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The Prevalence of Risk Factors of Coronary Artery Disease in the Patients who Underwent Coronary Artery Bypass Graft, Shiraz, Iran: Suggesting a Model

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ABSTRACT

Background: Cardiovascular diseases are the main cause of 40% of deaths in Iran annually. Many patients undergoing coronary artery bypass graft surgery have previous cardiovascular risk factors which could be prevented.

Objectives: The present study aimed to assess the prevalence of cardiovascular risk factors in the patients undergoing coronary artery bypass graft surgery.

Materials and Methods: In this cross-sectional (descriptive – analytical) study, a data collecting form was used. A total of 246 patients were selected from six hospitals of Shiraz using random stratification. Descriptive statistics were presented through figures and tables and t-test was used to analyze the continuous variables. All the statistical analyses were performed using the SPSS statistical software (version 15.0). Besides, $P < 0.05$ was considered as statistically significant.

Results: Among the study patients, only 11.67% had no risk factors and 88.33% had one or more risk factors. The most common risk factors observed in the patients were hypertension, obesity and overweight, hyperlipidemia, and diabetes mellitus. The results showed a significant difference between males and females regarding the prevalence of hypertension ($P = 0.001$), diabetes ($P = 0.028$), hypercholesterolemia ($P = 0.020$), and cigarette smoking ($P = 0.001$). In addition, the patients' mean levels of cholesterol, LDL, triglyceride, and fasting blood sugar were higher than the acceptable level, while that of HDL was lower than the accepted level.

Conclusions: These patients are recommended to be trained regarding lifestyle changes. Also, prevention strategies can play an important role in reducing patient morbidity and mortality.

► *Implication for health policy/practice/research/medical education:*
Considering the prevalence of coronary artery risk factors and the aging population, managing these risk factors plays an important role in reducing patients' morbidity and mortality.

1. Background

Since cardiovascular disease is the leading cause of mortality in the world, identifying and controlling the risk factors of coronary artery disease are important for prevention of cardiovascular diseases. Many patients undergoing coronary artery bypass graft surgery have previous cardiovascular risk factors which could be prevented. Cardiovascular diseases comprise the cause of 40% of deaths in Iran annually (1-3).

Up to now, numerous studies have been conducted on the risk factors of cardiovascular diseases, such as hypertension, diabetes, hyperlipidemia, obesity, and cigarette smoking. It seems that the patients with two or more risk factors may have more severe coronary artery stenosis and be affected

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by cardiovascular events. Also, the patients with more uncontrolled risk factors face complications. Considering the increasing elderly population, these risk factors can be considered more as a public health concern (4-10).

Furthermore, the role of secondary and tertiary prevention in cardiovascular events has been emphasized in the guidelines of American College of Cardiology Foundation (ACCF), American Heart Association (AHA), and European Society of Cardiology (11, 12).

2. Objectives

The present study aims to assess the prevalence of cardiovascular risk factors in the patients undergoing coronary artery bypass graft surgery.

3. Materials and Methods

The study data were retrospectively collected from the patients who underwent coronary artery bypass graft surgery at six cardiac surgery centers in Shiraz within a one-year period from March 21, 2011. Coronary Artery Bypass Graft (CABG) surgeries were performed in Nemazee, Shahid Faghihi, Dena, Ordibehesht, Markazi, and Kowsar hospitals in Shiraz during the study period and 246 patients were selected through random stratification.

Considering English alphabetical order, the patients were selected from "Dena", " Ordibehesht", " Kowsar", "Markazi", "Nemazee", and "Shahid Faghihi" hospitals. Then, a number was assigned to each patient based on the date of admission for CABG surgery. Afterwards, random numbers generation website was used to obtain randomized numbers. Considering power of 80% and $\alpha = 0.05$ and using the following formula, a 246-subject sample size was determined for the study:

$N = 4p (1-p)/d^2$

In addition, the number of samples selected from each hospital was determined based on the study sample size and the number of surgeries performed in each hospital.

All the selected patients who were operated in Shiraz in 2011 were enrolled into this study. However, 28 patients whose medical records were incomplete were excluded from the study. The study data were collected using a data collection form according to ACCF/AHA guideline, 2011. This data collecting form included demographic information,

medical history (diabetes, hyperlipidemia, hypertension, and cigarette smoking), lab data before the operation (lipid profile and fasting blood sugar), and objective data (ECG before and after the operation, echocardiography, and angiography before the operation). The risk factors were defined according to the existing standard definitions. After all, descriptive statistics were presented through figures and tables and t-test was used to compare the mean differences among male and female participants. All the statistical analyses were performed using the SPSS statistical software (version 15.0). $P < 0.05$ was considered as statistically significant.

