

Appetite regulation of breastfed infants: milk composition, appetite control factors and gastric emptying

Associate Prof Donna Geddes

School of Chemistry and Biochemistry, The University of Western Australia

Breastfed infants self-regulate their nutrient intake, with long-term advantages such as reduced risk of overweight and obesity later in life. This beneficial effect of breastfeeding against obesity is thought to be conferred via multiple factors such as the macronutrient components and appetite control factors in human milk, mode of feeding and gastric emptying. Most recently we have explored the macronutrient components of human milk on both breastfeeding behaviour and gastric emptying in the term infant as well as gastric emptying in the preterm infant.

Breastfeeding Behaviour

There is a wide variation in the feeding frequency and in the volume of milk consumed at each breastfeed over 24 hours both within and between infants. This variation suggests a degree of infant self-regulation. Whether or not milk composition affects breastfeeding behaviour or gastric emptying still remains unclear. Khan et al¹ found that greater mean 24h total protein, whey and casein intake was associated with less breastfeeds per day whereas lactose concentration was associated with more breastfeeds per day. These results suggest that the protein intake may play a significant role in infant appetite control.

Appetite Control Factors

Multiple appetite control factors exist in human milk yet their origins still remain unclear. We have endeavoured to clarify the origin of appetite control hormones in human milk by confirming their synthesis in rare specimens of lactating breast tissue. Current studies in the laboratory are measuring the concentration of these factors in the milk and examining their relationships with breastfeeding behaviour, gastric emptying and infant body composition.

Gastric Emptying

Our laboratory has developed a repeatable and reliable ultrasound technique that is suitable for monitoring gastric emptying in the term and preterm infant.² Interestingly it appears that casein is associated with rapid gastric emptying in the preterm infant³ but its effect still remains inconclusive in the term infant. Further the addition of fortifiers and pasteurisation of human milk, both of which alter the composition of the milk, can impact gastric emptying patterns. In addition the volume of the feed also impacts gastric emptying rate with larger volumes associated with slower gastric emptying in both the term and preterm infant.

It is clear that appetite regulation of the breastfed infant is dependent on the interaction of multiple factors. A more in depth understanding of these mechanisms may provide a 'window' for intervention in the increasing childhood and adult obesity epidemic.

References

- ¹ Khan S, Hepworth AR, Prime DK, Lai CT, Trengove NJ, Hartmann PE. Variation in Fat, Lactose, and Protein Composition in Breast Milk over 24 Hours: Associations with Infant Feeding Patterns. *J Hum Lact.* 2012.
- ² Perrella SL, Hepworth AR, Simmer KN, Geddes DT. Validation of ultrasound methods to monitor gastric volume changes in preterm infants. *J Pediatr Gastroenterol Nutr.* 2013;57(6):741-749.
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