

Original Article

Young adults Undergoing Coronary Artery Bypass Grafting (CABG)

Muhammad Arif¹, Yusra Saleem², Stephen Riaz³, Mahapara¹,
Muhammad Imran⁴, Atif Sharjeel¹, Shujjaat Ali Khan⁵ &
Ghufran Ullah Khan¹

¹Tabba Heart Institute, Karachi, Pakistan

²Advance Educational Institute & Research Center (AEIRC), Karachi, Pakistan

³Koohi Goth Hospital, Karachi, Pakistan

⁴Institute of Medical Technology (IMT), Dow University of Health Sciences, Karachi, Pakistan

⁵The Aga Khan University Hospital, Karachi, Pakistan



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Corresponding Author Email:

ccp.arif@yahoo.com

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Abstract

Background: Coronary artery bypass grafting (CABG) is referred to as the gold standard therapeutic modality for treating coronary artery disease (CAD) among both old or young patients. Hypertension, diabetes, Increased BMI and obesity, etc. are among the major risk factors for the development of cardiovascular diseases. The aim of the current study was to highlight the increasing rate of CAD and associated CABG surgery among young adults and to identify the potential risk factors associated with it.

Methodology: In this hospital based observational study, CAD patients ≤ 40 years of age admitted to the cardiac surgery department of a leading cardiac center for CABG surgery were included in the study. The study continued from 5th January 2018 to 21st August 2019 and the data of 184 patients who underwent CABG was collected during this time period. The details regarding patients' age, weight, height and body mass index (BMI) were obtained at the time of initial examination. Moreover, medical records, familial history and risk profile were also monitored. The collected data was analyzed using SPSS Version 22.0.

Results: A total of 184 CAD patients who underwent CABG surgery were included in the study and 114 (62%) of them were males and 70 (38%) were females. The age range was 25 to 40 years with the mean age of 36.5 ± 3.17 years. The risk profile displayed that increased BMI was the major contributor for cardiovascular disease i.e. 38% patients were overweight, 10.9% were in Obese I category and 5.97% were in obese II category. Following obesity, hypertension (49.5%), diabetes (29.9%) and dysfunctional lipids (14.7%) were common comorbid conditions. While smoking and positive familial history also contributed to the risk ratio. It was observed that hypertension, diabetic history was more among overweight and obese individuals ($p=0.029$ & 0.666).

Conclusion: Young CAD patients ≤ 40 years of age display decreased risk and adverse outcomes as compared to the older counterparts but the clinical pattern of presentation is different and hence require different strategic attention.

Keywords

Coronary Artery Bypass Grafting, Young adults, Body Mass Index, Coronary Artery Disease.



Introduction

CAD has become one of the most prevalent cardiovascular diseases among the developing countries with highest reported mortality and morbidity¹. The disease was previously known to affect older adults but now the incidence rate has excelled among young ones². Since the disease risk was scarce among the young people, the data and studies regarding the presence of CAD, its outcomes and the associated risk factors in this young age group hasn't been explored in comparison to the older counterparts³.

One of the gold standard surgery recommended for the treatment of CAD (involving three vessels) is CABG⁴. It is apparent from the previous studies that CABG has been more effective for coronary arterial treatment as compare to other coronary intervention⁵. Although, there is ample literature highlighting the use and risk associated with CABG surgery among elderly patients^{6,7} but the reports regarding younger patients are sparse. A study conducted in 2013 by D'Errigo and his colleagues presented the data regarding the performance of CABG among the CAD patients of < 50 years of age⁸.

Hypertension, diabetes, hypercholesterolemia, dysfunctional lipids, smoking and familial history are the potential risk factors promoting CAD. Moreover, increased BMI and obesity are among the leading causes of coronary heart disease⁹. Therefore, it is highly recommended to measure abdominal obesity in combination with BMI, which helps us to identify the obesity-related health risk¹⁰. Based on a study findings the abdominal obesity measures are essential for identifying cardiovascular risk factors in both males and females¹¹. Moreover, it is also a major risk among the patients who are going for CABG surgery, as obesity increases the risk of post-operative morbidity and mortality¹². It is observed that weight lose

has been proven to reduce the post-operative complications associated with CABG¹³.

