BMI: A critique of its use in human biology and the health professions

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Abstract: The purpose of this illustrated essay is to focus scientific attention on the use of ratios from the time of Adolph Quetelet to the present day. We have adopted a journalist style to counter what we regard as a conspiracy of ignorance to promote the BMI (Body Mass Index) to assess individual physique status, indicate health risk and monitor pharmacological, dietary and exercise intervention. We contend that the common BMI scale for men and women to ascribe a health weight range is a mathematical artifact. Log-log regression exponents in the YMCA LIFE and CANADA FITNESS SURVEY databases show exponents for females were lower than males at every five-year age increment from age 20 to 70 years. The exponents of the combined male and female data for each study at each age increment were systematically higher than those for each gender. Didactically, we showed why one could not legitimately combine samples that differ allometrically with size. The evidence showed that the BMI predicting sum of skinfolds explained only a small part of the variance. It grossly misrepresented individuals below and above the 20 to 27 range. Comprehensive data on 919 men and women from the KASP database was used to illustrate characteristic sexual dimorphic differences that defy the use of a common BMI scale. To illustrate how badly the BMI predicted adiposity, we showed a scatter plot of BMI predicting the sum of six skinfolds for 215 male and 175 females. There was no discernable pattern. We calculated BMI values for 50 heavyweight-boxing champions from the time of John L. Sullivan and displayed them in descending order. Fifty-six percent had BMI's greater than 27. In a recent defense of his title, Lennox Lewis, BMI 29.6, defeated David Tuo, BMI 35.3. Do we conclude, the "less obese" boxer emerged victorious? In a reprise, young microcomputer based investigators and clinicians were invited to unlock ratios, set aside historical and convenient assumptions and look at the real evidence. We reiterate, in clinical applications, there is no simple tool to look at the complexity of the individual and monitor structural change with pharmacological, exercise and dietary intervention. However, with appropriate theory, technique and technology, this can be done elegantly if we eliminate silly simplifications.

Keywords: BMI; Misuse; Predictive index; Quetelet; Scaling; Sexual dimorphism; Large sample; Young adults; Boxers.