

THE EFFECT OF AGE AND ADIPOSITY ON THE DIFFERENCE OF FAT-FREE MASS MEASURED BY DXA AND AIR DISPLACEMENT PLETHYSMOGRAPHY (BODY DENSITY)

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Background: Dual energy x-ray absorptiometry (DXA) may overestimate fat free mass (FFM) in older adults due to fat infiltration in skeletal muscles. FFM derived from the 2-compartment model using body density (BD) measurement can overcome this error. We attempted to examine the difference between DXA-measured and BD-derived FFM and test whether this difference is related to age, gender and adiposity measures. Methods: One hundred and seventy two participants aged 20 to 76 years, were examined by air displacement plethysmography (Bod Pod) and DXA to measure their BD and FFM respectively. FFM was also derived indirectly from the 2-compartment model where: $(FM + FFM) / BD = FM / FM \text{ density} + FFM / FFM \text{ density}$. The FFM and FM density was assumed to be 1.1000 and 0.9007 respectively. The difference between DXA-measured and BD-derived FFM was calculated and the association between this difference with age, gender, and adiposity measure, namely body mass index (BMI), was examined by multiple linear regression. Results: The DXA-measured FFM was 2.26 kg (2.34 kg) higher than the BD-derived FFM. (paired t-test, $p < 0.001$) In multiple linear regression, BMI was associated with the difference between DXA-measured and BD-derived FFM after adjustment for age and gender. ($p < 0.001$) Older age was also associated with greater difference. ($p < 0.001$) Conclusion: DXA-measured FFM was 2.26 kg higher than that derived by the 2-compartment model using BD measurement. This variation was significantly associated with older age and higher BMI. This supports that fat infiltration into skeletal muscles in older adults may contribute to the discrepancy.