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Comparison of self-reported and measured height and weight: Implications for obesity research among young adults

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Abstract

Background: The use of self-reported data in epidemiological surveys leads to misclassification of the prevalence of obesity as the participants overestimate or underestimate height, weight and/or both. Such misclassifications vary according to gender, age, status and ethnicity.
Objectives: To estimate on a sample of youth of both sexes (1) the difference between self-reported data and measured height and weight and (2) the extent of misclassification of BMI deriving from such differences.
Methods: Self-reporting in questionnaires and subsequent measurements of height and weight conducted by trained personnel. The mean values and the BMIs were calculated.
Results: Both sexes overestimate height (2.1 and 2.8 cm for males and females, respectively), and underestimate weight (1.5 and 1.9 kg for males and females, respectively). Consequently the BMI is underestimated (1.1 and 1.5 points for males and females, respectively). The classification of BMI from self-reported data shows underestimation of overweight in both sexes (8 percentage points) and of obese males (3.3 percentage points), an overestimation of normal weight (12.2 and 4.3 percentage points for males and females, respectively) and an excessive underweight in the girls (4.3 percentage points).
Conclusions: There is a difference between self-reported and measured data and self-reported biases are reflected in the classification of the participants in the 4 categories of BMI.

JEL classification : I10; I31

Keywords: Self-reported; Height; Weight; BMI; Validation; Italy; Anthropometrics

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1. Introduction

There is a widespread use of self-report questionnaires and telephone interviews in large-scale national studies to evaluate the general health status of the population. Of particular interest is the estimation of the prevalence of overweight and obesity using a very common, albeit approximate, biomedical indicator: BMI. Subjects are generally randomly selected from the population and are asked to provide their height and weight, in addition to other information. However, there are conflicting opinions about the reliability of self-reported height and weight values, and thus of BMI, since biased values in these surveys are very frequent, if not the norm (Kuskowska-Wolk et al., 1989; Hill and Roberts, 1998; Strauss, 1999; Bolton-Smith et al., 2000; Spencer et al., 2002; Tehard et al., 2002; Fonseca et al., 2004; Connor Gorber et al., 2007). Moreover, the type and frequency of the error varies between males and females, and also in relation to age, educational and socio-economic level, and ethnic group. In general, boys, men and elderly and socially disadvantaged subjects tend to overestimate their height, while girls and women underreport their weight (Nieto-Garcia et al., 1990; Hauck et al., 1995; Gunnell et al., 2000; Kuczmarski et al., 2001; Paeratakul et al., 2002; Brener et al., 2003, 2004; Ezzati et al., 2006). These distortions of the perception of one's physical characteristics are reflected in the calculation of BMI, which is constantly underestimated. In this regard, however, adult women generally provide more accurate information (Flood et al., 2000; Niedhammer et al., 2000; Payette et al., 2000; Paccaud et al., 2001; Farre Rovira et al., 2002; Lawlor et al., 2002).

The present study investigates a sample of young adults to evaluate the extent of divergence between the values declared in the questionnaires and those measured directly on the subjects by trained personnel with precision instruments. The aim was to contribute to the vast and increasing scientific debate on this topic, especially regarding distortions in the evaluation of overweight and obesity.

2. Materials and methods

Anonymous, specially designed questionnaires were used to collect the following information: personal details of the subject; the type and weekly frequency of sport activities, and the length of time they had been practised; if the subject was a smoker or non-smoker and, if a smoker, the number of daily cigarettes smoked; height and weight; the place of birth, age, educational level and profession of both parents.

The questionnaires were administered in the 2004–2005 academic year to students in the Faculty of Motor Sciences, University of L'Aquila, and the Faculty of Mathematics, Physics and Natural Sciences, University of Rome ''La Sapienza''. The overall research project, its aims and the two phases of participation required were clearly explained. The participation in the research was absolutely free and required 10–20 min for both phases. After the student volunteers had completed the questionnaires and handed them in, their height and weight were recorded by the trained operators. When measured, the subjects were barefoot and wearing approximately the same type of clothing: pants and T-shirt.

All the operators were trained in the same manner. Height was measured with a Harpenden anthropometer and recorded to the nearest mm. Weight was measured to the nearest 0.01 kg with a SECA 884 electronic balance. BMI was calculated as kg/m^2. The results were classified according to the categories adopted by the World Health Organization: (1) underweight: BMI $\leq$ 18.4; (2) normal weight: BMI 18.5–24.9; (3) overweight BMI 25–29.9; (4) obese: BMI $\geq$ 30 (WHO, 2006).