The aim of the current study was to explore the high rate of CABG surgery among young population and to identify the potential risk factors among the young CAD patients undergoing CABG.

Methodology

This observational study was conducted at cardiac surgery department of a leading cardiac center over a sample of 184 patients who met the inclusion criteria were enrolled based on the convenient sampling technique. The study continued from 5th January 2018 to 21st August 2019 and the patients ≤ 40 years of age, who underwent CABG during this duration were included in the study after obtaining written informed consent from the patient/caregivers/family. While the cases with emergency surgical procedures, robotic or off-pump surgeries, congenital surgeries, surgeries with hypothermic circulatory arrest and those involving the thoracic aorta were excluded from the study.

The patient data including demographic details, medical history, preoperative risk factors, and medications was collected. The data was analyzed using SPSS Version 22.0, all categorical variables were given as frequency and percentages while mean and standard deviation was used to present all quantitative variables. the potential risk profile of the patients was stratified on the basis of BMI category using Chi-square and independent sample t-test, where $p\text{-value} < 0.05$ was considered significant. The study was initiated after obtaining the ethical approval from the institutional review board and the conduction was in accordance to the Declaration of Helsinki.

Results

Out of 184 patients enrolled for CABG surgery majority were males (62%) and only 38% were females, with a mean age of 36.5 ± 3.17 years, mean BMI of 26.09 ± 7.27

kg/m². Moreover, 115 out of 184 patients who underwent CABG were in between 36 to 40 years of age, 32.6% were 31 to 35 years old and 4.9% were 25 to 30 years old.

Table I: Baseline characteristics of the study population

Characteristics	n=184	
Mean Age (Years)	36.5±3.17	
Age Group (Years)	25 to 30	9(4.9)
	31 to 35	60(32.6)
	36 to 40	115(62.5)
Gender	Male	114(62.0)
	Female	70(38.0)
Weight (kg)	67.8±14.6	
Height (m)	1.62±.104	
BMI (kg/m ²)	26.09±7.27	

*Values are given as mean ± SD or n(%).

The enrolled patients had following distribution of the risk factors, hypertension in 91(49.5%), diabetes in 55(29.9), dysfunctional lipids in 27(14.7%). More than 30% of the patients were overweight, 10.9% were in obese category and 6.5% were underweight. Among other risk factors were smoking and familial history, 38% patients were smokers and 29.9% has family history of cardiovascular diseases.

Table 2: Risk Profile of the study subjects

BMI Group	n(%)
Underweight (<18.5)	12(6.5)
Normal (18.5 - 24.9)	71(38.6)
Overweight (25 - 29.99)	70(38.0)
Obese I (30 - 34.9)	20(10.9)
Obese II (35 - 39.9)	11(5.97)
Comorbidities	
Hypertension	91(49.5)
Diabetes	55(29.9)
Dysfunctional Lipids	27(14.7)
Others	
Smoking	70(38.0)
Familial history	55(29.9)

The results of stratification of patient risk profile with BMI groups is given in table 2. Majority of the patients who underwent surgical procedure due to CAD were overweight and off them majority were males i.e. 42 vs 28 females, the ratio was similar in other BMI categories. Most of the obese patients has history of hypertension (35%) followed by 21.42% overweight hypertensive patients ($p < 0.05$). Diabetic history was common among overweight patients (15.71%). 15% of the obese patients were smokers,

only 4.22% normal and 2.85% overweight patients were observed with dysfunctional lipids while 18.18% obese II patients had familial cardiac history followed by 15% risk among obese I patients.

