Original Article

The Prevalence of Risk Factors for Coronary Artery Disease in Post Coronary Artery Bypass Graft Patients

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Abstract

Background: *Cardiovascular diseases, the part of non communicable diseases are the 30% death in Bangladesh. Many patients undergoing coronary artery bypass graft surgery have previous cardiovascular risk factors which could be prevented.* ***Objectives****: To assess the prevalence of cardiovascular risk factors in the patients undergoing coronary artery bypass graft surgery.* ***Materials and Methods:*** *All patients who had coronary artery bypass grafting between January 2018 to June 2018 data were collected retrospectively in six month duration time at a tertiary cardiac care hospital in Dhaka, Bangladesh. The prevalence rate of conventional risk factors are presented for observational study.* ***Results:*** *Out of 305 patients, 251 (82.3%) were male and 54 (17.7%) were female. The age ranged from 31 to 78 years old. The mean age was(56.72 ± 3.6). Hypertension was present in 249 (81.6%),diabetes 211 (69.2%), Dyslipidemia had 200 (65.6%), smoking habits had 105 (34.4%) and strong family history 9 (3%). As far as the obesity was concern 149 (48.9%)normal weight,128 (42.0%) patients were overweight and 25(8.2%) were obese. Majority of the patients had 3 risk factors together 136(44.6%), 2 risk factors 82 (26.9%), 1 risk factor 41(13.4%), 4 risk factors 38(12.5%) and 8(2.6%) had no risk factors. As compared to using the bypass technique there were 242(79.4%) On pump arrest heart, 40(13.1%) by On pump beating and 23(7.5%) were by Off pump beating. Mortality was 2.3%.Out of them 3(42.86%) patients had 3 risk factors, 2 (28.57%) patients had 2 risk factors and 2(28.57%) patients had 1 risk factor.* ***Conclusion:*** *The most common risk factors were hypertension, followed by diabetes, dyslipidemia , male gender, smoking, obesity and positive family history. These patients are recommended to be trained regarding lifestyle changes. Also, prevention strategies can play an important role in reducing patients' morbidity and mortality.*

Keywords: *Coronary Artery Disease, Risk Factors, Coronary Artery Bypass Graft.*

Introduction

Coronary artery disease (CAD) is an important medical problem globally because it is common and leading cause of death throughout the world. Identifying and controlling the risk factors of coronary artery disease are important for prevention of cardiovascular diseases. Many of those who underwent CABG surgery must have some risk factors which can be prevented. According to the World Health Organization (WHO) Cardiovascular disease (CVDs) were the cause of 17.5 million deaths (31% of all death) around the world in 2012, of which 80% occurred in low and middle income countries (LMICs) and 85% of all global disability arise from CVDs.[1]

Bangladesh has been experiencing epidemiological transition from communicable disease to non-communicable disease (NCD). NCDs represented only 8% of total deaths compared to 52% of deaths due to communicable diseases.[2] Whereas in 2014, non communicable diseases (NCDs) are estimated to account for 59% of total deaths; CVD is the single-most important contributor, and is responsible for 17% of total mortality.[3]

A rapid urbanization took place in Bangladesh in the past few decades due to its fast economic growth, and recently, it has emerged as a developing country.[4-5]

The results of this growth and urbanization increase the concern that a further rise in the chronic disease burden may be seen due to habituation of a sedentary life style (changing food habits including growing access to and demand for processed food, inconsistent mealtimes and reduced physical activity).[6]

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Many studies had been carried out on the risk factors of CVDs like hypertension, diabetis, obesity, hyperlipidemia and cigarette smoking. These risk factors cause severe coronary artery stenosis and be affected by cardiovascular events. 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.[7-8]

Materials and Methods

We collected data retrospectively from the patients who underwent coronary artery bypass surgery within the period of six months from January 2018 to June 2018. CABG operations were operated at Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka. We included all On pump, Off pump and also CABG with Valve surgery. Those patients who underwent surgeries with congenital heart disease and incomplete medical records were excluded from this study.

The risk factors were defined according to the existing standard definitions. After all   statistical analyses were performed using the SPSS (statistical package for social sciences) version 25. The test statistics to be used to analyze the data are descriptive statistics. The summarized data were presented in the form of tables.

Results

A total of 417 cases were operated during this time. Among them 78 cases were congenital heart surgery and 19 were valve surgery. Out of 320 we excluded 15 patients due to lack of adequate data. Among the 305 patients,251 (82.3%) were male and 54 (17.7%) were female. Mean age of patients was 56.72 ±3.6 years (Range 31-78). This result revealed the significant difference between male and female gender and also the age ,lowest age was 31 years and highest was 78. This 31 age is alarming that rapid urbanization may lead to develop CAD. (Table-I.)

