

# Risk Factors of Coronary Artery Disease in Coronary Artery Bypass Graft Patients: A Cross-sectional Assay from Tehran, Iran

Hamidreza Taghipour<sup>1</sup>, Sadra Taghipour<sup>2</sup>, Saman Soltani Moghadam<sup>3</sup>, Alireza Bolouriyan<sup>4</sup>, Seyed Mohammad Javad Mirlohi<sup>5</sup>



1. Atherosclerosis Research Center, Faculty of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran.
2. Faculty of Medicine, Hormozgan University of Medical Sciences, Bandar Abbas, Iran.
3. Faculty of Medicine, Gilan University of Medical Sciences, Rasht, Iran.
4. Student Research Committee, Baqiyatallah University of Medical Sciences, Tehran, Iran.
5. Department of Research, Arka Education and Clinical Research Consultants, Tehran, Iran.

## ABSTRACT

**Introduction:** Coronary artery disease (CAD) is the leading cause of death in world. In addition, coronary artery bypass graft (CABG), which is known as one of its therapeutic approaches, can cause complications and morbidities that have high costs. We aimed to investigate the distribution of CAD risk factors in patients who underwent CABG in Tehran, Iran. **Methods:** The present cross-sectional study included CAD patients who underwent CABG surgery from 20 March 2016 to 20 March 2017 in Baqiyatallah Hospital, Tehran, Iran. The data including the presence of CAD risk factors such as smoking, diabetes, hypertension, presence of CAD family history, and hyperlipidemia, were obtained from the patients' medical records. **Results:** out of 328 patients, 109 (33.3%) were female and 219(66.8%) were male. Their age ranged between 41 to 88 and the mean age (SD) was 62.15 (9.913) years. Finally, 296 patients (90.2%) had at least one symptom and 292 (89%) patients had at least one risk factor. Prevalence of hypertension, hyperlipidemia, diabetes, smoking, and positive familial history was 53.7%, 44.5%, 39.6%, 22.3%, and 16.2% respectively. **Conclusion:** The most prevalent risk factor was hypertension followed by hyperlipidemia, smoking, diabetes, and familial history. Also, chest pain was the most frequent symptom among patients. A healthy lifestyle is essential to decrease the prevalence of modifiable risk factors and preventing the presence of CAD and future vascular bypass surgeries in the population.

**Keywords:** CABG, CAD, Coronary artery disease

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\*Correspondence to: Seyed Mohammad Javad Mirlohi; General practitioner, Department of Research, Arka Education and Clinical Research Consultants, Tehran, Iran.  
 E-mail: mj.mirlohi@gmail.com



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## INTRODUCTION

Coronary artery disease (CAD) is a leading cause of mortality and morbidity worldwide(1). It is predicted that with this growth we are going to witness 23.6 million deaths due to cardiovascular disease, by 2030 (2-6). In detail, the disease is defined by inflammation and plaque formation in the arterial wall making it thickened and leading to narrowed artery. Rupture of the plaque leads to acute coronary syndrome which can be fatal (7, 8). There are several risk factors for CAD including older age, positive familial history for CAD, male gender, lack of physical activities, dyslipidemia, high blood pressure, smoking, diabetes, glucose intolerance, overeating, and obesity (2, 3, 9). Except for non-modifiable factors (age, sex male, familial history), others can be changed (2, 3). Management of modifiable risk factors can decrease cardiovascular diseases (CVD) and events (7, 10). Overall CVD prevalence

in the adult population is 48%. The prevalence increases with increase in age (3). Keeping some main risk factors low in the middle ages can lead to survival to age 85 (11, 12).

Cardiovascular diseases cause high economic costs in the world (3, 13). Coronary artery bypass graft (CABG), as a treatment option, may be accompanied by short- and long-term pre-operational and post-operational morbidities imposing high treatment costs (14-16). Methods such as coronary angiography, can predict the onset of severe atherosclerosis; however, they are expensive and associated with complications (17). Euro score is another predictive method that has an uncertain validity (18). Therefore, evaluating risk factors of cardiovascular disease is a certain and affordable way in comparison to other techniques. By diagnosing and recognizing the frequency of risk factors in patients undergoing CABG, severe atherosclerosis can be prevented in other patients

by changing their lifestyles. Epidemiological studies of coronary heart disease, show that complications of coronary heart disease vary according to age, sex, geographical areas, race, and risk factors (19-21).

We aimed to investigate the prevalence of cardiovascular risk factors such as hypertension, diabetes, hyperlipidemia, smoking, and family history of coronary artery disease among patients underwent CABG at Baqiyatallah hospital, Tehran, Iran.

**MATERIAL AND METHODS**

This descriptive cross-sectional study was conducted in Baqiyatallah university hospital, Tehran, Iran from 16 March 2016 to 16 March 2017. This study was approved by the institutional review board of Baqiyatallah University of Medical Sciences, Tehran, Iran. The study was conducted in adherence to the principles of declaration of Helsinki.

