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Are Normal-Weight Americans Over-Fat?

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Abstract

Data from National Health and Nutrition Examination Surveys (NHANES) 1999–2004 have recently shown the percent body fat of American adults. Average American men and women have ~28 and 40% body fat. When categorized by BMI and age, the data also show high percent body fat values, particularly in lower BMI categories. These data should make one reflect on the health status of Americans in all BMI categories and the use of these data for public health recommendations.

The NHANES database provides a wealth of information on the health and lifestyle habits of Americans. It has been used extensively to report the prevalence of obesity and, recently, Li *et al.* (1) published data on the body composition of Americans, as assessed using dual-energy X-ray absorptiometry (DXA), in the 1999–2004 cohort. Their report provides data on average percent body fat for men and women and by race–ethnicity, age, and BMI categories along with percentile cutoffs by sex, race–ethnicity, and age groups.

Although the report by Li *et al.* (1) provides useful information on the body fat content of Americans for specific BMI categories, these recent NHANES data seem to show high percent body fat levels, which is most striking among men and women who have a normal and overweight BMI. In fact, among women and men with BMI < 25 kg/m², Li *et al.* (1) report a crude percent body fat of 34.0 and 22.7%, respectively. In contrast, in a small study of whites in Switzerland, percent body fat in women and men with normal BMI were 25.3 and 17.7%, respectively (2). Deurenberg *et al.* (3) published a regression equation to determine percent body fat in women and men using data from whites (American, Australian, and European), blacks (American and Ethiopian), and Asians (Chinese, Thai, Indonesian, and Polynesian). The estimated values for a 30-year-old woman at BMI 22.5 and 27.5 kg/m² would be 27.1 and 33.5% body fat, respectively. Corresponding values from the NHANES 1999–2004 cohort are 32.2 and 39.5% (1), respectively, ~5–6 percentage points higher than that predicted from the Deurenberg *et al.* (3) meta-analysis. Similarly, men, aged 30 with BMIs of 22.5 and 27.5 kg/m² would be predicted to have 15.7 and 22.2% body fat based on the meta-analysis of Deurenberg *et al.* (3) compared to 21.0 and 27.0% reported by Li *et al.* (1) for the same age group. Gallagher *et al.* (4) also published predicted percent body fat by gender and ethnicity from a sample of subjects from the United Kingdom, Japan, and United States. Their results also show a 5–10 percentage point lower predicted percent body fat than that reported by Li *et al.* (1). A limitation of these studies is the use of multiple methods of body composition assessment and convenient samples from American and non-American populations. Nevertheless, one may conclude that, at similar

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DISCLOSURE

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BMI and age, Americans are over-fat relative to other populations and earlier generations. To provide an additional comparison, Bray (5) recommended a percent body fat of 21–32% for 21- to 39-year-old, normal-weight women and 8–20% for men of the same age and BMI category. The average percent body fat values reported by Li *et al.* (1) for the 20–39 age group were 32.2 and 22.9% for women and men, respectively. One would assume that the population average should fall within the middle of the range provide by Bray (5), yet, the most recent NHANES cohort, has an average percent body fat that exceeds this range for young, normal-weight men and women.

The notion that Americans may be over-fat warrants attention, particularly since Li *et al.* developed percentile curves that should be used “in clinical settings and public health services” (1). These curves could be interpreted by the public and other health professionals to mean that a high degree of body fat is acceptable. However, percent body fat is correlated with metabolic syndrome and risk factors for cardiovascular disease (6,7).

An analogy could be made between the percentile curves developed by Li *et al.* (1) and pediatric growth curves developed by the Center for Disease Control (8). The growth curves for children aged 6 years were developed after exclusion of the NHANES III data for this age group as it was decided that including these data would shift the overweight criterion upward and would lead to an underclassification of overweight (or overclassification of normal weight) (8). This is mostly because children aged 6 years, in the NHANES III cohort, had higher body weights and BMIs than the same age group in previous cohorts (8). Therefore, just as the current pediatric growth chart curves have excluded NHANES III data due to high body weights for children aged 6 years, perhaps we should avoid establishing cut-points for percent body fat for the American adults from the most recent NHANES cohort. The data are useful if considered as a “state of the nation” for percent body fat but do not provide information on the health desirability of the observed body fat percentages. If we conclude that normal-weight individuals in the NHANES database are over-fat, then providing cut-points for use in clinical settings and public health services may lead to an underclassification of individuals with excess fat relative to their body weight.

It is worth noting that the data reported from the NHANES cohort were corrected due to issues surrounding the calibration of the DXA instruments. Schoeller *et al.* (9) have reported that the instrument used in NHANES tended to overestimate lean soft tissue mass and underestimate fat mass by ~5% relative to criterion measurements of body composition by total body water dilution, densitometry, and four-compartment model. As a result, the DXA data reported by Li *et al.* (1) were corrected by adding 5 percentage points to the percent body fat data. However, from the comparisons highlighted above, it is possible that a correction was either not necessary or not appropriate across the range of body fatness and adult ages. The comparative studies used to determine the correction factor included three studies, out of a total of seven, with subjects over the age of 59 years ($n = 358/1,195$, not counting older adults in other data sets). Older adults are known to have greater adiposity than younger adults at equal BMI. It is possible that this may have contributed to the underestimation of percent body fat in the NHANES data set relative to the comparison data set used in establishing the correction factor. It would therefore be important to obtain body composition from criterion methods, either densitometry, total body water, or four-compartment model, on a subset of the NHANES population to determine whether the data correction was necessary.

Finally, although it is informative to have percent body fat information from a representative sample of the American population, we should remain cautious in the interpretation of these data and establishment of percentile cutoff estimates. It is disconcerting that the 5th percentile for percent body fat, which should represent the leanest of the population,

corresponds to 28 and 17% body fat for women and men, respectively, and that the 50th percentile is as high as 41 and 28%. The message that may be interpreted from these cut-points, if they are to be used “in clinical settings and public health services” (1), is that the percentage body fat values that correspond to normal BMIs are acceptable and/or healthy. This may send the wrong message to the American public and health professionals as there are no clinical data at this time to show that these percent body fat values are healthy from a metabolic risk standpoint. This is of particular concern when ~66% of the American adult population are currently overweight or obese (10).

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