

# Comparative study of outcomes in Coronary Artery by Pass Grafting (CABG) in obese versus non obese patients

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## ABSTRACT

**Background:** Coronary artery bypass grafting improves coronary blood flow to the heart in severe coronary heart disease. According to most of studies, in spite of co –morbid illnesses often present along with obesity, an obese body mass index was not found as an independent predictor of morbidity or mortality after Coronary artery bypass grafting (CABG)..

**Aim:** To compare outcomes (complications) after Coronary artery bypass grafting (CABG) in obese and non obese patients during their hospital stay.

**Methods:** Study was conducted at Punjab Institute of Cardiology Lahore, Cardiology and Medical units of Mayo hospital Lahore and Gulab Devi Hospital Lahore. This study was conducted from March 2015 to March 2016. Non-probability sampling technique was used to collect the data and entered on specified proforma. Sample size was 200 CABG patients. SPSS 16 was used for the data analysis. The qualitative data variables like Gender, BMI etc were presented in form of tables along with its percentage. Quantitative data were presented in form of mean  $\pm$ S.D.

**Results:** In this study the patients mean age was  $52\pm 10.10$  years. There were 185(92.50%) male and 30 (15%) female patients. There were 65(32.5%) normal weight patients, 36(18%) overweight and 110(55.5%) obese patients. For CPB time the mean was  $1.11\pm 3.958$  hours, ranging from 180 minutes with minimum to 45 minutes and maximum 250 minutes. For Cross Clamp time, mean was determined as  $50.41\pm 3.07$ , the range was 100 minutes with minimum of 15 minutes and maximum of 99 minutes. The mean duration of ventilator support was observed as  $8.89\pm 6.11$  hours; the range was 41 hours with minimum of 2 hours and maximum of 46 hours. Mean duration of ICU stay was determined as  $8.99\pm 3.99$  days; the range was 25 days with minimum duration of 3 days and maximum for 29 days. Sternal wound infection was found in 12(6%) patients.

**Conclusion:** In outcomes of CABG, mean for ventilator support was  $8.89\pm 6.11$  hours; mean for ICU stay was  $8.99\pm 3.99$  days. 12 patients got sternal wound infection, 22 patients have atrial fibrillation, 15 patients have stroke.

**Keywords:** CABG, obese, ventilator, BM!

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## INTRODUCTION

Coronary heart disease is a chronic disease with stable and unstable phases. Excessive and prolonged smoking, increased ApoB/ApoA1 ratio, hypertension, diabetes mellitus, abdominal obesity, psychosocial factors, regular alcohol consumption and low physical activity were significantly related to myocardial infarction<sup>1</sup>.

In Pakistan coronary artery disease (CAD) is the 2nd leading cause of death at all age groups contributing to 13% of all causes deaths<sup>2</sup>.

Coronary artery bypass grafting (CABG) was introduced in 1968 and has showed superior survival and much better quality of life in some subgroups of patients having coronary artery disease as compared to medical therapy<sup>3</sup>.

Obesity leads to excess body fat has accumulation to that extent that it may cause an adverse effect on patient health, leading to reduced life expectancy and increased morbidity<sup>4</sup>. Body mass index (BMI), which measures weight and height, defines as overweight (pre-obese) when BMI is between 25 kg/m<sup>2</sup> and 30 kg/m<sup>2</sup>, and an obese person when it is > than 30 kg/m<sup>2</sup>. Excessive dietary calories, physical inactivity, and high genetic susceptibility predispose to obesity although some cases are caused by genes, various endocrine disorders, medications, psychiatric illness<sup>5,6</sup>.

The impact of obesity on the coronary heart disease still remains disputed inspite of well established association between both<sup>7,8</sup>. Obesity is usually considered as a risk factor for perioperative morbidity and mortality with CABG and other surgery. Other factors as hypertension, hypercholesterolemia, and diabetes may also likely contribute to complications or outcomes<sup>9,10</sup>.

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Some literature did not find imbalance between obese and non-obese patients in the contribution of the severity of coronary artery disease.<sup>11,12,13</sup>

The objective of the study was to compare CABG effectiveness in obese and Non obese patients and to observe complications after CABG in obese and Non obese patients

## MATERIAL and METHODS

This was prospective analytical study. This study was conducted at Punjab Institute of Cardiology Lahore, Cardiology department and Medical units of Mayo Hospital Lahore as well as Ghulab Devi Hospital Lahore from March 2015 to March 2016. Non-probability sampling technique for collection of data. Sample size was 200 CABG patients

### Inclusion Criteria:

1. All patients of IHD
2. Myocardial infarction and Angina Pectoris patients.
3. Patients undergoing on-pump surgery
4. Patients of CABG.