Table I. Distribution of patients by their demographic characteristics (n=305)

	Frequency	Percentage	Mean ± SD (Range)
Age	--	--	56.72 ± 3.6-(3178)
Sex			
Male	251	82.3	--
Female	54	17.7	--

According to distribution of patients by their body mass index (BMI) 3(1%) patients were underweight, 149(48.9%) patients were normal weight, 128 (42.0%) patients overweight and 25 (8.2%) were obese. This indicates slight increase of percentage between normal and underweight with overweight and obese was 25(8.2%) (Table-II)

Table II. Distribution of patients by their BMI (n=305)

BMI (kg/m)^2	Frequency	Percentage
<18.5 kg/m^2(Underweight)	3	1.0
18.5 to < 23.0 kg/m^2 (Normal)	149	48.9
23.0 to < 25.0 kg/m^2 (Overweight)	128	42.0
25.0 to < 30.0 kg/m^2 (Obese)	25	8.2

Distribution of the major risk factors and other clinical conditions of the patients has been summarized in Table-III. This result revealed that highest percentage found who had hypertension ,was 249 (81.6%), next was diabetes 211 (69.2%), dyslipidemia 200(65.6%), smoking habits 105 (34.4%) and strong family history 9(3.0%).This results indicates that hypertension ,diabetes, dyslipidemia and smoking are main culprit risk factors for developing CAD ultimately needed for bypass surgery. (Table-III)

Table III: Distribution of patients by their risk factors (n=305)

Risk Factors	Frequency	Percentage
Hypertension	249	81.6
Diabetes	211	69.2
Dyslipidemia	200	65.6
Smoking Habit	105	34.4
Family History of CAD	9	3.0

Among the patients who need CABG, 242 (79.4%) by On pump arrest, 40 (13.1%) were On pump Beating heart and 23 (7.5%) by Off pump beating surgery in six months. This result signifies majority case done by cross clumping on cardiopulmonary bypass (CPB). (Table-IV)

Table IV: Distribution of patients by their operative data (n=305)

Pump	Frequency	Percentage
On pump arrest	242	79.4
On pump Beating	40	13.1
Off pump Beating	23	7.5

We further analyzed the distribution of percentage of patients by their risk factors number in table (Table-V) One risk factor had 41 patients (13.4%), Two risk factors had 82 patients (26.9%), Three risk factors had 136 patients (44.6%), Four risk factors had 38 patients (12.5%) and 8 patients (2.6) had no risk factors. We can see that majority patients had three risk factors.

Table V: Distribution of percentage of patients by their risk factors' number (n=305)

Number of Risk Factors	Patients	Percentage
One	41	13.4
Two	82	26.9
Three	136	44.6
Four	38	12.5
No risk factor	8	2.6

Graphical representation of the percentage of patients of different EF%. Majority of the patients had EF 45%-59% (52.5%) , then EF >60% (30.2%) , EF 30%-44% (17%) and EF<30% had only (0.3%) at that time. (Fig-1)
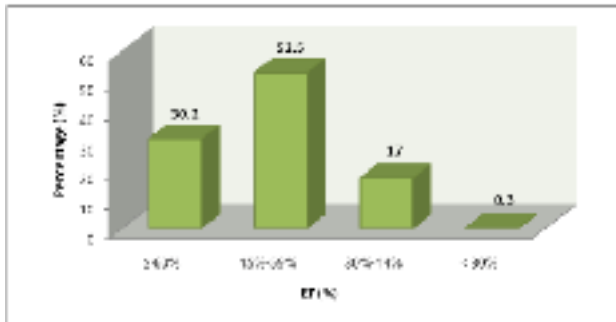

Fig 1: Percentage of patients of different EF (%)

Represented the of numbers of different risk factors by their EF%. This diagram is showing that majority percentage of patients had LVEF (45-59%) in all risk group category. Next was who had LVEF (>60%) (Fig: 2)
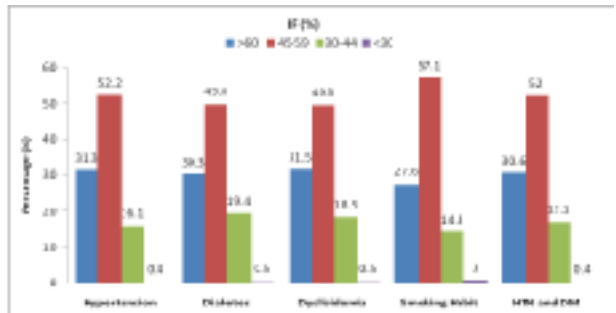

Fig 2: Distribution of patients by their risk factor with EF (n=305)

Our hospital mortality was 2.3%. Three risk factors were present in 3 patients (42.86%), Two were in 2 patients (28.57%) and One risk factors was in 2 patients (28.57%). This signifies majority percentage who had three risk factors. (Fig:3 and Table-VI)

Fig 3: Distribution of patients by their in hospital mortality (n=305)

Table VI : Distribution of percentage of patients who died by the risk factor numbers.

