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Comparison of Angiography Findings in Iranian Patients Younger and Older Than 50 Years Underwent Coronary Angiography in Boo-Ali Hospital: A Cross-sectional Study

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Abstract

Background: Coronary artery disease (CAD) or ischemic heart disease (IHD) is the most common cause of death globally. CAD is a multifactorial disease with many variable risk factors. It is estimated that its prevalence is increasing in various populations. CAD in young adults is also increasing in Iran due to the life style changes. Identifying risk factors and timely correction can reduce the burden of disease and related health problems.

Objectives: To evaluate the prevalence of CAD and the traditional risk factors according to angiographic findings of patient's ≤ 50 and > 50 years old.

Patients and Methods: This is a cross sectional descriptive study on 112 patients who were admitted to Boo-Ali hospital from November 2013 to December 2014 for evaluation of CAD. Self-administered questionnaire consisted of demographic data and risk factors were filled. Angiographic film was reviewed in respect to coronary arteries involvement and echocardiography was performed. For evaluation of left ventricular (LV) function, patients divided into two groups of ages ≤ 50 (group A) and > 50 (group B) years old. Risk factors, coronary angiography and ejection fraction (EF) were compared.

Results: Of the 112 patients, 51 (45.5%) were in group A and 61 (54.5%) were in group B with mean age of 37.6 ± 4.4 and 63 ± 8.5, respectively. No significant statistical differences were found between the body mass index (BMI), smoking, family history (FH), hyperlipidemia (HLP) and diabetes mellitus type 2 (DM2) between two groups ($P > 0.05$). Hypertension (HTN) was significantly higher in group B vs. group A respect to 65.6% and 31.4% ($P < 0.001$). Left circumflex artery (LCX) involvement were 54.9% in group A vs. 54.1% in group B, right coronary artery (RCA) involvement were 54.9% in group A vs. 54.1% in group B and left coronary artery (LAD) involvement were 54.9% in group A vs. 54.1% in group B. There were no statistical significant differences in coronary arteries involvement and the number of vessels disease between two groups ($P > 0.05$). There were a significant higher number of patients with a decline in EF in group B ($P = 0.01$).

Conclusions: The pattern and number of vessels involved were similar in both groups. Based on common prevalence of traditional risk factors among two groups, planning for lifestyle changes is recommended.

Keywords: Coronary Artery Disease, Coronary Angiography, Risk Factors, Young Adult

1. Background

Coronary artery disease (CAD) is the most common cause of mortality globally (1-4). It is estimated that its prevalence is increasing by 2020 in various populations (5). The age of presentation is decreasing in developing countries; Arzamendi et al. (6) showed that among the patients with sudden death, CAD was the main cause with distribution of 37% and 80% in groups of 21 to 30 and 31 to 40 years old, respectively. Decreasing age of CAD is harmful in respect to social activity and economic burden especially in developing countries (7). In Iran, an epidemiologic study that was done on 321570 deaths, 82307 were due to CAD and it was the first cause of death (8). Due to life style changes, the prevalence of CAD is increasing in young adults in Iran (7, 9, 10). CAD is a multifactorial disease with many variable risk factors and most of the coronary events are due to diabetes mellitus (DM), hypertension (HTN), family history (FH), cigarette smoking, hyperlipidemia (HLP). Timely determination of these risk factors can be useful for prevention of CAD especially in young patients (7, 11). Studies revealed that angiographic findings in respect to type and number of coronary involvement are different among younger and older patients, however older patients have more coronary arteries involvement in comparison with younger ones

(12). To our knowledge data on the frequency and different characteristics of CAD and the involvement of each artery of the left circumflex artery (LCX), right coronary artery (RCA) and left coronary artery (LAD) separately are limited in young adults in Iran. Based on the increasing prevalence of CAD and its mortality, many specialists have focused on the related risk factors. Early diagnosis of heart disease can prevent the burden of disease. Due to the increasing risk of CAD in Iran (7, 9, 10), we aimed to evaluate the prevalence of CAD and the traditional risk factors according to angiographic findings of patients ≤ 50 and > 50 years old. This is the first study that is investigating single-vessel and multivessel involvement of LCX, RCA and LAD with together.