4. Results

Among the 246 patients, 159 (64.6%) were male and 87 (35.4%) were female. The mean age of the patients was 62.24 ± 9.76 years (range: 38 to 85 years). Besides, the mean age of male and female participants was 61.33 ± 10.7 and 63.90 ± 8.83 years, respectively. The results revealed a significant difference between the male and female subjects regarding their mean age (P = 0.010; 95% CI: -5 - 0.136), and the mean age of the women was higher than that of the men. In addition, most of the patients (35%) were in the 60 - 69 years age group. Distribution of the major risk factors and other clinical conditions of the patients has been summarized in Table 1.

Accordingly, only 11.67% of the patients had no risk factors and 88.33% had one or more risk factors. The results indicated a significant difference between male and female patients regarding the prevalence of hypertension, diabetes, hypercholesterolemia, and cigarette smoking.

In this study, the patients' laboratory data were assessed according to their records and the results have been presented in Table 2.

Table 2. The Patients' Laboratory Data

Parameters	Mean ± SD (Range)
Cholesterol (mg/dL)	166 ± 43.8 (85 - 280)
LDL (mg/dL)	111.84 ± 35.3 (45 - 230)
HDL (mg/dL)	37.9 ± 8.6 (20 - 68)
Triglyceride (mg/dL)	144 ± 39.4 (43 - 404)
Fasting blood sugar (mg/dL)	140.7 ± 32.44 (42 - 396)

Abbreviations: LDL, low density lipoprotein; HDL, high density lipoprotein

Table 1. Distribution of the Risk Factors and Other Clinical Conditions among the Patients

Variable	Percent	Percent of the Genus	P value
Hypertension	58.9	Male:50.9% Female:73.56%	0.001
Diabetes mellitus	41.9	Male: 37.1% Female: 50.57%	0.028
Hypercholesterolemia	49.2	Male: 44.02% Female: 58.6%	0.020
Cigarette smoking	33.7	Male: 40.8% Female: 20.6%	0.001
Overweight (25 ≤ BMI < 30)	35.4	Male: 37.1% Female: 32.1%	0.400
Obesity(30 ≤ BMI < 35)	11.4	Male: 11.3% Female: 11.5%	0.300
Obesity (BMI ≥ 35)	3.2	Male: 2.5% Female: 4.6%	

5. Discussion

Due to the epidemic of coronary artery risk factors, secondary and tertiary prevention programs are essential. The results of our study showed that 88.3% of the patients had at least one risk factor; thus, it is necessary to change the patients' lifestyle. In addition, a stronger enforcement strategy is required for the modifiable risk factors. In the present study, the most common risk factors were hypertension, obesity and overweight, hyperlipidemia, and diabetes mellitus. Besides, the results showed a significant difference between male and female participants regarding the prevalence of hypertension, diabetes, hypercholesterolemia, and cigarette smoking. Except for cigarette smoking, other risk factors were more prevalent among the women. According to Table 1, 50% of the patients were overweight and obese. Since these risk factors were assessed in the cardiac surgery wards, the higher prevalence of the risk factors among the patients compared to the society was not quite unexpected. Comparison of the prevalence of risk factors in our patients and Asians and Americans who underwent CABG surgeries has been shown in Figure 1 (7).

Based on this figure, the prevalence of the risk factors was lower in our patients compared to Asian and North Americans, but the mean age of our patients was lower. This difference might have resulted from geographic and racial variations. Yet, a larger scale study is needed for further documentation.

In the current study, the mean age of the female subjects was 30 months more than that of the male subjects, which might be due to the protective role of female hormones. According to data of Reduction of Atherothrombosis for Continued Health (REACH) registry, the mean age of the Asian patients referring for CABG surgery was 64.7 years, while that of the North American patients was 70.1 years (7). Thus, the mean age of our patients was lower than that of Asian and North American ones. Mandegar et al. showed that the mean age of the patients was 58.7 years (60.97 and 57.87 in women and men, respectively) (13), which is similar to our study findings. Considering the low mean age of the Iranian patients for CABG surgery, more attention should be paid to the social determinants of health.

