DOI: https://doi.org/10.53350/pjmhs221610224

ORIGINAL ARTICLE

Association of Post-Operative Infection and MI with Metabolic Syndrome after Coronary Artery Bypass Graft

GHULAM KIBRIYA[1], AMNA ABBAS[2], HINA AFTAB[3], MUHAMMAD ATHIF AKRAM[4], YAHYA SAEED[5], OMAR IQBAL[6], AZHAR IQBAL[7]
[1]*Medical Officer, University of Child Health Sciences and Children Hospital, Lahore*
[2]*Senior Registrar , Cardiac Surgery, Integrated Medical Care Hospital, Lahore*
[3]*Assistant Professor, Anesthesia/ ICU, Lahore General Hospital /AMC, Lahore*
[4]*Associate Professor, Anesthesia/ ICU, Ali Fatima Hospital/ Abu Umara Medical College, Lahore*
[5]*Professor, Anesthesia/ ICU, Ali Fatima Hospital/ Abu Umara Medical College, Lahore*
[6]*Chief Perfusionist, Army Cardiac Centre, CMH, Lahore*
[7]*Chief Perfusionist, University of Child Health Sciences and Children Hospital, Lahore*
Correspondence to: Dr. Ghulam Kibriya, Email: drgkkhan99@gmail.com, Cell: 0331 5106511

ABSTRACT

Objective: To find out association of metabolic syndrome with early outcomes e.g.(post operative infection, acute kidney injury, and MI) after CABG.

Study Design: This was a comparative study.

Place and Duration: This study was performed from the first of July 2020 to the first of January 2021 at the Cardiac Surgery Department, PIC, Jail Road, Lahore

Methodology: This comparative study performed from the first of July 2020 to the first of January 2021 at the Cardiac Surgery Department, PIC, Jail Road, Lahore. The approach of non-probability sampling was applied. After obtaining consent on a consent form, 172 Patients (86 in the exposed group and 86 in the non-exposed group) were included.

Results: The average age of the participants in this study was 55.30 ± 8.77 years; there were 130 cases (75.6%) of men and 42 cases (24.4%) of women. There were 56 (65.12%) men and 30 (34.88%) women in the exposed group, compared to 74 (86.05%) men and 12 (13.95%) women in the non-exposed group. Post-operative MI was statistically insignificant in both groups, p-value >0.05, renal failure and postoperative infection were statistically significant.

Conclusion: Because many MetS syndrome factors are under our control, it is important to prevent it early especially in cases of CABG, to get better outcomes. Although we noted that renal failure and postoperative infection were statistically high in exposed groups, with a p-value of 0.05, and MI was statistically similar in both groups, with a p-value of >0.05, the outcomes of the current study were quite different and unexpected. Further studies are suggested to be done on a larger scale.

Keywords: CABG, Lipid Profile, Diabetes, Obesity, Mortality

INTRODUCTION

Obesity, a degree of glucose intolerance, hypertension, an elevated triglyceride (TG) level, and a decrease in high density lipoprotein (HDL) are all recognized symptoms of the metabolic syndrome (MetS) (International Diabetic Federation). However, some of its contributing factors which were labelled as condition X, have been thoroughly investigated in the past. The literature on this syndrome noted the co-occurrence of hypertension, higher TG, reduced HDL concentration, and some degree of glucose intolerance. Insulin's resistance to controlling the disposal of glucose is the primary issue with syndrome X. This collection of risk factors has often been referred to as insulin resistance syndrome because to this pathophysiology. The deadly quartet and the pleurimetabolic syndrome are other names for it. MetS is a collection of metabolic issues that are mostly brought forward by abdominal obesity, which is linked to cardiovascular disease and the potential for type II diabetes[1].

The MetS is characterised by insulin resistance, decreased HDL, hypertriglyceridemia, pro-inflammatory, and pro-thrombotic states, and is predominantly caused by the accumulation of abdominal fat [2].

A rough estimate of the prevalence of MetS in the general population is between 35 and 40 %. However, it appears to grow with age[3]. Additionally, it appears to be connected to patients with MetS having higher rates of morbidity and mortality than non-MetS patients[4].

It has also been demonstrated in the past that individuals diagnosed with MetS who underwent CABG were more likely to experience problems, which may be related to C-reactive protein (CRP).

Because central adiposity causes a rise in CRP. In actuality, as more MetS components are introduced, the CRP grows steadily. Patients with MetS vs. those without MS showed complications including M.I 6.3% vs. 1.1%, acute kidney injury 6.3% vs. 1.1%, infection 21.9% vs. 3.4%, stroke 6.3% vs. 1.1%, pneumonia 17.2% vs. 3.4%, and mortality 3.1% vs. 1.1%, suggesting that the risk for mortality and morbidity may be higher[6].

