh and others), and have risen even more among South Asians who immigrate to the US⁽⁸⁾. The mortality rates from CAD in South Asians are reported to be two to three times higher than those for Caucasians, irrespective of

gender, religion, social class, dietary practices or country of residence⁽⁹⁻¹⁰⁾. There is a dearth of available data on young patients with CAD neither in Iraq nor in the nearby countries, this study is an attempt to verify the prevalence, risk factors & angiographic profile of CAD in young patients (≤ 40 years) and compare it to older patients (>40 years).

Patients and Methods

this study was conducted at shaheed al muhrab cardiac center in Hilla city, all patients who had underwent coronary angiography in the catheterization laboratory were included in the study during the period from april 2008 to July 2011. Patient who had history of revascularization procedure were excluded from the study. The patients were divided into two groups on the basis of age. The first group (group A) include patients forty years and younger, while the second group (group B) include patients older than forty years. The following data were included for analysis: demographic data (i.e. age and gender) and CAD risk factor profile, comprised of current cigarette smoking history (patient regularly smokes a tobacco product/ products one or more times per day or has smoked in the 30 days prior to admission), family history of CAD (firstdegree relatives before the age of 55 in men and 65 years in women), hypertension (systolic blood pressure ≥ 140 and/or diastolic ≥ 90 mmHg and/or on anti-hypertensive treatment), diabetes mellitus (symptoms of diabetes and plasma glucose concentration ≥ 200 mg/dl (11.1 mmol/l), or fasting blood sugar (FBS) ≥ 126 mg/dl (7.0mmol/l) or 2-hp ≥ 200 mg/dl (11.1 mmol/l)), hyperlipidemia (total cholesterol ≥ 5.0 , HDL-cholesterol ≤ 1.0 in men or ≤ 1.1 in women, and triglycerides ≥ 2.0 mmol/l) coronary arteriography was performed using standard technique in all the patients. Significant CAD was defined as a diameter stenosis $> 50\%$ in each major

epicardial artery.). Data was analysed using SPSS-13 & Chi-square were used to calculate the associations.

Results

Coronary artery disease (CAD) is a devastating disease precisely because an otherwise healthy person in the prime of life may die or become disabled without warning. When the afflicted individual is under the age of 40, the tragic consequences for family, friends, and occupation are particularly catastrophic and unexpected. A total of 803 patients were included in this study. Mean±SD age of the patients was 56.7.89±10.51 years (Range 25–83 years). six hundred patients (74.8%) were male, two hundred and three patients (25.2%) were female. fifty-eight patients (7.2%) were in the age group 40 years and younger (Group-A), while 745 patients (92.8%) were more than 40 years of age as shown in table(1). Table (2) show the clinical characteristics of the two groups (Group A & Group B) in regards to

the risk factors which includes (smoking, family history of premature CAD, hyperlipidemia, hypertension, diabetes mellitus & obesity , the results as follow 14(24.2%,11(19%),10(17.2%), 9(15.5%), 8 (13.8%) & 6 (10.3%) respectively in Group A compared to Group B, 8 (13.2%), 77 (10.3%), 80 (10.7), 201 (27%), 170 (22.8%), 119 (16%) respectively. Table (3) showed the results of coronary angiography among the two groups (Group A & group B), in terms of normal coronary angiography versus evidence of CAD, results as follow, 12 (20.7%), 156 (20.9%), 46 (79.3%), 590 (79.1%) respectively. Table (4) disclosed that 636 patient (79.5%) had evidence of CAD by coronary angiography, of them 46 patients (7.2%) were ≤ 40 years age (Group A), compare to 590 patients (92.8%) aged > 40 years (Group B)As shown in table (5), 33 (56.9%), 14 (24.1%) , 11 (19%) in Group A and 182 (24.4%), 233 (31.3%), 330 (44.3%) in Group B had single vessel, two vessels and three vessel disease respectively.

Table 1. demographic characteristics of the study population

parameters	Results
Total number	803
Age in years	56.7
Male	600(74.8%)
female	203(25.2)
Age ≤40 yr	58(7.2%)
Age >40 yr	745 (92.8%)

Table 2. clinical characteristics of the two groups

Parameters	≤40 yr age group n=58 No (%)	40 yr age group> n=745 No (%)	P value
Smoking	14(24.2)	98(13.2)	<0.001
Family history of premature CAD	11(19)	77(10.3)	
Hyperlipidemia	10(17.2)	80(10.7)	
Hypertension	9(15.5)	201(27)	
Diabetes mellitus	8(13.8)	170(22.8)	
Obesity (BMI≥30Kg/m ²)	6(10.3)	119(16)	

