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Traditional body mass index cut-offs in older people: time for a rethink with altered fat distribution, sarcopenia and shrinking height

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Body mass index (BMI) is commonly used worldwide to establish obesity, and may predict adverse health outcomes in global population-based adult research. However, recent studies have questioned its validity to assess obesity status in older adults (1,2), and have indicated that traditional BMI cut-offs may inadequately address the degree of these adverse outcomes in older populations (3,4).

These concerns may be amplified in older women, given that important body composition related changes occur after the menopause, such as a decrease in bone mineral density and muscle mass, and fat mass increase and redistribution (with an increase of central adiposity)(5), which may be masked by a normal BMI resulting in the phenotype called sarcopenic obesity.

Direct measures of adiposity such as CT and MRI may provide accurate whole-body and regional assessment of fat and muscle (6), and dual-energy x-ray absorptiometry can be considered as an appropriate reference standard, for adiposity evaluation (7). Nevertheless, some issues such as high cost, limited access to equipment or concerns about radiation exposure may limit its use for routine clinical practice.

When comparing diagnostic performance with direct measures of adiposity, a BMI cut-off of 30 kg/m² may suboptimally identify adiposity (8,9), and will result in a low true positive rate and a high true negative rate. Thus, many women who are truly obese may be misclassified as non-obese by BMI, potentially leading to a systematic underestimation of obesity-related mortality risks in older women. In this respect, Banack et al (10) recently demonstrated that, in a study performed on postmenopausal women (66.1±7.0 years), if 35%, 38%, or 40% of body fat was used as reference standard for obesity, a BMI cut-point of 30 kg/m² is too high to accurately classify women as obese or nonobese, and should potentially be replaced with BMI cut-points of 24.9, 26.5, or 27.1 kg/m², respectively.

In addition, to obtain an accurate BMI assessment, it is important to accurately measure height. This can be problematic in older persons with kyphosis, shortening of the spinal vertebrae, or thinning of weight-bearing cartilage (11,12) and any resulting underestimation of height may lead to BMI overestimation, which causes again weight-category misclassifications.

In order to prevent weight misclassifications, several accessible options have been proposed:

- Other indirect measures of adiposity such as waist circumference and waist-to-hip ratio, although they also have their limitations.
- Alternatives to height measurements (and thus not affected by kyphosis), such as demi-span, arm span, and knee height, can be employed to assess BMI (13).
- Inverted BMI (iBMI=1000/BMI, cm/kg²), which has been demonstrated to be a better proxy for percentage of body fat (14). Nevertheless there is currently no recognized cut-point to identify obesity according to iBMI.

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