According to the present study results, the patients' means of cholesterol, LDL, triglyceride, and fasting blood sugar were higher than the acceptable level. However, the patients' mean of HDL was lower than the accepted level. Since desired HDL level has been known as an independent marker that prevents coronary artery disease, the low mean
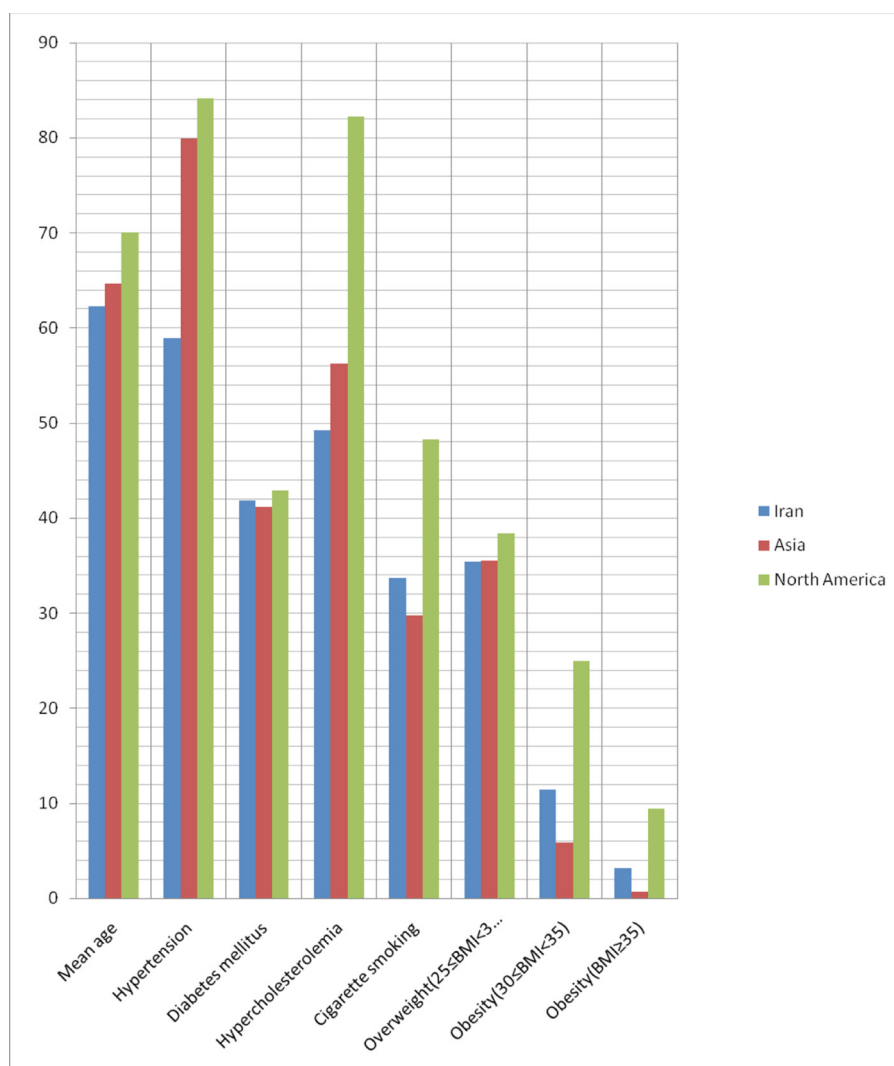

Figure 1. Comparison of the Prevalence of Risk Factors in Our Patients and Asian and North American Patients According to the Data of REACH Registry

age of our patients for surgery may be due to low levels of this marker (14).

Since the patients remain at a high risk of cardiovascular events after CABG surgery, they are recommended to be trained regarding lifestyle changes.

According to the role of lifestyle change in improvement of the modifiable risk factors of coronary artery diseases, these patients are recommended to be trained regarding modification of these risk factors. Secondary and tertiary prevention also plays an important role in reducing patient morbidity and mortality. Moreover, managing the risk factors can help prevent the occurrence of CAD in future. Therefore, a preventive clinic is suggested to be established, so that the patients with modifiable risk factors can refer to these clinics for routine follow-up. In this study, a model was also proposed to provide the patients with more appropriate services (Figure 2).
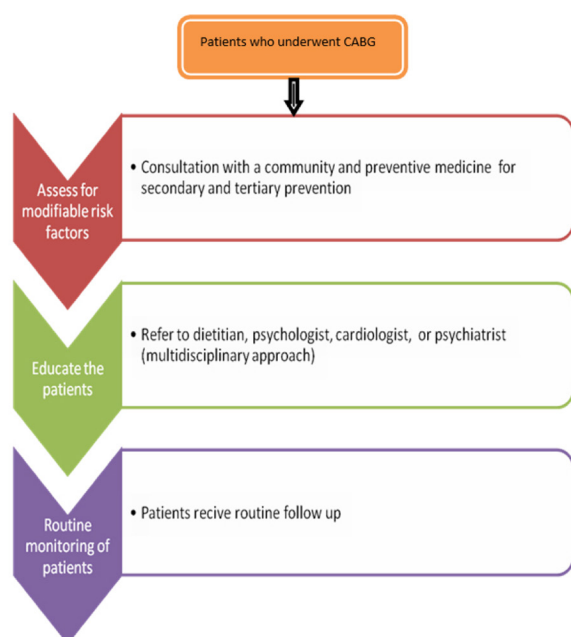

Figure 2. A Model for Establishment of a Preventive Clinic to Monitor the Patients

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Authors' Contribution

Study concept and design and critical revision of the manuscript for important intellectual content: Mohammad Ali Ostovan. Acquisition, analysis, and interpretation of the data, drafting of the manuscript, and statistical analysis: Negar Darvish. Critical revision of the manuscript for important intellectual content, analysis and interpretation of data, administrative, technical, and material support, and study supervision: Mehrdad Askarian.

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