Abstract

Introduction: Establishing the energy expenditure of patients with home parenteral nutrition (HPN) is a key component of nutritional care, just as important as being aware of how HPN affects energy expenditure. This helps prevent complications associated with excessive or insufficient nutrition. Certain studies have aimed at these issues have been carried out around the world, but little attention has been devoted to this subject in the Czech Republic as of yet. Several methods of ascertaining energy expenditure exist, with indirect calorimetry being considered the gold standard, however, in practice, various predictive equations are predominantly used instead.

Aims: To compare the difference between the base metabolic rate (BMR) and the resting energy expenditure (REE) in patients with home parenteral nutrition. When measuring REE, to also establish the extent of the thermic effect of parenteral nutrition. Furthermore, to compare the results for energy expenditure (BMR, REE) obtained via indirect calorimetry with the results obtained via the frequently used predictive equations for calculating BMR and REE, and to ascertain which predictive equation most closely matched the measurements obtained via indirect calorimetry.

Methodology: Outpatients with HPN seen at the 4th internal clinic of the General Faculty Hospital (VFN) in Prague were subjected to two rounds of indirect calorimetry measurement in order to establish their energy expenditure, once in order to ascertain their BMR and once in order to ascertain their REE (as well to measure the thermic effect of HPN). Furthermore, additional basic information was gathered from the patients (sex, age, reason for and type of HPN), and anthropometric measurements were taken (body height and mass). Based on this information, BMR and REE were calculated using predictive equations (namely the Harrison-Benedict, Owen, Mifflin-St. Jeor, and Ireton-Jones formulae) and once more in accordance with guidelines published by ESPEN (the European Society for Clinical Nutrition). The results of the predictive equation and ESPEN guideline calculations were subsequently compared with the results of indirect calorimetry measurements.

Results: The experiment showed that the most suitable equation for calculating energy expenditure outside of indirect calorimetry are the Harris-Benedict equations and the Owen equation, regardless of whether BMR or REE is being estimated. Unfortunately, the assumption that BMR is always lower than REE was not confirmed by the experiment, despite the fact that REE should have been even higher by the extent of the thermic effect of PN; in patients where this did hold true, REE was on average 15% higher than BMR. That is to say, the thermic effect of PN in patients with HPN is approximately 15%.

Conclusion: If it is not possible to measure energy expenditure using the method of indirect calorimetry, it would appear that the Harris-Benedict equation and the Owen equation are adequate substitute methods, and are simultaneously more expeditious and affordable, while placing a smaller burden on personnel. Despite the fact that the difference between BMR and

REE in the results was not as expected, the difference between them does not appear to be entirely substantive, particularly when one considers the fact that the most adequate substitute methodology for indirect calorimetry has been shown to be the same equations in the case of both BMR and REE. This dissertation could form the basis of further work in the future which may improve the precision of the results of this dissertation due to an increased patient sample size.