2. Objectives

We aimed to investigate the prevalence, traditional risk factors, various characteristics and each artery involved in different age groups of CAD patients especially in young adults in Iran to take the necessary measures.

3. Patients and Methods

3.1. Study Protocol

This observational study was performed as a cross-sectional descriptive comparative study. Using simple random sampling technique, we selected 112 patients with suspected CAD who were admitted to Boo-Ali hospital (a governmental hospital in Tehran, Iran) for coronary angioraphy, from November 2013 to November 2014. The ethical committee of Islamic Azad University, Tehran branch approved the study and written informed consent for participation was obtained. Two detailed questionnaires consisted of demographic and clinical characteristics were used and data were gathered by trained interviewers. Demographic data consisted of age, sex and clinical data consisted two parts of traditional risk factors and coronary angiographic findings. Traditional risk factors were smoking, FH, HLP, HTN, diabetes mellitus type 2 (DM2), body mass index (BMI) and coronary angiographic findings were single-vessel and multi-vessels involvement of LCX, RCA and LAD. Patients suspected or recognized to have CAD, stable angina, highly positive cardiac stress test, failure to control symptoms despite the appropriate and optimal treatment, clinical suspicion of acute coronary syndromes (ACS) at the time of admission, ST-elevation myocardial infarction (MI), ejection fraction (EF) less than 40% on echocardiogram, history of coronary artery bypass grafting surgery (CABG) or percutaneous intervention (PCI), preoperative evaluation of cardiac valvular disease or peripheral vascular disease underwent coronary angiography by using the Seldinger technique. The indication for coronary angiography in patients was based on ACC/AHA guidelines (13). We excluded patients with impaired renal function (acute renal failure, chronic renal failure secondary to diabetes), cardiomyopathy, presence of shock, active gastrointestinal (GI) bleeding, prior anaphylactic reaction to contrast medium, fever of unknown origin (FUO), active inflammatory disease, untreated active infection, acute stroke, severe anemia, altered thyroid function, severe coagulopathy, aortic valve endocarditis, severe uncontrolled HTN, decompensated chronic heart failure (CHF), digitals intoxications, electrolyte imbalance and severe peripheral vascular disease. The angiography film was assessed by two specialists and data were recorded in questionnaires. Patients divided into two groups of ≤ 50 (group A) and > 50 (group B) years old as young and old adults, respectively. Angiographic findings were compared between groups. A considerable obstructive in a major epicardial coronary vessel or left main coronary artery was defined if there was a lumen diameter narrowing more than or equal to 70% and 50%, respectively. We investigated traditional risk factors as smoking, FH, HLP, HTN, DM2 and BMI. Cigarette smoking misuse was considered if the patients has been smoker within the 5 past years, positive FH was considered if the patient had at least one first-degree relatives with CAD before the age of 55 in men or 65 in women (14), HLP was considered if the patient was under anti-hyperlipidemia treatment or any disturbance in lipid profile (15, 16), DM2 was considered if the patient was under antidiabetic treatment or meets diabetes criteria according to American Diabetes Association (17), BMI > 25 kg/m^2 (18). HTN was considered as BP > 140/90 mmHg or under antihypertensive treatment at present or prior to physician diagnosis (19).

3.2. Statistical Analysis

SPSS 13.0 was used for analyzing data. In descriptive statistic section, statistical indicators such as mean, absolute and relative frequency were used. In inferential statistic section, independent sample T test and chi square test were used to assess relation between variables. Continuous variables and categorical variables were presented as mean ± SD and percentages, respectively. Significant differences were set at $P < 0.05$.

