

GENDER DIFFERENCES IN EXTENT OF CORONARY ARTERY DISEASE AND LEFT VENTRICULAR FUNCTION IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY

Younes Nozari⁽¹⁾, Nehzat Akiash⁽²⁾, Anahita Tavoosi⁽²⁾,
Nasibe Akiash⁽³⁾, Shirin Ashkaboosi⁽⁴⁾

Abstract

BACKGROUND: Coronary angiography allows a direct evaluation of coronary artery. The aim of this investigation was to evaluate the coronary artery stenosis among males and females underwent coronary angiography (CAG).

METHODS: This randomized clinical trial was performed on 620 (425 males and 195 females) patients from March 2006 to September 2007 in the coronary angiographic registry of Imam Khomeini Hospital. The patients were selected for CAG according to the clinical criteria. Hypertension, diabetes, current medication, socio-demographic data, smoking, age and sex were recorded according to medical history and laboratory data.

RESULTS: Ejection fraction of left ventricle was significantly higher in women in comparison with men ($P = 0.01$). No significant differences in the extent of coronary artery disease between men and women were observed. Women with coronary artery disease were older than men ($P < 0.001$).

CONCLUSION: Although our study does not show any gender differences in the number of diseased vessels, it shows higher prevalence of risk factors such as diabetes mellitus and hypertension in women.

Keywords: Coronary artery disease, Stenosis, Gender differences

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Introduction

Coronary angiography can establish the presence or absence of coronary stenosis, define therapeutic options and determine the prognosis of patients with symptoms or signs of ischemic coronary artery disease (CAD).¹ Although the incidences of significant morbidity and mortality are low, coronary angiography may cause serious complications;² thus the benefits must justify the risks.

The rate of early death after myocardial infarction is higher in women than men³⁻⁵ and after acute myocardial infarction, women have worse short-term prognosis.⁶

Accordingly, the higher case fatality after an acute cardiac event in women admitted to hospital is largely explained by differences in living status, history and medical treatment.⁷

Women are less likely than men to be referred for

coronary angiography and subsequent revascularization.^{8,9} Some studies show no substantial evidence for gender difference in either severity of coronary artery disease or utilization of revascularization procedures.¹⁰⁻¹²

Therefore, the gender difference in diagnostic and therapeutic procedures is still not completely known. Accordingly, the aim of the present clinical study was to evaluate whether gender-related difference existed in coronary artery lesions in patients with documented coronary artery disease by invasive coronary angiography.

Materials and Methods

The study population consisted of a consecutive series of 620 patients underwent coronary angiography between March 2006 and September 2007 at the Imam Khomeini Hospital (Community Referral Hos-

1- Cardiologist; Department of Cardiology, Imam Khomeini Hospital Complex, Tehran University of Medical Science, Iran

2- Resident of Cardiology; Department of Cardiology, Imam Khomeini Hospital Complex, Tehran University of Medical Science, Iran

3- Medical Student; Department of Medicine, Lorestan University of Medical Science, Iran

4- General Practitioner, Isfahan University of Medical Science, Iran

Corresponding Author: Nehzat Akiash, E-mail: akiash.n@gmail.com

pital) in Tehran, Iran. For the purpose of this study, only patients with significant coronary artery disease (50% or more luminal narrowing) were included. Exclusion criteria were: unsatisfactory patients for CAG and normal coronary artery in coronary angiography.

Coronary Angiography Protocol: Coronary angiography was performed according to the standard Judkins technique. All of the 620 patients underwent conventional angiography with the trans-femoral approach and administration of an average amount of 95.9 ± 22.0 ml of a contrast agent. Local anesthesia at the puncture site was performed using 20 ml of 1% lidocaine. This was carried out using standard techniques and recorded in multiple projections for left and right coronary arteries. A pressure dressing at the puncture site was applied for 6 hours in each patient after angiography.

The study protocol was approved by the Ethic Committee of Cardiovascular Center of Tehran University of Medical Sciences. The collected data were analyzed using t-tests, chi-square and Mann-Whitney test in SPSS_{15.0} software. A p-value of < 0.05 was considered statistically significant.

Results

Of 620 patients, 7 (1.1%) were less than 35 years old and all of them were men; prevalence of CAD was greater in men than in women (68.4% vs. 31.6%). The mean age was 60.8 ± 9.3 years in women and 58.1 ± 9.3 years in men and women with coronary artery disease were older than men ($P < 0.001$). Prevalence of left main stenosis in the patients was 5.0% ($n = 31$).