### Exclusion Criteria:

1. Diabetes Mellitus patients
2. Valvular heart disease patients and ASD & VSD patients.
3. Patients undergoing other cardiac procedures.
4. Patients with chronic kidney disease.

## METHODS

This study of 200 CABG patients was conducted at Punjab Institute of Cardiology Lahore, Cardiology department and Medical units of Mayo Hospital Lahore as well as Gulab Devi Hospital Lahore. The duration of study was from March 2015 to March 2016. Patients were followed up after surgery. There were two groups of patients for study, obese and Non obese.

**Data analysis:** Sample size was 200 CABG patients. SPSS16 was used for the data analysis. The qualitative data variables like Gender, BMI etc were presented in form of chart (Simple, Multiple, Pie) and a table along with its percentage. Quantitative data were presented in form of mean  $\pm$ S.D.

## RESULTS

In this study the patients mean age was  $52 \pm 10.10$  years. There were 185(92.50%) male and 30(15%) female patients. There were 65(32.5%) normal weight patients, 36(18%) overweight and 110(55.5%) obese patients. For CPB time the mean was  $1.11 \pm 3.958$  hours, ranging from 180 minutes with minimum to 45 minutes and maximum 250 minutes. For Cross Clamp time, mean was

determined as  $50.41 \pm 3.07$ , the range was 100 minutes with minimum of 15 minutes and maximum of 99 minutes. The mean duration of ventilator support was observed as  $8.89 \pm 6.11$  hours; the range was 41 hours with minimum of 2 hours and maximum of 46 hours. Mean duration of ICU stay was determined as  $8.99 \pm 3.99$  days; the range was 25 days with minimum duration of 3 days and maximum for 29 days. Sternal wound infection was found in 12(6%) patients. Atrial fibrillation was observed in 22(11%) patients. Stroke was found in 15(7.5%). Mean pre- op haemoglobin (Hb) was detected as  $15.32 \pm 1.23$  G/dl and post- op Hb was found  $11.55 \pm 1.22$  Gg/dl. Mean pre operative prothombin time (PT) was  $12.44 \pm 1.76$  seconds and post- op was found  $11.45 \pm 2.14$  seconds. Mean pre operative activated partial thorboplastin time APTT was  $30.2 \pm 8.1$  seconds and post op was  $31.22 \pm 5.99$  seconds. Mean pre- op international normalized ratio INR was detected  $1.06 \pm 0.13$  and post- op was  $1.22 \pm 0.17$ . Mean pre- op urea was calculated  $30.10 \pm 8.99$  mmol/l and post operative was  $30.49 \pm 1.01$  mmol/l. Mean pre- op creatinine was  $0.66 \pm 0.36$  mg/dl and post- op was detected  $1.03 \pm 0.30$  mg/dl. Mean pre operative alkaline phosphatase ALP was  $69.66 \pm 2.03$  IU/L and post- op ALP was  $51.20 \pm 1.77$  IU/L. Mean -pre op alanine aminotransferase ALT was  $31.81 \pm 1.99$  IU/L and post- op was  $32.55 \pm 1.11$  IU/L.

Table1: Descriptive Statistics of Cardiopulmonary bypass time

| Mean | St deviation | Range | Min | Max. |
|------|--------------|-------|-----|------|
| 1.11 | 3.958        | 180   | 45  | 250  |

Table 2: Descriptive Statistics of Duration of Ventilator Support

| Mean | St. deviation | Range | Min. | Max. |
|------|---------------|-------|------|------|
| 8.89 | 6.11          | 41    | 2    | 46   |

Table 3: Descriptive Statistics of Duration of ICU Stay

| Mean | St. Deviation | Range | Min. | Max. |
|------|---------------|-------|------|------|
| 8.99 | 3.99          | 25    | 3    | 29   |

Table no#4 Descriptive statistics of risk factors

| Risk factors   | Yes       | No       |
|----------------|-----------|----------|
| Hypertension   | 130(65%)  | 80(40%)  |
| Smoking        | 67(33.5%) | 150(75%) |
| Family history | 55(27.5%) | 160(80%) |
| Liver disease  | 15(7.5%)  | 192(96%) |

## DISCUSSION

Except sternal wound infection, the thought that obesity predisposes to various postoperative complications with CABG is not well proved by these studies<sup>14,15</sup>.

Survival and serious complications like perioperative MI, severe sternal wound infection, kidney failure, stroke, highly prolonged mechanical ventilation, acute pneumonia and symptomatic atrial arrhythmias were analyzed. There was no significant difference between obese and non-obese patients<sup>16,17</sup>.

