Gender-related differences of risk factors among patients undergoing coronary artery bypass graft in Ahwaz, Iran

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ABSTRACT

Objective: To evaluate the major risk factors among male and female patients with severe coronary artery diseases undergoing coronary artery bypass graft (CABG).

Methods: This randomized clinical trial was performed on 897 (655 male and 242 female) patients from March 2001 to March 2006 in the Department of Cardiovascular Surgery, Golestan Hospital, Ahwaz, Iran, with male to female ratio approximately 2.7. The mean age was 54.37±0.3 years. The major risk factors were diabetes mellitus, smoking, hyperlipidemia, hypertension, obesity, familial history of coronary artery disease, past medical history of myocardial infarction and heart failure before surgery.

Results: The results show that the rate of risk factors among the males and females was age (male=54.01, female=55.35 years), smoking (p=0.00001), previous myocardial infarction (p=0.00004), heart failure (p=0.05), diabetes mellitus (p=0.0001), hyperlipidemia (p=0.00001), obesity (p=0.03), historical familial background (p=0.01) and hypertension (p=0.000001). The risk factors were revealed significantly higher in females than males (p<0.05).

Conclusion: The incidence of the risk factors among the females showed higher than males patients.

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Coronary artery bypass graft (CABG) is one of the most important treatments of patients with severe coronary artery diseases.[1] It is clear that CABG use is much lower in women than in men.[2] However, what has not been established is whether these differences represent under utilization in women or over utilization in men, or both. In comparison with men, women who undergo CABG are sicker, as defined by age, co-morbid conditions, severity of angina, and history of heart failure.[3,4] The society of thoracic surgeon's database showed that approximately 30% of isolated CABG procedures in the USA were performed in women, with a preoperative mortality of 3.9% versus 2.3% for men. Most of the differences between men and women are the consequences of age, preoperative status, higher emergency operations, more diffuse coronary diseases and left ventricular dysfunction, small body size and lower use of internal mammary artery.[5-9] In hospital mortality and perioperative morbidity after CABG has remained, on average, 2 times higher in women compared with men. Smaller vessel size, a higher incidence of left ventricular hypertrophy. and hypertensive heart disease have been raised potential contributors to higher surgical risk in women. However, these differences are reasonably expected to be more important in elderly women; the pathophysiological bases for the observed difference in younger women compared with men require further exploration. Despite the magnitude of the problem in women, much less information on optimal primary and secondary prevention strategies, diagnostic modalities and response to medical and surgical treatment is available for women than men. This lack of data reflects several factors, including the exclusion of women from many older clinical trials, a lower prevalence of symptomatic coronary artery diseases in women than in men until 70, hormonal effects and gender differences in presenting symptoms and relative effects of various risk factors.[11,12] Although some new studies from national data sets fail to reveal a strong gender bias in treatment among

patients aged ≥65 years.[13] In this contemporary data set from 31 Midwestern hospitals, female gender was an independent predictor of perioperative mortality, even after accounting for all comorbidities, including low BSA.[14] There are clear gender differences in the epidemiology, and presentation of diseases, risk factors prevalence, physiology and response to diagnostic tests and interventions. Women were treated differently to men. Fewer women with a positive history of acute coronary syndrome received revascularization prior to current admission and fewer women were prescribed lipid-lowering medications on discharge.[15] Acute phase hospital treatment was not gender determined. According to this data, we intended to evaluate the major risk factor among males and females undergoing CABG.

