Applying artificial neural network to predict total body water in hemodialysis patients

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Abstract

BACKGROUND: Estimating total body water (TBW) is crucial in determining dry weight and dialytic dose for hemodialysis patients. Several anthropometric equations have been used to predict TBW, but a more accurate method is needed. We developed an artificial neural network (ANN) to predict TBW in hemodialysis patients. METHODS: Demographic data, anthropometric measurements, and multifrequency bioelectrical impedance analysis (MF-BIA) were investigated in 54 patients. TBW measured by MF-BIA (TBW-BIA) was the reference. The predictive value of TBW based on ANN and five anthropometric equations (58% of actual body weight, Watson formula, Hume formula, Chertow formula, and Lee formula) was evaluated. RESULTS: Predictive TBW values derived from anthropometric equations were significantly higher than TBW-BIA (31.341 +/- 6.033 liters). The only non-significant difference was between TBW-ANN (31.468 +/- 5.301 liters) and TBW-BIA (p = 0.639). ANN had the strongest Pearson's correlation coefficient (0.911) and smallest root mean square error (2.480); its peak centered most closely to zero with the shortest tails in an empirical cumulative distribution plot when compared with the other five equations. CONCLUSION: ANN could surpass traditional anthropometric equations and serve as a feasible alternative method of TBW estimation for chronic hemodialysis patients.