

A method of constructing an index of obesity

Abstract:

Body density data obtained from underwater weighing, of 458 children and adults aged from 6 to 51 years, in combination with weight (W) and stature (S), have been used to estimate percent body fat (% BF). A model for an obesity index of the form: $\% \text{ BF} = C(W^m/S^k)$ is proposed. The parameters of the model were derived using a non-linear least squares procedure to maximize the relationship between the index and % BF. The constant C was independent of age but varied by sex. The estimated values of m (1.2) and k (3.3) for the sample studied were age- and sex-independent and significantly different from integers. The estimates of % BF from the index were significantly correlated with those from densitometry (r ranging from + 0.5 to + 0.75). It is considered that any estimated index of body fat based on measures such as W and S is likely to be population-specific. Nevertheless, the proposed general model can be used to obtain the "best" estimates of the parameters C, m and k in different samples, particularly samples for which more direct fat-related variables are not available. This approach requires little training in measurement techniques, it is non-invasive and is applicable to the very obese. The population specificity of the parameters would make it difficult to compare populations using such an index, but the approach should be useful for inter-individual comparisons and analyses of serial data, if densitometric data are available for subsets of the samples studied.