Patients with obesity are not at a higher risk for early and late mortality after CABG as compared to patients who are not overweight<sup>18,19</sup>.

The patients who were markedly obese were more likely to suffer from prolonged mechanical ventilation and post-operative in hospital stays as compared to non-obese patients<sup>20,21</sup>.

Except mild sternal wound infection, temporary impairment of kidney function, and slightly prolonged in hospital admission, obesity was not found increase the risk of other adverse complications/outcomes during the first year follow up of CABG patients<sup>22,23,24,25</sup>.

## CONCLUSION

For our study purpose, patients had been divided into obese, overweight and normal weight groups.<sup>26,27</sup> Out of 200 patients 110 were obese, 36 were overweight and 65 were normal weight.<sup>28,29</sup>

130 patients were hypertensive, 67 were smokers, 55 patients had family history of cardiac disease.<sup>30,31</sup>

In outcomes of CABG, mean for ventilator support was  $8.89 \pm 6.11$  hours; mean for ICU stay was  $8.99 \pm 3.99$  days. 12 patients got sternal wound infection, 22 patients have atrial fibrillation, 15 patients have stroke.

## REFERENCES

- ALAM, M., SIDDIQUI, S., LEE, V.-V., ELAYDA, M. A., NAMBI, V., YANG, E. Y., JNEID, H. M., WILSON, J. M., BALLANTYNE, C. M. & VIRANI, S. S. 2011. Isolated Coronary Artery Bypass Grafting in Obese Individuals-A Propensity Matched Analysis of Outcomes. *Circulation Journal*, 75, 1378-1385.
- AMBROSE, J. A. & SINGH, M. 2015. Pathophysiology of coronary artery disease leading to acute coronary syndromes. *F1000prime reports*, 7.
- AZIZ, S. & RAMSDALE, D. 2005. Chronic total occlusions—a stiff challenge requiring a major breakthrough: is there light at the end of the tunnel? *Heart*, 91, iii42-iii48.
- BENEDETTO, U., DANESE, C. & CODISPOTI, M. 2014. Obesity paradox in coronary artery bypass grafting: Myth or reality? *The Journal of thoracic and cardiovascular surgery*, 147, 1517-1523.
- CHAWLA, L. S. & KELLUM, J. A. 2012. Acute kidney injury in 2011: biomarkers are transforming our understanding of AKI. *Nature reviews Nephrology*, 8, 68-70.
- DEHBOZORGI, P., GHODSIN, F., JANATI, M. & AGHASADEGHI, K. 2010. The effects of body mass index category on early outcomes of coronary artery bypass graft. *ARYA Atheroscler*, 3.
- DEL PRETE, J. C., BAKAEEN, F. G., DAO, T. K., HUH, J., LEMAIRE, S. A., COSELLI, J. S. & CHU, D. 2010. The impact of obesity on long-term survival after coronary artery bypass grafting. *Journal of Surgical Research*, 163, 7-11.
- ENGEL, A. M., MCDONOUGH, S. & SMITH, J. M. 2009. Does an obese body mass index affect hospital outcomes after coronary artery bypass graft surgery? *The Annals of thoracic surgery*, 88, 1793-1800.
- HABIB, R. H., ZACHARIAS, A., SCHWANN, T. A., RIORDAN, C. J., DURHAM, S. J. & SHAH, A. 2005. Effects of obesity and small body size on operative and long-term outcomes of coronary artery bypass surgery: a propensity-matched analysis. *The Annals of thoracic surgery*, 79, 1976-1986.
- HARMON, K. 2010. Heart-Lung Machine May Not Be the Culprit in Post-Op. Pump Head" Syndrome". *ScientificAmerican.com. Retrieved February*, 2.
- ISSA, Z., MILLER, J. M. & ZIPES, D. P. 2012. *Clinical Arrhythmology and Electrophysiology: A Companion to Braunwald's Heart Disease: Expert Consult: Online and Print*, Elsevier Health Sciences.
- JÄRVINEN, O., JULKUNEN, J. & TARKKA, M. R. 2007. Impact of obesity on outcome and changes in quality of life after coronary artery bypass grafting. *World journal of surgery*, 31, 318-325.
- JIN, R., GRUNKEMEIER, G. L., FURNARY, A. P. & HANDY, J. R. 2005. Is obesity a risk factor for mortality in coronary artery bypass surgery? *Circulation*, 111, 3359-3365.
- JOHNSON, A. P., PARLOW, J. L., WHITEHEAD, M., XU, J., ROHLAND, S. & MILNE, B. 2015. Body Mass Index, Outcomes, and Mortality Following Cardiac Surgery in Ontario, Canada. *Journal of the American Heart Association*, 4, e002140.
- KDIGO, A. 2012. Work Group. KDIGO clinical practice guideline for acute kidney injury. *Kidney Int Suppl*, 2, 1-138.
- KUSHNER, R. F. & BESSESEN, D. H. 2007. *Treatment of the obese patient*, Springer.
- LE-BERT, G., SANTANA, O., PINEDA, A. M., ZAMORA, C., LAMAS, G. A. & LAMELAS, J. 2011. The obesity paradox in elderly obese patients undergoing coronary artery bypass surgery. *Interactive cardiovascular and thoracic surgery*, 13, 124-127.
- LIEDTKE, R. K. 2009. A model on the induction of adverse vascular long-term effects of NSAIDs. *Medicinal Chemistry*, 5, 23-28.
- MEHTA, R. L., KELLUM, J. A., SHAH, S. V., MOLITORIS, B. A., RONCO, C., WARNOCK, D. G. & LEVIN, A. 2007. Acute Kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. *Critical care*, 11, R31.
- MURPHY, G. J., PIKE, K., ROGERS, C. A., WORDSWORTH, S., STOKES, E. A., ANGELINI, G. D. & REEVES, B. C. 2015. Liberal or restrictive transfusion after cardiac surgery. *New England Journal of Medicine*, 372, 997-1008.
- POIRIER, P., GILES, T. D., BRAY, G. A., HONG, Y., STERN, J. S., PI-SUNYER, F. X. & ECKEL, R. H. 2006. Obesity and cardiovascular disease: pathophysiology, evaluation, and effect of weight loss an update of the 1997 American Heart Association Scientific statement on obesity and heart disease from the obesity committee of the council on nutrition, physical activity, and metabolism. *Circulation*, 113, 898-918.
- ROGER, V. L., GO, A. S., LLOYD-JONES, D. M., BENJAMIN, E. J., BERRY, J. D., BORDEN, W. B., BRAVATA, D. M., DAI, S., FORD, E. S. & FOX, C. S. 2012. Heart disease and stroke statistics—2012 update a report from the American heart association. *Circulation*, 125, e2-e220.
- ROSNER, M. H. & OKUSA, M. D. 2006. Acute kidney injury associated with cardiac surgery. *Clinical journal of the American Society of Nephrology*, 1, 19-32.
- SELNES, O. A., GOTTESMAN, R. F., GREGA, M. A., BAUMGARTNER, W. A., ZEGER, S. L. & MCKHANN, G. M. 2012. Cognitive and neurologic outcomes after coronary-

