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ORIGINAL ARTICLE

Impact of waist circumference on hospital outcome and coronary angiographic findings of patients with acute ST-segment elevation myocardial infarction

Sameh W.G. Bakhoum [a,*], Samir M. Sorour [b], Mohamed Z. Elramly [a], Hala Z. Raslan [b], Iman I. Salama [c]

[a] *Department of Cardiology, Kasralaini School of Medicine, Cairo University, Cairo, Egypt*
[b] *Department of Medicine, National Research Centre, Guiza, Egypt*
[c] *Department of Community Medicine, National Research Centre, Guiza, Egypt*

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KEYWORDS

Obesity;
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Abstract *Background:* Several studies showed that ST-segment elevation myocardial infarction (STEMI) patients with high body mass index (BMI) have better in-hospital outcomes.
Aim: This study examined the impact of waist circumference (WC) on the hospital outcome and coronary angiographic extent of STEMI patients.
Methods: We evaluated 142 consecutive patients with STEMI. Patients were classified into 2 groups according to WC. Group A ($n = 72$) had increased WC (WC > 88/102 cm for women/men). Group B ($n = 70$) had normal WC. A primary composite outcome of in-hospital mortality and cardiovascular complications namely heart failure, cardiogenic shock, serious arrhythmias, re-infarction, post infarction angina, a secondary outcome of in-hospital mortality and coronary angiographic findings were compared between the 2 groups.
Results: Group A patients were significantly older, had a significantly higher prevalence of hypertension (HTN), diabetes mellitus (DM) and were significantly less likely to be smokers compared to

Abbreviations: ACS, acute coronary syndromes; Ao, aortic root dimensions; BMI, body mass index; CABG, coronary artery bypass graft; CAD, coronary artery disease; DM, diabetes mellitus; EF, ejection fraction; HTN, hypertension; LA, left atrial dimensions; LVEDD, left ventricular end diastolic diameter; LVESD, left ventricular end systolic diameter; MI, myocardial infarction; PCI, percutaneous coronary intervention; PWT, posterior wall end diastolic thickness; STEMI, ST segment elevation myocardial infarction; SWT, septal wall thickness; WC, waist circumference; WMSI, wall motion score index

* Corresponding author. Address: Hadayek El Solimania, Villa A10/12, Sheikh Zayed City 122581, Guiza, Egypt. Tel.: +20 01223165863.
E-mail address: samehbakhoum@live.com (S.W.G. Bakhoum).

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group B. There was no statistically significant difference in the primary outcome between the 2 groups. WC as a categorical or as a continuous variable did not have any significant influence on the secondary outcome of in-hospital mortality even after adjustment for other predictors of death. Age was the only statistically significant predictor for mortality ($p = 0.01$). Coronary angiography revealed no statistically significant difference in the number of diseased coronary vessels, number of coronary lesions or Gensini score between the 2 groups.

Conclusion: A high WC, had no favorable impact on in-hospital mortality, cardiovascular complications or coronary angiographic extent in STEMI patients.

1. Introduction

Obesity, a worldwide epidemic in recent years, is a major predictor of fatal and nonfatal cardiovascular events.[1,2] Different reports have however, shown an apparent protective effect of obesity as reflected by a high body mass index (BMI) on outcome of patients with coronary artery disease (CAD) and patients with acute coronary syndromes (ACS), the concept of the "obesity paradox". Ikeda et al.[3] studying the impact of obesity on the long term prognosis of patients with first acute myocardial infarction (AMI) have shown that patients with higher BMI and no insulin resistance or diabetes mellitus (DM) presented better long term outcomes while normal weight patients with DM presented the highest risk of major cardiac and cerebrovascular events. A recent report of the Swedish coronary angiography and angioplasty registry[4] concluded that the relation between BMI and mortality was U-shaped in patients who underwent coronary angiography due to ACS, with the nadir among overweight or obese patients while underweight and normal-weight patients had the highest risk.

Abdominal adiposity, a reflection of central body fat distribution, is associated with significant metabolic abnormalities including insulin resistance, hyperinsulinemia, elevated triglycerides, glucose intolerance, DM[5,6] as well increased incidence of hypertension (HTN), atherosclerosis and strokes.[7–9] Waist circumference, a simple measure to calculate, is a surrogate marker of abdominal fat.[10] Fewer studies have however examined the impact of waist circumference on clinical outcome after acute coronary events. A large study by Zeller et al.[11] evaluating patients with AMI has shown that WC as a continuous variable had no impact on all-cause death. After adjustment for baseline confounding predictors of death, BMI also was not independently predictive of death. The aim of this study was to assess the impact of abdominal adiposity as reflected by waist circumference on the in-hospital outcome and coronary angiographic findings of a cohort of Egyptian patients with STEMI and to determine whether these findings are independent of total obesity or BMI.

2. Materials and methods

2.1. Patients

In this prospective study, patients presenting with acute STEMI were included. Data were collected from a cohort of 142 consecutive patients admitted to the coronary care unit of Kasralaini University Hospital, Cairo University, during the period between August 2011 and April 2012. The diagnosis of STEMI was based on the universal definition of myocardial infarction.[12] The present study complied with the Declaration of Helsinki and was approved by the ethics committee of Kasralaini University Hospital, Cairo University. Each patient gave a written consent before enrollment in the study.

2.1.1. Data collection

Data on demographics, CV risk factors (history of HTN, DM, treated hyperlipidemia, current smoking, family history of CAD), prior MI, prior PCI or CABG were collected prospectively, along with admission characteristics, chronic medication intake prior to admission and hemodynamic parameters. The type of acute reperfusion procedures (thrombolysis or PCI) was also recorded. Anthropometric parameters were measured within 24 h of admission. BMI was categorized according to the World Health Organization standards[13] as normal (<25 kg/m^2), overweight (25–29.9 kg/m^2), obese (30–34.9 kg/m^2), and very obese ($\geqslant 35$ kg/m^2). WC was measured with a non-elastic tape at the mid distance between the top of the iliac crest and the bottom of the rib cage and as the average of 2 measurements, one taken after inspiration and the other after expiration. Increased WC was defined using the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP)[14] cutoff of WC $>$ 102 cm in men and >88 cm in women.

2.2. Methods

The patients were subjected to the following examinations.

2.2.1. Electrocardiogram (ECG)

New ST elevation at the J-point in two contiguous leads with the cut-off points: $\geqslant 0.2$ mV in men or $\geqslant 0.15$ mV in women in leads V2–V3 and/or $\geqslant 0.1$ mV in other leads or new left bundle branch block were considered diagnostic of STEMI in the presence of a rise and/or fall of cardiac biomarkers with at least one value above the 99th percentile of the upper reference level.[12]

2.2.2. Echocardiography

M-mode, two dimensional echocardiography and Doppler examinations were performed within 48 h of admission to obtain the following variables according to the recommendations of the American society of echocardiography:[15]

(a) M-mode measurements: the end systolic dimension of the left atrium (LA), the end diastolic dimension of the aortic root (Ao), the left ventricular end diastolic diameter (LVEDD), the left ventricular end systolic diameter (LVESD), the end diastolic posterior wall thickness(PWT) and septal wall thickness (SWT).