A popular procedure in cardiac surgery is CABG. There are a number of risks associated with this treatment, such as post-operative infection, acute renal injury, MI, stroke, pneumonia, and mortality. However, we think that MetS may make these consequences, including death, worse. Therefore, we are carrying out this research to correctly evaluate the association between them. In the future, it might be useful for preoperative patient evaluation and for counselling the patient side if the disease is present.

MATERIAL AND METHODS

This comparative study performed from the first of July 2020 to the first of January 2021 at the Cardiac Surgery Department, PIC, Jail Road, Lahore. The approach of non-probability sampling was applied. After obtaining consent on a consent form, 172 Patients (86 in the exposed group and 86 in the non-exposed group) were included.

OPERATIONAL DEFINITION

Metabolic Syndrome: must have two of the following four criteria in addition to central obesity, which is defined as a waist circumference of 94 cm or more for males and more than 80 for women:

Early Outcomes

Post-operative infection: Presence of either Superficial or Deep Sternal Wound Infection within 30 days.

A skin or subcutaneous tissue wound infection (SSWI) near the site of the incision

An infection that affects the tissues or spaces on under subcutaneous tissues is known as DSWI.

1 of the following requirements is met:

(1) Mediastinal tissue or fluid was cultured and an organism was identified

(2) Operative evidence of mediastinitis

(3) Chest discomfort, sternal instability, or fever (>38°C).

Acute kidney injury: Serum creatinine ≥ 2.0 mg/dL 3 days after surgery.

Postoperative MI: During the first 48 hours following surgery, (existence of new Q waves >0.04 ms and/or a reduction in R waves >25% in at least 2 consecutive lines on ECG and rise in CPK-MB > 75 g/l) will be examined.

Inclusion Criteria

Exposed

Patients undergoing CABG with MetS.

Non-Exposed

Patients undergoing CABG MetS.
Patients undergoing on pump CABG.
Patients of both genders with age range 18-70 years.

Exclusion Criteria

Patients undergoing emergency CABG.
People who have more than four distal anastomoses
People having CABG who have a congenital coronary abnormality
Previous heart surgery history and preoperative dialysis

Data Collection Procedure: After obtaining consent, 172 patients (86 in the exposed group and 86 in the non-exposed group) were enrolled. Data was collected on well designed performa. Early outcomes were noted for (morbidity, such as postoperative MI, Infection, and renal failure).

Statistical Analysis: In order to do the statistical analysis, SPSS Version 21.0 was used. For qualitative factors like gender and early outcomes, i.e., Postoperative MI, Post-operative infection, and Renal Failure frequencies and percentages were provided. For quantitative factors like age, height, weight, and EF, the mean and S.D were given. The chi-square test was employed to evaluate the relationships between the qualitative factors and the two groups. P value less than 0.05 was considered significant.

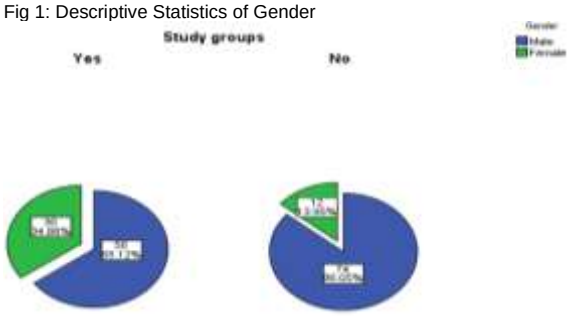
RESULTS

Table -1: Comparison of age (years) in both groups

	Age (years)			
MetS	Mean S.D	Minimum	Maximum	P-value
Exposed	56.49 ± 8.88	37	82	0.09
Non-Exposed	54.10 ± 8.55	39	80	
Total	55.30 ± 8.77	37	82	

According to Table 1, the mean age of the patients was 55.30 ± 8.77 years, whereas the mean ages of exposed and non-exposed participants were 56.49 ± 8.88 years and 54.10 ± 8.55 years, respectively. Both groups' average ages were statistically similar (p-value > 0.09).

Fig 1: Descriptive Statistics of Gender



In this study, there were 42 (24.4%) female patients and 130 (75.6%) male cases. In exposed group there were 56 (65.12%) male and 30 (34.88%) female while in non-exposed group there were 74 (86.05%) male and 12 (13.95%) female.