CAD patients who underwent CABG were included in the study by a census sampling method. Patients who had congenital heart diseases, heart malignancies, or records containing incomplete information or inaccurate history, cases who underwent another

surgery at the time of hospitalization, and those who underwent second bypass surgery were excluded from the study.

Demographic characteristics of the CAD patients who underwent CABG by a specific cardiac surgeon, including age, gender, risk factors (family history of heart disease, smoking, alcohol, diabetes, hypertension, hypercholesterolemia), and their symptoms were extracted from records. Moreover, other para-clinical results including echocardiography as well as numbers and types of coronary grafts were also obtained through patients’ medical records using a pre-designed checklist.

Statistical analysis was conducted using SPSS software version 21 (SPSS Inc., Chicago, USA –version 21). Descriptive statistics for the measured characteristics were presented by frequency and percentage.

**RESULTS**

Eventually, 328 patients were included in the analysis of which 109 (33.2%) patients were female, and 219 (66.8%) were male. The patients’ age ranged from 41 to 88 years and the mean (SD) was 62.15 (9.91) years. As reported in Table 1, 296 patients (90.2%) had at least one symptom.

In fact, 36 (11%) of the patients did not have any risk factors, and 292 (89%) patients had at least one risk factor. The most prevalent factor was hypertension, and the least prevalent one was the familial history of CVD. Frequencies are reported in Table 1.

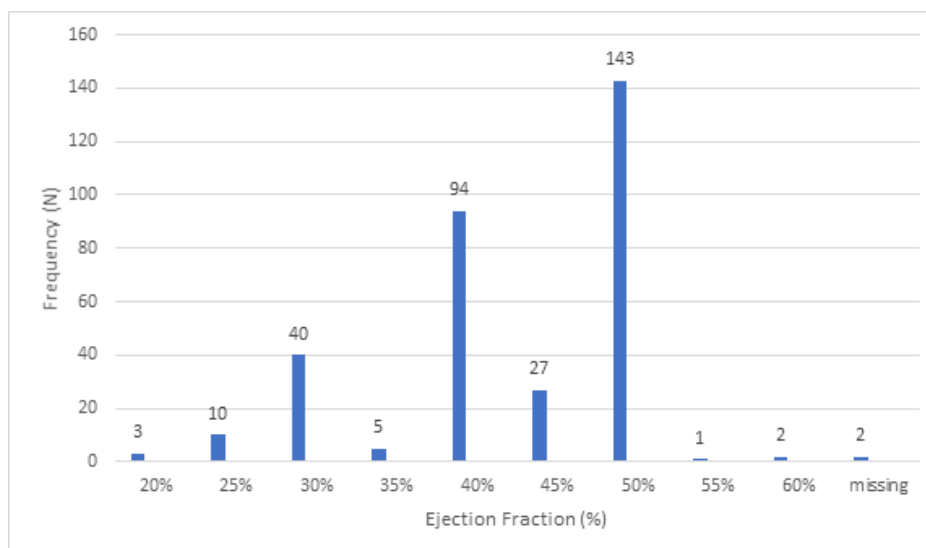
In further analysis, 81 patients (21.9%) had also a peripheral vascular disease. In para-clinical assessments, 28 patients (8.5%) had arrhythmia. Other para-clinical collected reports and the number of coronary grafts are shown in Figures 1 and 2.

**DISCUSSION**

In this study, we aimed to determine the prevalence of risk factors and demographic characteristics in patients with coronary artery disease undergoing CABG surgery. Male patients were more than female ones. 90.2% of patients had at least one risk factor. The most and the least prevalent risk factors were hypertension and familial history, respectively.

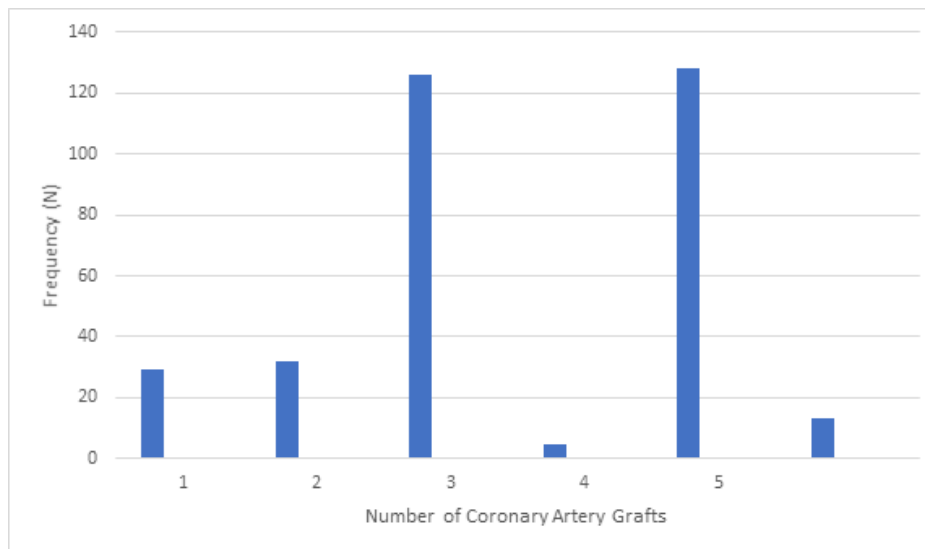
**Table 1.** prevalence of symptoms and risk factors in the study population

| Variable                | Frequency | Percentage |
|-------------------------|-----------|------------|
| Symptoms                |           |            |
| Chest Pain              | 258       | 87.2       |
| Dyspnea                 | 61        | 18.6       |
| Risk Factors            |           |            |
| Hypertension            | 176       | 53.7       |
| Hyperlipidemia          | 146       | 44.5       |
| Smoking                 | 73        | 22.3       |
| Diabetes                | 130       | 39.6       |
| Familial history of CVD | 53        | 16.2       |



