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Assessment and prediction of human milk intake in late infancy

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Abstract

The significance of human milk in an infant's diet is well-established, yet accurately measuring human milk intake remains challenging. Current methods are either unsuitable for large-scale studies, such as the dose-to-mother stable isotope technique, or rely on set amounts of human milk, regardless of known variability in individual intake[(1)]. There is a paucity of data on how much infants consume, particularly in later infancy (>6 months) when complementary foods have been introduced. This research aimed to estimate human milk intakes and total infant milk intakes (including infant formula) in New Zealand infants aged 7-10 months, explore factors that predict these intakes, and develop and validate equations to predict human milk intake using simple measures. Human milk intake data were obtained using the dose-to-mother stable isotope technique in infants aged 7-10 months and their mothers as part of the First Foods New Zealand study (FFNZ)[(2)]. Predictive equations were developed using questionnaire and anthropometric data (Model 1) and additional dietary data from diet recalls (Model 2)[(3)]. The validity of existing methods to estimate human milk intake (NHANES and ALSPAC studies) was compared against the dose-to-mother results. FFNZ included 625 infants, with 157 mother-infant dyads providing complete data for determining human milk volume. Using the dose-to-mother data, the measured mean (SD) human milk intake was 785 (264) g/day. Older infants had lower human milk and total milk intakes, male infants consumed more total milk. The strongest predictors of human milk intake were infant age, infant body mass index, number of breastfeeds a day, infant formula consumption, and energy from complementary food intake. When the predictive equations were tested, mean (95% CI) differences in predicted versus measured human milk intake (mean, [SD]: 762 [257] mL/day) were 0.0 mL/day (-26, 26) for Model 1 and 0.5 mL/day (-21, 22) for Model 2. In contrast, the NHANES and ALSPAC methods underestimated intake by 197 mL/day (-233, -161) and 175 mL/day (-216, -134), respectively. The predictive equations are presented as the Human Milk Intake Level Calculations (HuMILC) tool, designed for use in large-scale studies to more accurately estimate human milk intakes of infants. The use of objective quantifiable assessment methods enhances our understanding of infant human milk intakes, improving our ability to accurately assess nutritional adequacy in infants.

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