According to Table 2, the exposed group's mean ejection fraction was 47.73 ± 11.16 and the non-exposed group's was 47.99 ± 10.97, with a p-value of 0.503. The mean weight in the exposed and non-exposed groups was 79.87 ± 12.49 and 70.67 ± 8.58 kg, respectively, with a p-value of 0.001 for each. The mean BMI in the exposed and non-exposed groups was 29.6 ±2 5.62 and 24.89 ± 2.69, with a p-value of 0.001 for each. In exposed groups, the average height, weight, and BMI were all considerably higher (p-value 0.005). The mean waist size was 103.19 ± 10.68 cm in the exposed group and 91.56 ± 7.01 cm in the non-exposed group, respectively, with a substantially greater waist size in MetS.

Table 2: Comparison of Demographic Variables both study groups

		Mean ± S.D	Minimum	Maximum	P-value
Ejection Fraction	Exposed	47.73 ± 11.16	25	85	0.503
	Non-Exposed	47.99 ± 10.87	25	65	
	Total	47.86 ± 10.99	25	85	
Height (m)	Exposed	1.65 ± 0.11	1.28	1.85	0.015
	Non-Exposed	1.69 ± 0.08	1.47	1.85	
	Total	1.67 ± 0.10	1.28	1.85	
Weight (kg)	Exposed	79.87 ± 12.49	48	120	*<0.001*
	Non-Exposed	70.67 ± 8.58	48	94	
	Total	75.27 ± 11.64	48	120	
BMI	Exposed	29.62 ± 5.62	21.93	57.37	<0.001
	Non-Exposed	24.89 ± 2.69	18.73	34.45	
	Total	27.26 ± 4.99	18.73	57.37	
Waist circumference	Exposed	103.19 ± 10.68	82	136	<0.001
	Non-Exposed	91.56 ± 7.01	78	114	
	Total	97.37 ± 10.73	78	136	

Table 3: Comparison of early outcomes in both groups.

Complications		Exposed	Non-Exposed	P-Value
Post-Operative Infection	Yes	12(13.6%)	74(86.04%)	0.036
	No	4 (4.65%)	82(95.35%)	
Total		16(9.3%)	156(90.7 %)	
Renal Failure	Yes	7(8%)	79(92%)	0.030
	No	1(1.1%)	85(98.9%)	
Total		8(4.65%)	164(95.35%)	
Post-Operative MI	Yes	7(8%)	79(92%)	0.79
	No	6(7%)	80(93%)	
Total		13(7.56%)	159(92.44%)	

Renal failure occurred in 7 (8%) patients in the exposed group and 1 (1.1%) in non-exposed group, with a significant p-value of 0.05 indicating a substantial connection between renal failure and MetS. There was no correlation between post-operative MI and MetS, 7 (8.1%) cases of exposed patients and 6 (7.1%) cases of non-exposed patients (p-value = 0.79, not significant). Similar to this, post-operative infections were observed in 12 (13.6%) and 4 (4.5%) cases in the exposed and non-exposed groups, respectively. A substantial relationship between post-operative infections and MetS was shown by the p-value of <0.05, which was significant.

DISCUSSION

Central obesity, high TG, low HDL, hypertension, and hyperglycemia are all symptoms of the metabolic syndrome (MetS), which increases the risk of heart disease. About 46% to 51% of patients undergoing CABG had MetS. [5, 7] In a review of the MetS in young patients having MI, the frequency of MetS, was as high as 69%.[8]

The effects of MetS on rates of morbidity and mortality before surgery in patients having CABG were assessed in a recent research. There were 152 patients altogether, 109 men, and 43 women, with a mean age of 60.1 ± 8.6 years. The cases in the current study had a 55.30 ± 8.77 average age, with 42 (24.4%) female cases and 130 (75.6%) male cases. The age distribution in the current study was younger than that of the other study because the mean age was in the mid-fifties as opposed to the sixties in the studies mentioned above[9].

When having CABG, patients with MetS were more likely than those without MetS to experience complications (16.5% to 30.26% vs. 12.7% to 16.7% respectively, p = 0.0074) and mortality

(p = 0.0007). Another study found that patients without MetS experienced less post-operative complications 12.2% vs 20.3% [10].

According to a study, there is a strong correlation between the MetS and wound infection, pulmonary abnormalities, arrhythmia, and prolonged intubation [9]. In this investigation, we discovered that post-operative infection occurred in 23 (37.2%) with MetS, with a p-value of 0.001. These results support the conclusions of the previously mentioned study.

