

# Early Outcome of Coronary Artery Bypass Grafting in Obese and Non Obese Patients

Ajwad Farogh<sup>1</sup>, Noman Izhar<sup>2</sup>, Iqra Niaz<sup>3</sup>, Omar Iqbal<sup>4</sup>

<sup>1</sup>Associate Professor of Cardiac Surgery, SIMC Lodhran

<sup>2</sup>Consultant Cardiac Surgeon, Maroof International Hospital Islamabad

<sup>3</sup>Chief Perfusionist Cardiac Center Bahawalpur, <sup>4</sup>Chief Perfusionist, Army Cardiac Centre, CMH, Lahore Cantt

## Author's Contribution

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## Address of Correspondent

Dr. Ajwad Farogh

Associate Professor of Cardiac Surgery, SIMC Lodhran

ajwaad@yahoo.com

## ABSTRACT

**Objective:** To determine the impact of body mass index (BMI) on short-term outcomes like; renal failure, prolonged ventilation and mortality after CABG surgery.

**Methodology:** This prospective comparative study was conducted at the Cardiac Surgery Department, Pervaiz Elahi Institute of Cardiology, Bahawalpur from February to December 2021. A total of 148 patients were enrolled after taking written consent and data was collected through predesign proforma sheets, including; clinical history, investigation and early outcomes in term of (renal failure, prolonged ventilation, and mortality). SPSS 23 was used to analyze data with statistically significant p-value < 0.05.

**Results:** The findings showed that average age of research participants were 57.14 ± 3.07 (age range 30-73 years) and 121 (81.76%) male compared with 27(18.24%) female patients were enrolled with insignificant p-value of 0.730. In this study prolonged ventilation was found in 5(6.76%) obese and 8(10.81%) non-obese patients with insignificant p-value of 0.070. Renal Failure was found in 2 (2.70%) obese and 8 (10.81%) non-obese patients with significant p-value of 0.02 and mortality in 4(5.41%) obese and 2 (2.70%) non-obese patients with significant p-value of 0.0482.

**Conclusion:** The results of the current investigation demonstrated that an obese BMI was a reliable indicator of morbidity or mortality following CABG.

**Key words:** ICU (intensive care unit), CABG (coronary artery bypass graft), BMI.

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## Introduction

Obesity involves the increase of both lean body mass and adipose tissue and is distinguished by adipose tissue growth that is disproportionate to lean body mass. It is now understood that adipose tissue is not a homogeneous tissue, but rather differs in terms of metabolic activity.<sup>1</sup> Unlike fat that accumulates in the subcutaneous region, fat that surrounds an organ is metabolically active, requires energy, and creates a number of substances that affect the circulatory system both directly and indirectly.<sup>2</sup>

Obesity is one of the oldest recognized human disorders and has evolved into one of Pakistan's most significant public health concerns. Obesity is one of the oldest known human ailments and has evolved into one of the most important public health concern in Pakistan. The World

Health Organization has identified obesity as one of the top five global risks to mortality. Obesity related morbidity and mortality have been known to the medical profession for over 2000 years.<sup>3</sup>

Obesity affects one-fourth of Pakistan's population (22.2% of adults). Obesity in Pakistan is mostly caused by changing lifestyles as a result of urbanization, as well as dietary difficulties. Obesity should be regarded as a sickness in any case, and it is also a significant risk factor for many chronic physical and mental problems.<sup>4</sup>

Obesity patients are more likely to have additional comorbidities, such as; diabetes, hypertension, hyperlipidemia, coronary artery disease (CAD), and also provides technical challenges in perioperative care, which may contribute to poor early outcomes.<sup>5</sup> Obesity is frequently regarded as a risk factor for in-hospital

prognosis following heart surgery. The body mass index expresses a patient's nutritional state, metabolic problems, and overall organ performance. Morbid obesity is an independent predictor of higher surgical morbidity and death in patients receiving CABG, according to the Society of Thoracic Surgeons National Cardiac Database.<sup>6</sup>