Methods. This randomized clinical trial was performed on 897 (655 male and 242 female) patients in Department of Cardiac Surgery, Golestan Hospital, Ahwaz, Iran during March 2001 to March 2006. The male to female ratio was 2.7. The mean age of patients was 54.37 ± 0.3 (men 54.01, females 54.35) years. The selections of patients were carried out by cardiology team for CABG according to the anatomic and clinical criteria. This criteria includes: patients with refractory angina, heart failure and sudden cardiac death that was not respond to medical and interventional treatment, left main lesion >50%, 3 vessel diseases (3VD) with left ventricular dysfunction (EF <40%), 3VD with good left ventricular function (not suitable for angioplasty), multiple vessel involvement with and without left ventricular dysfunction. Exclusion criteria includes: patients with mono, 2, 3 or multivessel coronary artery disease associated with valvular or congenital or cardiomyopathic heart disease. The major risk factors including: hypertension (>130/85 mm Hg in 2 separate occasion), diabetes mellitus (fasting blood glucose >128 mg/dl in 2 separate occasion), hyperlipidemia (fasting blood cholesterol >200 mg/dl and LDL >130 mg/dl or HDL <40 mg/dl), smoking (10 number per day for the past 5 year), obesity (body mass index >30 kg/m^3), family history of coronary artery diseases (known history of coronary diseases in male <40 and female <50 years), past medical history of myocardial infarction were studied before surgery among patients. All patients underwent cardiopulmonary bypass with arterial and venous grafts. The in-hospital complications including death, acute heart failure, Q-wave interaoperative infarction, acute pulmonary edema, postoperation hypertension, embolic cerebrovascular accident, wound infection, massive hemorrahage and pleural effusion were recorded during hospitalization. The major risk factors were followed up before and after surgery in-hospital and outpatient clinics. The study protocol was approved by the Ethic Committee of Cardiovascular Center of Jondi Shapour University of Medical Sciences and parental consent was taken for the trial. The collected data were analyzed by chi-square and t-test methods with Epi-infor (Version 6.0) software.

Results. Cigarette smoking was more common among males 44.5% than females 10.33% (p=0.00001). The history of previous myocardial infarction was found more common among males 31.3% than females 17.3% (p=0.00004). Diabetes mellitus was showed more common among females (48.3%) than males (26.9%)(p=0.0001). Hyperlipidemia was revealed more common among females (37.6%) than males (21.5%) (p=0.00001). Obesity was more common among females (50%) than males (42%) (p=0.03). Historical familial background of coronary artery diseases was more common among females (23.4%) than males (15.83%) (p=0.01). Hypertension was more common among

Table 1 - Incidence of in-hospital complication among male and female undergoing coronary bypass graft.

Incedence	Male	Female	n	(%)	*P*-value
Death	6	6	12	(1.3)	0/12
Acute heart failure	2	0	2	(0.5)	0/180
Q-wave interaoperative infarction	12	1	13	(2.0)	0/17
Acute pulmonary edema	5	4	9	(1.2)	0/18
Postoperation hypertension	124	62	186	(21.0)	0/12
Embolic cerebrovascular accident	2	0	2	(0.5)	0/18
Wound infection	4	0	4	(1.4)	0/18
Massive hemorrahage	7	0	7	(0.7)	0/17
Massive pleural effusion	15	7	22	(6.8)	0/17

females (76.7%) than males (28.4%) (p=0.000001). In-hospital complication was evaluated such as death, acute heart failure, Q-wave interoperative infarction, acute pulmonary edema, postoperation hypertension, embolic cerebrovascular accident, wound infection, massive hemorrahage, and pleural effusion. There are not any significant statistical differences in inhospital complication between males and females (**Table 1**).