4. Results

A total of 112 patients who underwent coronary angiography divided into two groups of patients ≤ 50 (group A) and > 50 (group B) years old. Fifty five patients (45.5%) were in group A and sixty one patients (54.5%) were in group B with mean age of 37.6 ± 4.4 and 63 ± 8.5, respectively. In group A and B male proportion was significantly more than female. There were significant statistical differences between the genders in group A and B ($P < 0.05$). Gender distribution by age is listed in Table 1.

The prevalence of smoking and positive FH in group A was higher than group B (54.9% vs.42.6%, P = 0.17 and 56.9% vs. 44.3%, P = 0.18) whereas HLP (39.2% vs.54.1%, P = 0.12), DM2 (29.4% vs. 39.3%, P = 0.18), overweight and

obesity (47.1% vs.42.6%, P = 0.37) were more prevalent in group B. No significant statistical differences were found between two groups (P > 0.05). There were a significant higher number of patients with HTN (31.4% vs. 65.6%, P = 0.0001) in group B (P < 0.001). Clinical risk factors of patients are listed in Table 2.

Angiographic analysis of patients showed LCX, RCA and RCA-LCX involvement were higher in group A whereas the higher number of patients with LAD, LAD-LCX and RCA-LAD involvement were in group B. No significant differences were found in coronary arteries involvement between two groups (P > 0.05). The frequency of coronary angiographic findings are listed in Table 3.

In part of vessels involvement, patients divided into two groups: Single-vessel disease and multivessel (two/three) disease. Nineteen patients (37.3%) of group A and nineteen patients (31.1%) of group B had single-vessel disease. Fifteen patients (29.4%) of group A and twenty two patients (36.1%) of group B, seventeen patients (33.3%) of group A and nineteen patients (31.1%) of group B had two-vessel and three-vessel disease, respectively. There were no statistical significant differences in the number of vessels disease between two groups (P > 0.05). EF less than or equal to 30%, 31-50% and more than 50% were 0 (0%) in group A vs. 6 (12%) in group B, 21 (50%) in group A vs. 31 (62%) in group B and 21 (50%) in group A vs. 13 (26%) in group B, respectively. Systolic LV dysfunction was 50% and 74% in group A and B, respectively. There were significant higher number of patients with a decline in EF in group B (P = 0.01).

Table 1. Gender Distribution by Age in Patients ≤ 50 (Group A) and Patients > 50 (Group B)

Variables	Groups[a]		P Value
	A	B	
Gender			0.003
Male	35 (68.6)	38 (62.3)	
Female	16 (31.4)	23 (37.7)	
Age, year	37.6 ± 4.4	63 ± 8.5	0.170

[a]Values are expressed as No. (%) or mean ± SD.

Table 2. Clinical Risk Factors of Patients ≤ 50 (Group A) and Patients > 50 (Group B)

Risk Factors	Groups[a]		P Value
	A (n = 51)	B (n = 61)	
Smoking	28 (54.9)	26 (42.6)	0.17
FH	29 (56.9)	27 (44.3)	0.18
HLP	20 (39.2)	33 (54.1)	0.12
DM2	15 (29.4)	24 (39.3)	0.18
BMI > 25, kg/m^2	24 (47.1)	26 (42.6)	0.37
HTN	16 (31.4)	40 (65.6)	< 0.001

Abbreviations: BMI, body mass index; DM, diabetes mellitus; FH, family history; HLP, hyperlipidemia; HTN, hypertension.
[a]Values are expressed as No. (%).

Table 3. The Frequency of Coronary Angiographic Findings of Patients ≤ 50 (Group A) and Patients > 50 (Group B)

Variables	Groups[a]		P Value
	A (n = 51)	B (n = 61)	
LCX	28 (54.9)	33 (54.1)	0.48
RCA	30 (58.8)	33 (54.1)	0.38
LAD	42 (82.4)	53 (86.9)	0.10
RCA-LCX	5 (9.8)	2 (3.3)	0.08
LAD-LCX	5 (9.8)	9 (14.8)	0.18
RCA-LAD	4 (7.8)	9 (14.8)	0.14
RCA-LAD-LCX	17 (33.3)	19 (31.1)	0.36

Abbreviations: LCX, left circumflex artery; LAD, left coronary artery; RCA right coronary artery.
[a]Values are expressed as No. (%).