Risk factors Number	Number of patient	Percentage
3	3	42.86%
2	2	28.57%
1	2	28.57%

Discussion

The pathogenesis of CAD remains incompletely understood. Interplay between environmental and genetic factors likely contributes to the pathophysiology of CAD. The 'classic' risk factors such as hypertension, dyslipidemia, diabetes mellitus obesity and smoking undoubtedly play vital role; in addition, some emerging risk factors and as yet unrecognized factors may be important. These factors in isolation, or in different combinations, in a genetically predisposed population, may explain the high prevalence of CAD in Bangladesh.[9]

Due to the epidemic of coronary artery risk factors, secondary and tertiary prevention programs are essential. In our study, hypertension was the most (81.6%) prevalent risk factor. The prevalence of hypertension varies around the world, with the lowest prevalence in rural India (3% and 7% in men and women, respectively) and the highest prevalence from Poland (69% and 73% in men and women, respectively).[10] In addition to this non communicable diseases are showing the raising trends.

Diabetes was the second risk factor in our study(69.2%). Like other developing and also developed countries, prevalence and incidence of type 2 DM is increasing in Bangladesh. In 2010, the International Diabetes Federation (IDF) estimated that 5.7 million (6.1%) and 6.7 million (7.1%) of people living in Bangladesh are suffering from DM and impaired glucose tolerance (IGT), respectively. By 2030, that number of diabetic population is expected to rise to 11.1million.[11] This explosion in diabetes prevalence will place Bangladesh among the top seven countries in terms of the number of people living with diabetes in 2030.[11]

Strategies for prevention of diabetes should be taken as early as possible. This includes primary, secondary and tertiary. Primary prevention includes avoidance of obesity and increased exercise or restricted calorie intake. Secondary prevention is earliest possible identification of the disease and for early evidence based intervention. Tertiary prevention is most effectively achieved by weight loss, whether achieved by diet, drugs or bariatric surgery. Such interventions have shown that obesity-related diabetes is potentially reversible, even after many years of hyperglycemia.[12]

The third prevalent factor was dyslipidemia. The cause and associations of dyslipidemia are complex. It could be associated with nutrition and dietary habits, obesity, diabetes and a genetic predisposition. There is also a wide ethnic variation. The main attributed risk factor for CHD is elevated LDL. However,

in a recent study from our unit, the most common pattern of dyslipidemia observed in CABG patients was low HDL-C (51%), followed by high triglyceride (34%), and high total cholesterol (29%); high LDL-C was seen in only 20% of patients.[13]

Smoking was our next prevalent risk factor. In our study it was 34.4%.Tobacco use is quite common in Bangladesh. Bangladesh is one of the top 10 countries that make up two-thirds of the world population of smokers.[14] According to the Bangladesh NCD risk factor survey 2010, the prevalence is 51.0% for any form of tobacco, 26.2% for smoking and 31.7% for smokeless tobacco (SLT).[15] We found much lower prevalence of smoking in our patients as compared of other studies. Koch et al stated that 66.6% patients of their patients was smoker.[16] Waly et al saw exactly similar prevalence of smoking in Egyptian patients. In the same study prevalence of smoking was found to be much lower (47.5%) in American Patients but it was still higher than that seen in our study.[17]

Another important findings of our study was regarding Obesity. 42.0% were over weight and 8.2% were obese by WHO criteria for BMI. Obesity is well known to cause the elevation of LDL and triglycerides with a decrease in HDL; it increases the incidence of hypertension, diabetes and metabolic syndrome, and it promotes atherosclerosis. Obesity also increases the cause of mortality in most studied populations. Thus, obesity would indirectly increase the incidence of Coronary heart disease (CHD). However, many studies have found that obesity is an independent risk factor for CHD.[18-20] The prevalence of obesity in Oman is 16.7% in men and 23.8% in women.[21]

A family history of coronary heart disease (FHCHD) has been conclusively shown to be an independent risk factor for CHD.[22-24] The impact of FHCHD on the population has been investigated at length.[24] Some studies have shown that the relationship between FHCHD and the risk of CHD is modified by classical risk factors,[22] while other studies have shown that the risk of CHD posed by family history is not modified by classical risk factors.[25]

Reports comparing the variation of prevalence of FHCHD, throughout regions are hard to find. In a UK study involving white Europeans, the incidence was 33.2%.24 Similar incidence rates have been reported from the USA.[26]

Vast changes in lifestyle in Bangladesh within the two decades have been associated with increasing prevalence of risk factors who develop the CAD and ultimately need CABG operation. In our study we have seen who have three risk factors are the majority and second one is two risk factors. In Oman Rajeeva Rivikath Pieris et al saw that Four risk factors was 33.5% patients next one was five risk factors 24.0% and then three risk factors 19.9%.[27]

Conclusion

This study revels that high prevalence of most of the cardiovascular risk factors are hypertension, diabetes, dyslipidemia, male gender patients undergoing CABG. This implies greater risk of short-term and long-term complications in these patients. These findings mandate strategies to increase emphasis on aggressive risk factor modification in overall population of our country.

Acknowledgement

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