Results. The results revealed that the risk factors such as diabetes mellitus, hyperlipidemia, obesity, historical familial background and hypertension were significantly higher in females (p<0.05). In contrast, smoking and pervious myocardial infarction were significantly higher in males (p<0.05). Nowadays population undergoing CABG had older ages than past,[1,16] but in our study demography of patients showed younger ages than from other countries. Although this problem needs close attention to the factors precipitating coronary artery diseases in young ages. This event may be due to poor control of risk factors among our patients.[17] According to this data, it needs to be attended by health center. Some other studies showed that patients have a high prevalence of modifiable risk factors related to unhealthy lifestyle and ineffective prophylactic drug use >1 year after CABG. Low educational level has a significant influence in this situation.[18] Disease prevalence in women, and not gender per se, affects mid- and long- term survival after cardiac surgery. Attention, therefore, should be focused on efforts to reduce or modify such disease prevalence earlier in women, which may in turn allow longer survival after surgical intervention.[19] Differences in postoperative survival between women and men were related to the gender differences in the distribution of preoperative risk factors. One of the most important finding in this study was relatively higher incidence of risk factors including diabetes mellitus, hyperlipidemia, obesity, historical familial background and hypertension among females than males. Gender-specific risk factors such as systolic blood pressure, fasting triglycerides (or HDL cholesterol), and WHR were found to be important in the development of CHD.[20] This difference may be due to different life style among them. Females may be less inclination or possibilities for medical seeking. This problem may be due to lower socioeconomic status of these groups in our provenience. The obesity and hyperlipedemia was very important in female group that may be due to low information on nutritional status and immobility.[21] This provenience had a very hot weather in many seasons of year (9 months 35-45°C, 3 months 10-35°C), according to this condition the rate of exercise was very low especially among women. However, in recent years for other countries the concern has been raised that women are evaluated less intensively, under referred and not treated aggressively as men for comparable presentations and diseases. In previous studies, men with abnormal nuclear stress study result referred to coronary angiography were 10 times higher than women with similar result.[22,23] Body mass index appears to have a differential impact on short- and long- term outcomes after coronary revascularization. These results underscore the need for further research to identify factors responsible for the apparent short-term protective effect of a higher BMI in patients undergoing PTCA and to study the impact of weight reduction on the long-term survival of obese patients undergoing CABG.[24] Male who underwent CABG was higher than females but in the future it might increase in numbers among females. This problem probably originated from increased numbers of risk factors among females. Although men and women have the same risk factors for coronary artery diseases, but the relative weight of a given risk may be more or less significant in women.[21] Diabetes mellitus in women has a higher risk factor for coronary artery diseases and heart failure than in men.[21] The metabolic derangements accompanying diabetes adversely contribute to obesity, lower level of HDL, increased levels of triglyceride, abnormal endothelial and coagulation function and increased risk of hypertension. Hypertension and cigarette smoking are significantly stronger risk factor in women than in men.[21] In other countries, the overall population of females undergoing CABG were increased in number slowly.[25,26] Recently, despite the extensive international literature referring to a gender bias in favor of men with coronary heart disease, some national survey found no gender differences in the use of investigations or in revascularisation overall. This study shows that major risk factors among females undergoing CABG had more common than males.[27] However, the role of age was not significant in our study. We recommended closer attention to the control and recognition of risk factors among women for better prevention of coronary artery diseases.

References

1. Braunwald E, Zipes DP, Libby P, Bonow RO. Heart Disease, A Text Book of Cardiovascular Medicine. 7th ed. Philadelphia (PA): Elsevier Saunders Co; 2005. p. 1323-1325.
2. Tukuitonga CF, Bindman AB. Ethnic and gender differences in the use of coronary artery revascularization procedures in New Zealand. ***N Z Med J*** 2002; 115: 179-182.
3. Salmon B. Differences between men and women in compliance with risk factor reduction: before and after coronary artery bypass surgery. ***J Vasc Nurs*** 2001; 19: 73-7; Quiz 78-79.
4. Williams MR, Choudhri AF, Morales DL, Helman DN, Oz MC. Gender differences in patients undergoing coronary artery bypass surgery, from a mandatory statewide database. ***J Gend Specif Med*** 2000; 3: 41-48.

