

Fat mass in young Malian children with moderate acute malnutrition: A concern regarding the use of correction factors

Dear Editor,

We read with great interest the recent report by McDonald and colleagues on a randomised trial of ready-to-use supplementary foods in young children with moderate acute malnutrition (MAM) from Mali (1). However, like the authors themselves, we were surprised at the high levels of body fat reported, and would like to raise some concerns regarding potential errors in the method used. Our comment is stimulated by the findings from our “Treatfood” trial conducted among children with MAM from neighbouring Burkina Faso, where we observed substantially lower levels of body fat (2).

In both studies, body composition was measured using deuterium dilution, an objective method for the measurement of total body water (TBW) and hence fat-free mass (FFM) through adjustment for FFM hydration. Fat mass (FM) is calculated by difference of FFM and weight.

Our main concern relates to the adjustments made to the raw isotopic data from the study by McDonald. The authors cite the following equation for the calculation of TBW (1):

$$\text{TBW} = [({}^2\text{H}_2\text{O}/{}^2\text{H}_2\text{O enrichment}) * 900 * 0.96 * 0.944] - \text{water intake (L)}$$

where the value of 0.96 represents a correction for non-aqueous hydrogen exchange, the value of 900 adjusts for the molecular weight of ${}^2\text{H}_2\text{O}$ relative to water, and the value of 0.944 adjusts for the estimated fractionation of the isotope. However, we believe that only the adjustment for non-aqueous hydrogen exchange is necessary. We do not see any need to adjust for the molecular weight of ${}^2\text{H}_2\text{O}$ relative to water, and correction for fractionation is only required for physiological processes that do not proceed to completion, which is not applicable here. These two corrections seem unnecessary, and result in a 15% reduction in the final TBW values.

Interestingly, reference data on body composition for healthy UK children aged 6 weeks to 5 years was recently published (3). At 15 months (average age in the study of MacDonal and colleagues) fat mass index (FMI) in the UK data averaged 4.12 kg/m², similar to the value of Macdonald (3.97 kg/m²). It seems very unlikely that under-nourished children would have levels of body fat identical to those of well-nourished children in the UK.

We suggest that the unnecessary corrections, described above, propagate directly to a ~15% reduction in FFM, and hence an overestimation of FM. Recalculating the average baseline values of MacDonal and colleagues without this 15% reduction provides values for fat-free mass index (FFMI) and FMI of 11.56 and 2.39 kg/m² respectively, very similar to those of our own study (11.62 and 2.30 kg/m² respectively).

We therefore encourage the authors to recalculate their database, and provide values for body composition outcomes unaffected by the two corrections that we suggest are unnecessary, in order to enable a more direct comparison between their study and that of ourselves.

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