5. Discussion

Coronary artery disease is the most common cause of death globally (1, 4, 5). Similar angiography findings in younger and older adults have been demonstrated an increasing trend in prevalence of CAD in young adults (4, 6, 20, 21). In Queensland, Chen et al. (22) reported 6.1% of patients with CAD were < 45 years old and aggressive primary prevention for changing the health status was recommended. Data from Tabei et al. (23) study which was done in South of Iran showed the number of males with risk of coronary atherosclerosis who diagnosed with angiography was higher in CAD group. These data are similar to results of our study that the number of males with CAD were higher in young and old groups, however in our study the number of females who suffered from CAD were higher in older patients that may be related to protective role of sex hormones (Estrogen and Progesterone) in young women. Previous studies showed that traditional risk factors as smoking, FH, DM, HLP, obesity and HTN are the main cause of the disease (24-27). However, the studies have been suggested that patients with CAD may have several unidentified factors (28, 29). This analysis in respect to risk factors in two groups (Group A ≤ 50 years, Group B > 50 years) revealed that there was no statistically significant difference of smoking and HLP between two groups but previous studies (10, 20, 22, 30) found that smoking is more prevalent in younger patients and HLP is equally distributed between young and old groups (10, 20, 31). Zimmerman et al. (31) in the United States and Canada, Sharma et al. (32) in India and Khot et al. (33) in 14 international randomized clinical trials of coronary heart disease conducted during the prior decade reported the important role of cigarette smoking in CAD patients. Shemirani et al. (10) in Central Iran reported the role of smoking on LAD involvement in young adults and smokers constituted 60% of patients with CAD. We found a significant role of traditional risk factors in different age groups. Cigarette smoking was present as an important risk factor in both groups however it was higher in younger patients. Cigarette smoking as a modifiable risk factor should be considered immediately especially among in young adults. Positive FH was more prevalent in group A but this difference was not significant. Other investigations found that positive FH is more prevalent in young age groups (31). A study which was done on Turkish patients showed that DM is more prevalent in older adults (≥ 40) (30), however in this present study distribution of DM showed no differences between two groups. HTN is significantly higher in group B and this is an agreement with previous studies (4, 30, 34). Angiographic studies revealed that type and number of arteries involvement was not different between two groups. Studies showed that LAD involvement and angiographically normal or minimal CAD was more prevalent in younger patients (10, 31). In this study LV dysfunction was significantly higher in group B and this is consistent with previous finding (22). It's concluded that due to the increasing prevalence of CAD especially in young adults and common risk factors between two age groups, planning for lifestyle changes is recommended. This is the first study that is investigating single-vessel and multivessel involvement of LCX, RCA and LAD with together. This study was primarily limited by its small sample size, so it cannot be generalized to other various populations. A larger sample with more diversity would have benefited our results. We evaluated the traditional risk factors in patients with CAD, however the role of other probable risk factors such as homocysteine level, inflammation markers, platelet glycoprotein III a and PIA2 polymorphism (35) were not investigated. A limitation of the current study was not-equal numbers of males and females in each group and this may lead to incorrect interpretation of data. An inclusion of a gender role may be beneficial for further research.

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Footnote

Authors' Contribution: Simindokht Moshar, Reza Najibpour; Maryam Mohsenikia and Seyedehsara Bayesh: study concept and design, acquisition of data, analysis and interpretation of data, drafting of the manuscript, critical revision of the manuscript for important intellectual content, statistical analysis, administrative, technical, and material support, and study supervision; Kiarash Vafaei Rad: study concept and design, acquisition of data, analysis and interpretation of data, statistical analysis, administrative, technical, and material support; Nooshin Rahimi: acquisition of data, analysis and interpretation of data, statistical analysis, administrative, technical, and material support.

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