**Figure 1.** Frequency of ejection fraction in the studied population.





**Figure 2.** Number of coronary artery grafts in patients.

In a study by Dadkhah-Tirani et al. (2018) prevalence of risk factors among the patients who underwent CABG in 2010 and 2016 were compared; the most and the least prevalent risk factors were hypertension and familial history, respectively, in both years, which was similar to our results (15). In a study by Ostovan et al. (2014), the majority of patients undergoing CABG had at least one risk factor as same as our study; the most prevalent risk factor was hypertension, and the least one was body mass index (BMI)  $\geq 35$ . All the measured variables were not similar to our study, like BMI, which is not included in our data. On the other hand, considering familial history isn't included in the study of Ostovan et al., an appropriate comparison between the least prevalent factors may not be obtained (16).

In a study by Bifari et al. (2020), two groups of patients with CABG in 2012 and 2018 were compared. In both periods, smoking was the least prevalent factor, although it increased significantly in the second period. In our study, the least one was familial history, which was not considered in the data of the study by Bifari et al. The most prevalent one was hypertension and diabetes in 2012 and 2018, respectively (17). In a single-center study in Oman by Pieris et al. in 2014, the risk factors of patients who underwent coronary artery bypass surgery from March 2008 to March 2010 were measured. The results were similar to our study, the most and the least common factor was hypertension and familial history, respectively (18).

In a retrospective study by Waly et al. (1997) prevalence of risk factors of patients undergoing CABG were compared between 2 groups of Egyptian and American patients. The most frequent factors were hyperlipidemia and hypertension in Egyptians and Americans, respectively. The least one was diabetes in Egyptians and obesity in Americans. These differences may result from different races and different lifestyles like food habits (19). In a similar survey by Kaslival et al. on a population of Indian patients who underwent CABG surgery, the prevalence of cardiac risk factors was significantly higher. However, the number of risk factors examined was limited (20). The results of a 2019 study by Vafaie et

al. on patients undergoing coronary artery bypass grafting showed that cardiac risk factors were significantly higher in women. Diabetes, hypertension, and obesity were also increased in this group. Additionally, HTN was the most prevalent risk factor (56.74%) among the patients which was consonant with our results (21).

The prevalence of hypertension was 53.7% in our population. The study conducted by Karimi et al. in 2009 reported similar results, and HTN was seen in 51.8% of cases. However, hyperlipidemia with 63% frequency was identified as the most critical risk factor in the Iranian population. Plus, 91% of patients undergoing CABG had one or more risk factors (22). In the study of Safaei et al., in Pakistan, most of the cases undergone CABG had at least one risk factor, which was consistent with our result. Nevertheless, hyperlipidemia was known as the most prevalent among patients  $>65$  years old (11). In the study conducted by Sarrafzadegan et al., the prevalence of hypercholesterolemia, hypertriglyceridemia, hypertension, and smoking in the Iranian population was 34%, 43%, 26%, and 26%, respectively (23). The least prevalent risk factor in our study, positive familial history, may indicate that non-modifiable factors are less associated with CAD compared to modifiable factors, which can emphasize the importance of a healthy lifestyle.

#### LIMITATION

Our study had some limitations. We gathered data retrospectively, so we had access to just the recorded information. For instance, we had no access to the height and weight data and consequently, we could not consider body mass index (BMI) in our study. In addition, we did not have information about patients' physical activity. More studies with a larger sample size, along with fewer limitations, would be a great help to get more knowledge.

#### CONCLUSION

In our study, hypertension was the most prevalent risk factor, and positive family history of CAD was the less dominant risk factor among the subjects. The other most prevalent risk factors following hypertension were hyperlipidemia, diabetes, and smoking, respectively. More than half of the cases undergoing CABG have at

least one risk factor of cardiovascular disease. Additionally, chest pain was the most frequent symptom among patients. Therefore, it is essential to evaluate these risk factors, particularly hypertension among patients, to prevent future vascular bypass surgeries in the population. By training people to have a healthy lifestyle, we are able to decrease modifiable cardiovascular risk factors. As a result, we can prevent or delay CAD and reduce hospitalizations and surgeries, along with morbidities, mortalities, and high costs.

### CONFLICT OF INTERESTS

The authors declare there is no conflict of interests.

### ABBREVIATIONS

CAD; Coronary artery disease, CABG; coronary artery bypass graft, BMI; body mass index.

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