- artery bypass surgery. *New England Journal of Medicine*, 366, 250-257.
25. SERRUYS, P. W., MORICE, M.-C., KAPPETEIN, A. P., COLOMBO, A., HOLMES, D. R., MACK, M. J., STÄHLE, E., FELDMAN, T. E., VAN DEN BRAND, M. & BASS, E. J. 2009. Percutaneous coronary intervention versus coronary-artery bypass grafting for severe coronary artery disease. *New England Journal of Medicine*, 360, 961-972.
  26. SHIRZAD, M., KARIMI, A., ARMADI, S., MARZBAN, M., ABBASI, K., ALINEJAD, B. & MOSHTAGHI, N. 2009. Effects of body mass index on early outcome of coronary artery bypass surgery. *Minerva chirurgica*, 64, 17-23.
  27. STAMOU, S. C., NUSSBAUM, M., STIEGEL, R. M., REAMES, M. K., SKIPPER, E. R., ROBICSEK, F. & LOBDELL, K. W. 2011. Effect of body mass index on outcomes after cardiac surgery: is there an obesity paradox? *The Annals of thoracic surgery*, 91, 42-47.
  28. THYGESEN, K., ALPERT, J. S. & WHITE, H. D. 2007. Universal Definition of Myocardial Infarction. *Journal of the American College of Cardiology*, 50, 2173-2195.
  29. VAHIDEH, K., MORTEZA, A., REZA, S. H. & SHAHYAD, S. A. 2015. The effect of obesity on Mortality and Morbidity after isolated Coronary Artery Bypass Grafting Surgery. *International Cardiovascular Research Journal*, 6, 0-0.
  30. WAGNER, B. D., GRUNWALD, G. K., RUMSFELD, J. S., HILL, J. O., HO, P. M., WYATT, H. R. & SHROYER, A. L. W. 2007. Relationship of body mass index with outcomes after coronary artery bypass graft surgery. *The Annals of thoracic surgery*, 84, 10-16.
  31. ZONI-BERISSO, M., LERCARI, F., CARAZZA, T. & DOMENICUCCI, S. 2014. Epidemiology of atrial fibrillation: European perspective. *Clin Epidemiol*, 6, e220