

Prediction of basal metabolic rate in patients with Prader-Willi syndrome.

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Background/Objectives: The objective of this study was to develop new equations for predicting basal metabolic rate (BMR) in Prader-Willi syndrome (PWS) subjects and to compare their accuracy with commonly used equations developed by Lazzer (2007), Livingston (2005), Huang (2004), Nelson (1992), Mifflin (1990), Owen (1987), WHO (1985), Bernstein (1983) and Harris-Benedict (1919), using the Bland-Altman method.

Subjects/Methods: BMR was measured by indirect calorimetry and fat-free mass (FFM) and fat mass (FM) by a tetrapolar impedancemeter in 80 Caucasian PWS patients (mean body mass index: 39.1 kg/m²; 17-50 years). Equations were derived by stepwise multiple regression analysis using a calibration group (n:50) and tested against the validation group (n:30).

Results: Two new equations, based on anthropometric ($BMR = \text{body mass} \times 0.052 + \text{sex} \times 0.778 - \text{age} \times 0.033 + 2.839$ ($R^2_{\text{adj}} = 0.61$, s.e. = 0.89 MJ per day)) or body composition ($BMR = \text{FFM} \times 0.074 + \text{FM} \times 0.042 + \text{sex} \times 0.636 - \text{age} \times 0.037 + 2.515$ ($R^2_{\text{adj}} = 0.69$, s.e. = 0.82 MJ per day)), were generated. Predicted BMR (PBMR) was not significantly different from the measured BMR (< 3.3%), and was accurate in 59% and 62% of patients, respectively. Nevertheless, significant magnitude bias was found for both equations ($P < 0.001$, $R^2 = 0.36$). The Owen (1987), Mifflin (1990), Huang (2004) and Lazzer (2007) equations showed mean differences < 5% and PBMR was accurate in ~ 50% of patients. The Livingston (2005), WHO (1985) and Harris-Benedict (1919) equations showed a PBMR overestimation 47% and were accurate in < 50% of patients. The Nelson (1992) and Bernstein (1983) equations showed a greater PBMR underestimation in > 60% of subjects.

Conclusions: The new prediction equations showed significantly higher accuracy compared with equations tested, with exception of Lazzer (2007) and Livingston (2005) equations, and result in lower mean differences and lower limits of agreement compared with the equations tested.

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