The early prognosis after CABG in obese patients is less apparent, and the data on the impact of obesity on postoperative outcome is contradictory: numerous studies found no significant link between increased BMI and morbidity and mortality after cardiac surgery.<sup>7</sup>

Although South East Asia has increased morbidity for any given BMI, the World Health Organization has advised alternative BMI cut-off thresholds. Obesity in Indo-Asia is defined as BMI more than 25 kg/m<sup>2</sup> and overweight as BMI more than 23 kg/m<sup>2</sup>.<sup>8</sup>

Many developing countries, like Pakistan, have faced the combined dilemma of having both underweight and overweight populations. Excess body weight was formerly thought to be a developed-world phenomenon. Nonetheless, it has recently expanded to developing countries. Overweight and obesity have increased several folds in emerging countries, including Pakistan. According to worldwide disease estimates from 2014, Pakistan ranks eighth among the ten countries housing half of the world's 693 million obese people.<sup>9</sup>

The prognosis for CAD in obese patients is good with treatment, better than it is for patients without obesity.<sup>10</sup> For a long time, CABG was the standard of care for CAD, and it is still the case for CAD with complex lesions today (after the development of percutaneous transluminal coronary angioplasty), notably in the case of triple vessel CAD.<sup>11</sup>

## Methodology

This prospective comparative study was conducted at the Cardiac Surgery Department, Pervaiz Elahi Institute of Cardiology, Bahawalpur. The sample size was calculated by using two population proportion formula and keeping the power of study equal to 90% and level of significance equal to 5%. P1 = 25.9% (Prevalence of early death in the non-obese group in the population) P2 = 16.2% (Prevalence of early death in the obese category in the population).<sup>12</sup> A total of 148 patients were enrolled after taking written consent and data was collected through predesign proforma sheets, clinical history, investigation

and early outcomes in terms of renal failure, prolonged ventilation, and mortality. SPSS 23 was used to analyze data with statistically significant p-value < 0.05.

**Inclusion Criteria:** Patients of both genders undergoing on pump CABG with age range of 30-70 years.

**Exclusion Criteria:** Patients having an urgent CABG, individuals with co-morbid conditions (such as renal impairment, chronic obstructive pulmonary disease, and preoperative antibiotic use)

## Results

The findings showed that average age of research participants was 57.14 ± 3.07 (age range of 30-73 years) and 121(81.76%) male compared with 27(18.24%) female patients were enrolled with insignificant p-value of 0.730. (Table I)

**Table I: Patient Characteristics**

Variables	Obese	None Obese	P value
	Group(n=74)	Group (n=74)	
Age (in years)	57.14 ± 3.07 (Age Rang 30-73 years)		
Mean ± SD	47.02± 7.62	43.56± 13.35	0.004
Gender	Male	56(47%)	0.730
	Female	15(56%)	

The findings of Table II showed that there were 56 (75.68%) diabetic 49 (66.21%), hypertensive, 45(60.82%) smoker, 36(48.65%) patients with hyperlipidemia and 55(74.32%) patients with IHD found in obese group with insignificant p-value > 0.05.

**Table II: Clinical Characteristics of patients with to respect to Research Group.**

Risk Factors	Research Group		p-value
	Obese	Non-obese	
Diabetes	Yes	56(75.68%)	0.319
	No	18(24.32%)	
Hypertension	Yes	49(66.21%)	0.309
	No	25(33.78%)	
Smoking	Yes	45(60.82%)	1.00
	No	29(39.19%)	
Hyperlipidemia	Yes	36(48.65%)	0.510
	No	38(51.35%)	
IHD	Yes	55(74.32%)	0.722
	No	19(25.68%)	

Table III showed that prolonged ventilation was found in 5 (6.76%) obese and 8 (10.81%) non-obese patients with insignificant p-value of 0.070. Renal Failure was found in 2 (2.70%) obese and 8 (10.81%) non-obese patients with significant p-value of 0.02 and mortality in 4(5.41%) obese and 2 (2.70%) non-obese patients with significant p-value of 0.0482.

