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Larsson, Melanie Wange

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VERY HIGH WEIGHT GAIN IN EXCLUSIVELY BREASTFEEDED INFANTS
what are the causes and consequences?

Melanie W. Larsson1,2, Anni Larnkjær1, Christian Mølgaard1, Kim F. Michaelsen1
1 University of Copenhagen, Department of Nutrition, Exercise and Sports. 2 Metropolitan University College, Department of Nutrition and Midwifery.

BACKGROUND
• Breastfed infants have, except for the first two months, lower weight gain and are shorter and thinner at 12 mo compared to formula-fed infants. Breastfed infants gain more fat during the first 6 mo and more lean mass from 6-12 mo, compared to formula-fed infants (Gale 2012).
• A high weight gain during early infancy is associated with later obesity, but it is a general understanding that the risk is less if the infant is breastfed. However, a large cohort study showed that overweight in infancy (≥75 BMI at 6 mo) increases the odds of childhood obesity at 5-6 years of age regardless of feeding method (Van der Wilk 2015). A Danish study (presented at this conference) showed that infants with a high weight for age at 5 mo (≥ 75th SD) had a high risk of overweight at age 7 years and this was the same for infants fully breastfed shorter or longer than 5 mo.
• A recent case report (Grunewald 2014) showed excessive weight gain during full breastfeeding and suggested that the high protein and adiponectin content they found in breastmilk at 1 year could be the cause.
• A study of Brunner (2015) suggested that high concentrations of breastmilk adiponectin might be associated with high weight gain in the offspring up to 2 years of age.

AIM
• We present two cases of excessive weight gain during exclusive breastfeeding and present our ongoing SKOT III cohort study of breastfed infants with excessive weight gain.

METHODS
• Weight and length: measured by health visitors, family doctors and at our institute and plotted on WHO growth standards.
• Breastmilk intake: estimated by pre- and postfeeding infant weight during 2-4 24h periods (Tanita BD 615 MA).
• Breastmilk macronutrient content: measured by mid-infrared human milk analyzer (MiraS AB, Sweden).
• None of the infants had clinical signs of syndromes.
• The mothers had normal bodyweight and no gestational diabetes.

RESULTS Case 1 - boy
• Birth weight 3.8 kg.
• Exclusively breastfed until 5 mo, and stopped breastfeeding at 11 mo.
• At 5.5 mo milk intake was about 1100 ml/day (91 ml/kg).
• Milk macronutrient content (4 samples foremilk and 4 hindmilk (g/100 ml)): fat foremilk 0.4-2.1, hindmilk 4.3-6.9, protein mean 0.6.

CONCLUSION
• Both cases had extreme weight gain during exclusive breastfeeding. When complementary feeding was started both infants had a “catch-down” in weight and case 1 was within normal range at 20 mo.
• Milk protein and fat content was within normal range for both infants.
• Total milk intake was high for both infants, but intake per kg body weight was similar to the average of 110 ml/kg at six months in exclusively breastfed infants (Neville 1988).
• The two infants are likely to have a high body fat content which has a low metabolic activity. Therefore the energy demand may be lower per kg bodyweight compared to infants with a higher lean mass and consequently the high milk intake per kg lean mass may result in a surplus of energy available for growth. However, the causes of the high milk intake and to what extent they are influenced by maternal or infant factors are unknown.
• A better understanding of the causes of this very high weight gain in some exclusively breastfed infants and how it influence later growth and risk of obesity will provide valuable information on early regulation of appetite and growth.

RESULTS Case 2 - girl
• Birth weight 4.45 kg.
• Exclusively breastfed until 5 mo and at 13 mo still partially breastfed once a day.
• At 4 mo milk intake was about 1500 ml (128 ml/kg).
• Milk macronutrient content (g/100 ml) measured on 4 complete emptying of a breast: fat 2.4-3.8, protein 0.7-0.8.

SKOT III STUDY
• The SKOT III cohort is a study in nutrition, growth and development in fully breastfed infants with very high weight gain in the first months of life.
• The study aim is to provide more knowledge on breastfeeding, growth and appetite regulation.
• Inclusion criteria: Exclusively breastfed infants with a high weight for age (≥2.00 SD).
• Infants are examined at age 5, 7, 9, 18 and 36 mo.
• Examinations include:
  • Appetite hormones in milk
  • Appetite and growth hormones in infant blood samples
  • Milk volume and macronutrient content
  • Feeding pattern
  • Microbiota
  • GWAS
  • Metabolomics
  • Body composition (using wide range of different anthropometric measurements as well as Doubly Labeled Water)
  • Motor skills development
  • Physical activity

References

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