Table 2: Patient risk profile on the basis of BMI categories

Variable	BMI Group					p-value
	Normal (n=71)	Overweight (n=70)	Obese I (n=20)	Obese II (n=11)	Underweight (n=12)	
Age	36.00±3.321	36.84±3.077	36.70±3.181	37.30±2.452	36.42±3.605	0.120
Gender (M/F)	51/20	42/28	9/11	4/6	0/1	0.099
Hypertension	13(18.30)	15(21.42)	7(35)	1(9.09)	0(0)	0.029
Diabetes Mellitus	5(7.04)	11(15.71)	2(10)	0(0)	2(16.6)	0.666
Smoking	5(7.04)	6(8.57)	3(15)	1(9.09)	0(0)	0.455
Dysfunctional Lipids	3(4.22)	2(2.85)	0(0)	0(0)	0(0)	0.682
Familial history	6(8.45)	5(7.14)	3(15)	2(18.18)	1(8.3)	0.258

*M/F=male/female; BMI-Body Mass Index.

Discussion

Our study was focused to estimate the potential risk associated with CABG surgery among young adults (≤ 40 years), of which 4.9% belonged to the youngest age group i.e. 25 to 30 years while 62.5% were in between 36 to 40 years of age (Table 1). In comparison a study conducted to identify the complications among two groups <40 and >40 years of age after CABG, reported only 1.9% of the young CAD patients who underwent CABG¹⁴. One of the reasons for this might be the increased percutaneous preference as compared to the coronary revascularization¹⁴. While the unclear diagnosis and asymptomatic progression is also very common in the young adults.

Among the most prevalent cardiovascular risk factors was hypertension (49.5%) followed by smoking habits (38%), diabetes and family history (29.9% each). Smoking is considered as the most relevant factor leading to CAD in young population as identified by many studies^{14,15}. Moreover, the positive family history also increases the chances of CAD

twice among young patients as compared to older adults¹⁵. With reference to the published report, the association of familial background with the prevalence of CAD among young people is mostly in relation to metabolic or other genetic factors¹⁴. Apart from that the young people have lesser surgery associated risk factors than the older patients.

It is apparent from the study results that 71 out of 186 patients were normal while the remaining were categorized as overweight and obese (Table 3). It is a well-known fact that the CVD risk increases with the increasing weight, the overweight and obese subjects are more likely to develop hypertension, dyslipidemia, diabetes, etc¹⁶. Moreover, it also increases the risk of stroke, MI, heart failure, and arterial aneurysm compromising the quality of life of the patient¹⁷. The pre-operative characteristics or the potential risk profile of the enrolled patients showed that most of the young male patients were overweight or obese, they were mostly hypertensive and diabetic as compared to those having normal BMI. Also supported by a

positive familial history of CAD which is consistent with other published studies¹⁸⁻¹⁹.

In majority of the study cases the hospital stay was short, perioperative morbidity and in-hospital mortality rate was low. Hence, the safety and efficacy of the surgical procedure is evident^{4,14,15}. The study had several limitations that must be recognized, the sample size of the patients enrolled was very small, the perioperative and postoperative technical complications were not recorded and the study was restricted to single centre. None of the data for other comparative therapeutic modalities was computed. The patients were not followed up for the procedure associated morbidities.

Conclusion

Previously cardiovascular diseases were known to affect to the older age group but recently the prevalence studies have shown a high frequency of CAD among younger adults. We had 184 young CAD patients admitted and treated with CABG surgery. the results were effective and decreased morbidity and no in-hospital mortality was observed during the course of the study. One of the reasons for this might be the young age as decreased risk and adverse outcomes has been observed in comparison to the older counterparts but strategically among these patients the major contributors were hypertension, obesity and diabetes. Clinically, the medical attention focusing on the lifestyle management, weight control and dietary regulations is required in order to control the cardiovascular disease ratio in this age group.

Conflicts of Interest

None.

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