There was no observation about significant differences in the extent of CAD between men and women

($P = 0.835$) (Table 2).

Three-vessel disease was the most common angiographic finding in both men (43.9%) and women (44.6%). Ejection fraction of left ventricle was significantly more in women in comparison with men ($P = 0.01$) (Table 2).

Diabetes mellitus and hypertension were significantly more prevalent in women ($P < 0.001$). Smoking was more reported in Men than women ($P < 0.001$) (Table 1).

Discussion

Despite major advances in the diagnosis and treatment of heart disease, coronary artery disease (CAD) remains the leading cause of morbidity and mortality in both men and women in developed countries.^{13,14}

Several studies have assessed sex-based differences in treatment and mortality following acute myocardial infarction (AMI). It is shown that women receive somewhat less aggressive treatment during the early management of acute myocardial infarction than the men.⁹ Overwhelming majority of women are unaware of their cardiovascular risk and physicians do little to educate them.¹⁵

Multiple studies have shown that women with AMI tend to be older than men and are more likely to have a history of traditional risk factors of coronary atherosclerosis such as hypertension, diabetes and hypercholesterolemia except cigarette smoking;^{16,17} our study confirmed these findings.

Woman are more likely than men to experience vascular and renal complications from diagnostic angiography, possibility because of more advance age, higher prevalence of diabetes and smaller body size.

Table 1. Prevalence of major risk factors of coronary artery disease in the patients

Risk Factor	Men n (%)	Women n (%)	P-value
Diabetes mellitus	84 (19.6)	130 (66)	< 0.0001
Hypertension	121 (28.3)	98 (49.7)	< 0.0001
Smoking	170 (39.7)	12 (6.1)	< 0.0001

Hypertension (BP $>140/90$ mmHg in 2 separate occasion), diabetes mellitus (FBS ≥ 126 mg/dl in 2 separation or >200 mg/dl with clinical finding of diabetes, smoking 10 numbers per day for the past 5 days)

Table 2. Results of coronary angiography according to gender

Coronary Angiographic Findings	Men (n=425) n (%)	Women (n=195) n (%)	P value
Number of Diseased Vessels			
One-vessel	93 (21.8)	46 (23.6)	
Two-vessel	145 (34.0)	62 (31.8)	
Three-vessel	187 (43.9)	87 (44.6)	
Left main	22 (5.1)	9 (4.6)	NS
Left ventricle ejection fraction			0.01
$< 50\%$	162 (38.0)	54 (27.7)	
$\geq 50\%$	263 (62.0)	141 (72.3)	

The incidences of stroke, myocardial infarction and death complicating coronary angiography are similar in men and women.¹⁸

The primary aim of the present study was to evaluate whether there would be gender-related differences in terms of the extent of coronary artery lesions in the angiographic findings. We observed no differences in extent of the angiographic lesions between men and women.

Jacobs et al study in 1829 on patients with symptomatic multi-vessel coronary disease showed that women were older than men (mean age, 64 versus 61 years) and a higher percentage of women were older than 65 years (49% versus 35%). There was also a higher prevalence of diabetes mellitus, history of hypercholesterolemia and history of hypertension in women than in men; although there was a similar prevalence of current cigarette smokers. There was a similar occurrence of triple-vessel coronary disease and similar numbers of significant lesions in women and men. Lesion morphology was also similar between groups. Although mean left ventricular ejection fraction was slightly higher in women.¹⁰

A report of a clinical study over a 16-year period (1981–1997) evaluated 1894 patients (1526 men and 368 women) with angiographically documented coronary artery disease. No gender differences in extent and localization of coronary angiographic lesions were observed. In men and women the incidence of single-vessel disease was 42% and 40%, two-vessel disease 27% and 27%, three-vessel disease 26% and 24% and left main disease 5% and 8%, respectively ($P > 0.05$).¹¹

In the present, study we found higher prevalence of three-vessel disease in our patients than patients in developed country. This may be due to poor control of traditional risk factors among our patients. We recommend risk factor modification and primary prevention of coronary atherosclerosis in patients. The modification should be focused on reduction of the coronary risk factors in women. Finally, an increase in educational messages focusing on cardiovascular disease promotes the overall objective of enhancing the cardiovascular health of men and women in our country.

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