

Better to be Underweight or Obese going for Cardiac Surgery? - A study in Asian population

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Introduction

There is an apparent paradox that increased body mass index (BMI) is associated with reduced mortality after cardiac surgeryⁱ. It has been attributed to reverse epidemiology (causation) bias whereby the underweight patients who are more frail and cachexic has worse outcomesⁱⁱ. We examine the association of BMI with mortality in cardiac surgery in an Asian population.

Methodology

A retrospective review of patients undergoing cardiac surgery in a tertiary hospital between 2016 and 2018 was done. Ethics approval was obtained from Institutional Review Board. A follow up of one-year was done.

Patients were divided into 4 groups based on BMI categories for Asians: Underweight(BMI <18, N=45), Normal(BMI 18-23.5, N=449), Overweight (BMI 23.5-27.5, N=501), and Obese (BMI >27.5, N=342). Multivariable logistical regression models were used where appropriate for the statistical analysis.

Results

A total of 1337 patients were included in the study. 45 (3.4%) were underweight while 342(25.6%) are obese. Although there were less 30-day mortality in obese group vs normal weight group (Adjusted HR(95% CI): 0.50 (-0.14- -1.23), p=0.014), there was no difference in Underweight vs Obese(Adjusted HR(95% CI):0.96 (0.74- -0.83), p=0.92). The 1-year mortality is significantly more in underweight(Underweight vs Normal, Adjusted HR(95% CI): 0.66(-0.02- 0.80), p=0.039), but there was no difference between underweight and obese groups(Adjusted HR(95% CI):0.76 (0.26- -0.81), p=0.32).

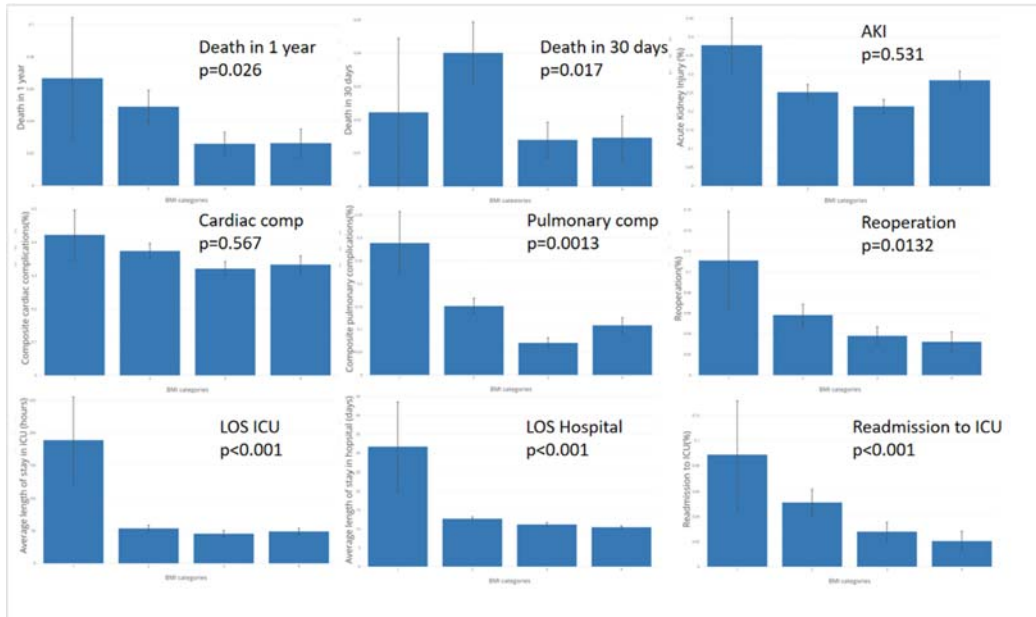
Exploratory analysis shows obese patients and more protected from pulmonary complications, re-operations, re-admissions to Intensive care unit (ICU), length of stay in both ICU and hospital, and there was difference in risk of acute kidney injury(AKI) and cardiac complications (figure 1).

Discussions and Conclusions

There was no difference in 30-day and 1 year mortality between the underweight and obese patients, but the obese patients have less postoperative complications. Rather than the obesity paradox, one might call it the Lean paradox as patients who are underweight has worse reserves after cardiac surgery.

300 words

Figure 1: Error bar plot of incidence of events in cardiac patients based on BMI categories (1 - Underweight, 2 - Normal, 3 - Overweight, 4 - Obese).



AKI: Acute kidney injury, defined by creatinine >1.5x of baseline post-operatively

LOS: Length of stay

ICU: Intensive care unit

Pulmonary comp: Composite pulmonary complications including re-intubation, pneumonia, pneumothorax requiring drainage, pleural effusion requiring drainage, tracheostomy.

Cardiac comp: Atrial Fibrillation, VT/VF, other arrhythmia, bradycardia, PVCs, heart block, Perioperative AMI, Graft occlusion needing PCI (revascularisation).

ⁱ Flegal KM, Kit BK, Orpana H, Graubard BI. Association of all-cause mortality with overweight and obesity using standard body mass index categories: a systematic review and meta-analysis. *JAMA*. 2013; 309:71–82. doi: 10.1001/jama.2012.113905.

ⁱⁱ Stamou SC, Nussbaum M, Stiegel RM, Reames MK, Skipper ER, Robicsek F, Lobdell KW. Effect of body mass index on outcomes after cardiac surgery: is there an obesity paradox? *Ann Thorac Surg*. 2011; 91:42–47