5. Shigematsu H, Tsutsui H, Shihara M, Tsuchihashi M, Koike G, Yamamoto S, et al. Japanese Coronary Intervention Study (JCIS) Group.Coronary revascularization in Japan. Part 4: coronary artery bypass surgery during 1997. ***Circ J*** 2002; 66: 20-29.
6. VanDomburg RT, Takkenberg JJ, van Herwerden LA, Venema AC, Bogers AJ. Short-term and 5-year outcome after primary isolated coronary artery bypass graft surgery: results of risk stratification in a bilocation center. ***Eur J Cardiothorac Surg*** 2002; 21: 733-740.
7. Koivula M, Paunonen-Ilmonen M, Tarkka MT, Tarkka M, Laippala P. Gender differences and fears in patients awaiting coronary artery bypass grafting. ***J Clin Nurs*** 2001; 10: 538-549.
8. Doughty M, Mehta R, Bruckman D, Das S, Karavite D, Tsai T, et al. Acute myocardial infarction in the young. The University of Michigan experience. ***Am Heart J*** 2002; 143: 56-62.
9. Vargas A, Doliszny K, Herlitz J, Karlsson T, McGovern P, Brandrup-Wognsen G, et al. Characteristics and outcomes among patients undergoing coronary artery bypass grafting in western Sweden and Minneapolis-St Paul, Minnesota. ***Am Heart J*** 2001; 142: 1080-1087.
10. Efthimiadis A, Lefkos N, Psirropoulos D, Papadopoulos I, Boudonas G, Lefkou E, et al. Risk factors of ischaemic heart disease and long-term outcome after coronary bypass surgery. ***J Cardiovasc Surg (Torino)*** 2001; 42: 731-734.
11. Kyker KA, Limacher MC. Gender differences in the presentation and symptoms of coronary artery disease. ***Curr Womens Health Rep*** 2002; 2: 115-119.
12. King KM. Gender and short-term recovery from cardiac surgery. ***Nurs Res*** 2000; 49: 29-36.
13. Gold LD, Krumholz HM. Gender differences in treatment of heart failure and acute myocardial infarction: a question of quality or epidemiology? ***Cardiol Rev*** 2006; 14: 180-186.
14. Blankstein R, Ward RP, Arnsdorf M, Jones B, Lou YB, Pine M. Female gender is an independent predictor of operative mortality after coronary artery bypass graft surgery: contemporary analysis of 31 Midwestern hospitals. ***Circulation*** 2005; 112 (Suppl): 1323-1327.
15. Doyle F, De La Harpe D, McGee H, Shelley E, Conroy R. Gender differences in the presentation and management of acute coronary syndromes: a national sample of 1365 admissions. ***Eur J Cardiovasc Prev Rehabil*** 2005; 12: 376-379.
16. Ferguson TB, Hammill BG, Peterson ED, DeLong ER, Grover FL. STS National Database Committee, A decade of change--risk profiles and outcomes for isolated coronary artery bypass grafting procedures, 1990-1999: a report from the STS National Database Committee and the Duke Clinical Research Institute. Society of Thoracic Surgeons. ***Ann Thorac Surg*** 2002; 73: 480-489.
17. Stouffer GA, Mott L, Brizolara A, Subbarao V. Left main coronary artery disease in adults younger than 50 years: a comparison with older patients. ***Catheter Cardiovasc Interv*** 2000; 51: 11-17.
18. Baltali M, Kiziltan HT, Korkmaz ME, Topcu S, Demirtas M, Metin M, et al. Prevalence of modifiable cardiovascular risk factors remain high after coronary bypass graft surgery: a multicentre study among Turkish patient. ***J Cardiovasc Risk*** 2002; 9: 207-214.
19. Koch CG, Weng YS, Zhou SX, Savino JS, Mathew JP, Hsu PH, et al. Prevalence of risk factors, and not gender per se, determines short- and long-term survival after coronary artery bypass surgery. ***J Cardiothorac Vasc Anesth*** 2003; 17: 585-593.
20. Soedamah-Muthu SS, Chaturvedi N, Toeller M, Ferriss B, Reboldi P, Michel G, et al. Study Risk factors for coronary heart disease in type 1 diabetic patients in Europe: the EURODIAB Prospective Complications. ***Diabetes Care*** 2004; 27: 530-537.
21. Murphy GP. Mayo Clinic Cardiology Review. 2th ed. Place of publication: William-Wilkins Co; 2000. p. 1109.
22. Filardo G, Maggioni AP, Mura G, Valagussa F, Valagussa L, Schweiger C, et al. The consequences of under-use of coronary revascularization; results of a cohort study in Northern Italy. ***Eur Heart J*** 2001; 22: 654-662.
23. King KB, Rowe MA, Zerwic JJ. Concerns and risk factor modification in women during the year after coronary artery surgery. ***Nurs Res*** 2000; 49: 167-172.
24. Gurm HS, Whitlow PL, Kip KE, BARI Investigators. The impact of body mass index on short- and long-term outcomes inpatients undergoing coronary revascularization. Insights from the bypass angioplasty revascularization investigation (BARI). ***J Am Coll Cardiol*** 2002; 39: 834-840.
25. Novaro GM, Pearce GL, Sprecher DL, Griffin BP. Comparison of cardiovascular risk and lipid profiles in patients undergoing aortic valve surgery versus those undergoing coronary artery bypass grafting. ***J Heart Valve Dis*** 2001; 10: 19-24.
26. Yap AG, Baladi N, Allman G, Avenmarg J, Yap S, Shaw RE. Coronary artery bypass surgery on small patients. ***J Invasive Cardiol*** 2000; 12: 242-246.
27. Raine RA, Black NA, Bowker T, Wood DAJ. Gender differences in the management and outcome of patients with acute coronary artery disease. ***J Epidemiol Community Health*** 2002; 56: 791-797.