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Abstract

Circadian Variation of Human Milk Hormones and Macronutrients: Implications for Sampling and Analysis Strategies †

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Abstract: The daily variation in human milk (HM) hormones and macronutrients is not well characterised and sample protocols are highly variable between studies. Method: During a 24 h period, the mothers (n = 10) hand-expressed small milk samples, immediately before and after each breastfeeding or expression from each breast. Test-weighing was used to determine the volume of HM consumed in each feed. Concentrations of leptin, adiponectin, insulin, fat, and glucose were measured by variable biochemical assays. A linear mixed model was fitted to eleven outcomes of leptin, adiponectin, insulin, fat, glucose (dose and concentration for each), and feed volume. The explanatory variables considered were a circadian cycle (cosine and sine terms), and for dose and concentration outcomes, an indicator variable for pre- or post-feed. The random effect was a circadian cycle (cosine and sine terms) for each mother. Results: The average infant intake of HM was 1060 mL/day (8 to 20 feeds/day). Pre- and post-feed differences were found in the concentrations of leptin, adiponectin, insulin, and fat ($p < 0.05$). Significant circadian variation across the 24 h period was found in adiponectin concentration, insulin (both concentration and dose), fat dose, glucose (both concentration and dose), and milk volume. Conclusion: These results highlight the importance of establishing standardised and rigorous sampling protocols considering all levels of variations (within-feed or circadian) to provide a better determination of the impact of these components on infant health and development.

Keywords: human milk; lactation; breastfeeding; hormones; adipokine; macronutrient; circadian rhythm; variation

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