**Table III: Clinical outcomes of research groups**

Risk Factors	Research Group		p-value	
	Obese	Non-obese		
Prolonged Ventilation	Yes	5 (6.76%)	8 (10.81%)	0.070
	No	69 (93.24%)	66 (89.19%)	
Renal Failure	Yes	2 (2.70%)	8 (10.81%)	0.02
	No	72 (97.30%)	66 (89.19%)	
Mortality	Yes	4(5.41%)	2(2.70%)	0.0482
	No	70(94.59%)	72(97.30%)	

## Discussion

Obesity is a well-known risk factor for the development of coronary artery disease and an independent risk factor for decreased short term survival in the Pakistani population. Other elements, such as ethnic groups, are still present and have a part in understanding such discrepancies. A total of 148 adult patients underwent CABG were divided into 2 groups as obese and non-obese. The findings of current study showed that the mean age of participants was  $57.14 \pm 3.07$  (age range of 30-73 years) and 121(81.76%) male compared with 27(18.24%) female patients were enrolled with insignificant p-value of 0.730.

Another study was conducted by Burgos et.al, which showed the obesity paradox and the effect of BMI on early and late clinical outcomes after cardiac surgery. A total of 5,419 patients were studied; 74.6% were men with an average age of  $65.8 \pm 12.1$ . The study sample included 27 patients who were underweight (0.5%), 1,393 were normal weight (25.7%), 2,423 were overweight (44.7%), and 1,576 were obese (29.1%).<sup>13</sup>

Creatinine clearance was studied in patients who were normal weight, obese, and severely obese. Ghanta et.al found a statistically significant relationship between an increase in creatinine clearance and BMI. Similar to past studies, there was no discernible difference in the prevalence of creatinine levels between obese and non-obese patients, which were 83% and 78%, respectively.<sup>14</sup>

In our study there were 56 (75.68%) diabetic, 49 (66.21%) hypertensive, 45(60.82%) smokers, 36(48.65%) patients with hyperlipidemia and 55(74.32%) patients with IHD found in obese group with insignificant p-value  $> 0.05$ . In a study by Ali et.al, 387 type II diabetic individuals of any age and sex were included. A substantial independent risk factor for hypertension was found to be obesity. A rise in body weight is also associated with high blood pressure. Regardless of age or gender, the Framingham study found that the prevalence of hypertension was twice as high in obese adults as it was in people of normal weight. Similar to this, 25 out of

62 normal weight diabetics and 23 out of 44 overweight and 162 out of 281 obese patients both had hypertension.<sup>15</sup>

The findings of current study showed that prolonged ventilation was found in 5 (6.76%) obese and 8 (10.81%) non-obese patients with insignificant p-value of 0.070. Renal Failure was found in 2 (2.70%) obese and 8 (10.81%) non-obese patients with significant p-value of 0.02 and mortality in 4(5.41%) obese and 2 (2.70%) non-obese patients with significant p-value of 0.0482. Tokmakoglu conducted a research in 2018, he showed that in a four year period a total of 427 female patients underwent isolated CABG under cardiopulmonary bypass. In terms of all operational data, the study found no statistically significant difference between the two groups. The study found a significant difference in the frequency of re-explorations in obese versus non-obese patients.<sup>16</sup>

In our study, obesity was linked to a higher mortality rate. Previous research has shown the same results. Rajae and Dabbagh showed a significant mortality difference between obese and non-obese CABG patients.<sup>17</sup> There was a noticeable increase in health-care services, as well as a decrease in cardio-vascular risk factors, which explains why the influence of obesity on mortality has been diminishing over time.

## Conclusion

The results of the current study demonstrated that a BMI is a reliable indicator of morbidity or mortality following CABG.

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