Adiposity and cardiovascular disease: are we using the right definition of obesity?

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The data provide important information to understand the conflicting results of epidemiological studies assessing the association between BMI and adverse events. Furthermore, the findings support that an accurate diagnosis of obesity may entail more refined investigations of body composition in patients with CAD. Hence, in patients with CAD and mildly elevated BMI, body composition techniques might be necessary to diagnose obesity accurately. Nevertheless, this study has limitations. At baseline, the diagnosis of diabetes and the metabolic syndrome could have been underestimated. This is of importance since both are associated with the risk of CAD. In addition to waist circumference, it would have been desirable for the authors to have used the presence of the metabolic syndrome to explain the variability accounting for BMI. Also, a small number of women were included in the study. Finally, it would have been interesting to assess sensitivity and specificity of waist circumference to detect total body fat since waist circumference may be a better surrogate marker of ‘at risk’ obesity. Numerous techniques (air displacement plethysmography, bioelectrical impedance, skinfold thickness, X-ray absorptiometry, hydrostatic weighing, etc.) may be used to assess obesity, but waist circumference may be the next best clinical tool to assess ‘at risk’ obesity.

Previous investigations have found BMI to be both directly and inversely associated with mortality, to have no independent association, or to have a U- or a J-shaped association. Possible explanations for a lack of consistency and reproducibility in the relationship between BMI and death may be the covariation of BMI with other cardiac risk factors, unmeasured confounders, or misclassification bias from use of surrogate markers of obesity. A recent meta-analysis, published by the same group of investigators, regarding the influence of body weight or obesity measures in patients with CAD reported a better outcome for cardiovascular and total mortality seen in overweight and mildly obese groups. The authors suggested that this could be due to the lack of discriminatory power of BMI to reflect adiposity adequately. They tried to address this issue in the current study.

Waist circumference or waist-to-hip ratio have been used as a proxy measure for body fat distribution when investigating the health risk increased with an increasing ratio. Waist circumference reflects abdominal or intra-abdominal fat, and hip circumference reflects different aspects of body composition in the gluteofemoral region, i.e. muscle mass, bone, and fat mass. Waist circumference among
both men and women showed a strong dose–response-type of relationship with mortality when adjusted for BMI, whereas the low range of BMI was inversely associated with mortality when adjusted for waist circumference.\textsuperscript{4} Since BMI measures total body mass, both fat and lean mass, after adjusting for waist circumference, BMI may better represent the protective effect of lean body mass on mortality. This negative confounding may have been underappreciated in previous studies that did not adjust for measures of abdominal obesity.

In post-menopausal women with CAD from the Heart and Estrogen/progestin Replacement Study, it was reported that both BMI and waist circumference were associated with mortality, but waist circumference may be more important than BMI.\textsuperscript{5} In the Nurses’ Health Study, waist-to-hip ratio and waist circumference were also independently strongly associated with increased risk of coronary heart disease among women with a BMI of $\leq 25$ kg/m$^2$.\textsuperscript{2,6} and in the Paris prospective study, sagittal diameter, i.e. abdominal obesity, was the only significant predictor of cardiac death.\textsuperscript{7} In patients with known cardiovascular disease (CVD) or following acute myocardial infarction, overall obesity as assessed by BMI was not associated with cardiovascular mortality, myocardial infarction, and total mortality when abdominal obesity indexes (waist-to-hip ratio, waist circumference) were integrated into the statistical analysis.\textsuperscript{1} Guidelines for optimal weight in older individuals are limited by uncertainty about the ideal BMI. The excess health risk associated with a higher BMI declines with increasing age. An explanation for the lack of a positive association with BMI and mortality at older ages is that, in older persons, BMI is a poor measure of body fat. Sarcopenic obesity, which is defined as excess fat with loss of lean body mass, is a highly prevalent problem in older individuals. The introduction of waist circumference as a simple risk measure in public health settings has already begun, but this simplification is under debate. The discrepancies between the findings regarding obesity, CVD, and mortality need to be addressed, and the current paper may shed some light on explaining the controversy surrounding BMI and events in chronic diseases. Through the years, researches have refined some indices associated with CVD, but refinements are now needed in the assessment of ‘at risk’ obesity (Table 1).

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References