3.8% of patients with MetS and 1.1% without MetS experienced postoperative ARF. Acute renal failure rates for Mets were 3.81 (P = 0.008) and postoperative stroke rates were 2.27 (P = 0.012), respectively, according to multivariate analysis. ARF and postoperative stroke in CABG patients were used to illustrate the clinical importance of MetS. Therefore, like many other predictors, MetS must be acknowledged as a risk factor for postoperative complications [11].

The 30-day evaluation of postoperative complications included death, readmission requirements, and surgical wound infections. During the hospital stay, no statistically significant differences were found. Events like AF, blood transfusions, respiratory infection, surgical wound infection, prolonged ventilation, duration of ICU stay, duration of hospital stay and mortality was similar in both groups in insignificant p-value. Both groups experienced the same number of integrated events throughout the course of 30 days. Therefore, it may be said that those who were diagnosed with MetS had comparable risks of morbidity and death to those who were not, while MetS type had higher odds of surgical wound infection[12].

CONCLUSION

Because many MetS syndrome factors are under our control, it is important to prevent it early especially in cases of CABG, to get better outcomes. Although we noted that renal failure and postoperative infection were statistically high in exposed groups, with a p-value of 0.05, and MI was statistically similar in both groups, with a p-value of >0.05, the outcomes of the current study were quite different and unexpected. Further studies are suggested to be done on a larger scale.

REFERENCE

1. El Bilbeisi AH, Shab-Bidar S, Jackson D, Djafarian K. The prevalence of metabolic syndrome and its related factors among adults in Palestine: a meta-analysis. Ethiopian journal of health sciences. 2017 Feb 6;27(1):77-84.
2. Ormazabal V, Nair S, Elfeky O, Aguayo C, Salomon C, Zuñiga FA. Association between insulin resistance and the development of cardiovascular disease. Cardiovascular diabetology. 2018 Dec;17(1):1-4.
3. Khan Y, Lalchandani A, Gupta AC, Khadanga S, Kumar S. Prevalence of metabolic syndrome crossing 40% in Northern India: Time to act fast before it runs out of proportions. Journal of family medicine and primary care. 2018 Jan;7(1):118.
4. Alamdari NM, Rahimi FS, Afaghi S, Zarghi A, Qaderi S, Tarki FE, Ghafouri SR, Besharat S. The impact of metabolic syndrome on morbidity and mortality among intensive care unit admitted COVID-19 patients. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020 Nov 1;14(6):1979-86.
5. Ao, H., Xu, F., Wang, X., Tang, X., Zheng, Z. & Hu, S. 2015. Effects of metabolic syndrome with or without obesity on outcomes after coronary artery bypass graft. A cohort and 5-year study. PLoS ONE, 10, e0117671.
6. Santos AC, Lopes C, Guimaraes JT, Barros H. Central obesity as a major determinant of increased high-sensitivity C-reactive protein in metabolic syndrome. International journal of obesity. 2005 Dec;29(12):1452-6.
7. Montazerifar F, Bolouri A, Mozaffar MM, Karajibani M. The prevalence of metabolic syndrome in coronary artery disease patients. Cardiology research. 2016 Dec;7(6):202.
8. Ranjith N, Pegoraro RJ, Naidoo DP, Esterhuizen TM. Metabolic syndrome in young Asian Indian patients with myocardial infarction. Cardiovascular Journal of Africa. 2008 Nov 1;11(Congress 1).
9. Özkan, S., Demirtunç, R., Özdemir, F., Uğur, O., Balcı, A. Y., Kızılay, M., et al. 2017. The effects of the metabolic syndrome on coronary artery bypass grafting surgery. Cardiovasc J Afr, 28, 48-52.
10. Engel AM, McDonough S, Smith JM. Does an obese body mass index affect hospital outcomes after coronary artery bypass graft surgery?. The Annals of thoracic surgery. 2009 Dec 1;88(6):1793-800.
11. Kajimoto K, Kasai T, Miyauchi K, Hirose H, Yanagisawa N, Yamamoto T, Takazawa K, Niinami H, Hosoda Y, Daida H, Amano A. Metabolic syndrome predicts 10-year mortality in non-diabetic patients following coronary artery bypass surgery. Circulation Journal. 2008;72(9):1481-6.
12. Cicione A, Brassetti A, Lombardo R, Franco A, Turchi B, D'Annunzio S, Nacchia A, Tubaro A, Simone G, De Nunzio C. Metabolic Syndrome and Physical Inactivity May Be Shared Etiological Agents of Prostate Cancer and Coronary Heart Diseases. Cancers. 2022 Feb 14;14(4):936.