Table 3. comparison of the results of coronary angiography of the two groups

Age	Normal coronaries N (%)	Evidence of CAD N (%)
≤40 yr	12 (20.7)	46(79.3)
>40 yr	156 (20.9)	590(79.1)

Table 4. Evidence of CAD by coronary angiography of the two groups

Total number %	Age ≤40 yr N (%)	Age >40 yr N (%)
636(79.5%)	46 (7.2%)	590 (92.8%)

Table 5. Comparison of angiographic data according to the number of diseased coronary arteries of the two groups

Number of coronaries involved		Age ≤40 yr n=58) No (%)	Age >40 yr (n=745) No (%)	P value
		One vessel	33(56.9)	
Two vessels	14(24.1)	233(31.3)		
Three vessels	11(19)	330(44.3)		

Discussion

Up to the best of my knowledge, there is no study addressing the prevalence of CAD in patients' ≤ 40 years of age in Iraq. The incidence of CH is declining in the UK in all age groups. The actual prevalence of the disease was found to be 0.5% in men and 0.18% in women between 35 and 44 years, 20.5% in men, and 17.1% in women over the age of 60 years. However, CAD in younger population aged less than 40 years was found to represent only 3% of all patients with CAD⁽¹¹⁾ the current study showed a high percentage of CAD in patients ≤ 40 years of age (7.2%), The possible explanations for this high percentage could be attributed to the ignorance or at least under estimation of newer risk factors for CAD (sedentary life style, work stress, anxiety, depression, psychosocial problems⁽¹²⁾, in addition to that the effects of wars and terrorism in Iraq(from 1980 till now). Other explanation for an increase in the incidence is the earlier exposure to some risk factors such as smoking, life style, hyperlipidemia, and

stress has been recognized⁽¹³⁾This study disclosed that smoking is the commonest risk factor in Group A compared to Group B (24.2% vs 13.2%),this finding is in agreement with Jason et al⁽¹⁴⁾; who concluded that smoking 65% of young patients with myocardial infarction are smokers, other studies reported that between 76% and 90% of young patients with MI are smoker compared with 40% of older patients, this fact could be explained by ;cigarette smoking increase the risk of thrombosis⁽¹⁵⁾ Regarding family history of premature CAD, it is the second risk factor in Group A compared to Group B (19% vs 10.3%), these results were compatible with that of pohle et al⁽¹⁶⁾. The role of positive family history of premature CAD will be completed by many reports about the role of genetic factors in the development of atherosclerosis and occurrence of STEMI in young patients. According to studies, there may be polymorphisms in genes such as methylene tetrahydrofolate reductase⁽¹⁷⁾. Platelet receptors, 24 and plasminogen activator inhibitor 1 (PAI1)⁽¹⁸⁾. In contrast, there is at least one report about the polymorphism in beta fibrinogen gene

and its protective effect against the incidence of premature STEMI⁽¹⁹⁾. Whether or not such findings could have therapeutic impacts needs to be illuminated in the future. Hyperlipidemia also significantly higher in Group A as compared to Group B (17.2% vs 10.7%), this finding was in agreement with previous studies done by Tewarie et al & Pineda et al⁽²⁰⁻²¹⁾, whereas hypertension, diabetes mellitus and obesity were more prevalent in (Group B), 27%, 22.8%, 16% respectively, compared to (Group A), 15.5%, 13.8%, 10.3% respectively. These findings were not in agreement with a study done by Chen et al who found a similar pattern of distribution of HT & DM in younger & older patients with CAD⁽²²⁾, Zimmerman *et al* however, found that both hypertension and diabetes mellitus were more prevalent in older patients⁽²³⁾. Whether this difference is due to the geographic location of the two study populations or selection pattern of the population is not clear. In regards to the number of diseased coronaries by coronary angiography This study disclosed a preponderance of a single vessel disease I Group A compared to Group B (55.9% vs 24.4%), and the reverse is true regarding three vessel disease in Group B compared to Group A (44.2% vs 19%) and these findings were in agreement with the previous studies⁽²⁴⁾.

Conclusions

7.2% of angiographically documented cases of coronary artery disease were 40 years & younger in age, it was considered to be a high percentage among our studied population, smoking, positive family history of premature CAD & hyperlipidemia were significantly associated with CAD in young patients, young patients tends to have single vessel disease whereas older ones tends to have three vessel disease. Recommendations Beside conventional risk factors, especially modifiable ones, we need to

look for other possible new risk factors which might be underestimated and contributed to high prevalence of CAD in young adults. The issue of screening the first degree relatives of young patients with CAD should be taken seriously. Further studies are recommended to address the exact relationship between the newer risk factors & as a cause of increasing prevalence of CAD in young age group.

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