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“Analysis of nutrition and nutritional status during breastfeeding: impact on human milk composition”

Abstract

Introduction

Breastfeeding or feeding with mother’s milk constitutes the gold standard in the nutrition of neonates and infants. According to the recommendations of the World Health Organization and Polish Society of Pediatric Gastroenterology, Hepatology and Nutrition exclusive breastfeeding should last until the baby is 6 months old and should be continued over the subsequent months with a simultaneous introduction of complementary foods. The composition of human milk is dynamic and its energy value and content of nutritional components are influenced by physiological factors, mother- and child-related factors. Physiological factors include the duration of lactation, time of feeding (day/night) and feeding phase (foremilk/hindmilk). The composition of human milk is also characterized by inter-individual variability and may depend on maternal age, her origin, diet and nutritional status.

The aim of the study

The main aim of the study included the assessment of the relationship between maternal diet and nutritional status in breastfeeding women and the composition of produced milk. Detailed aims included:

- the analysis of diet in breastfeeding women,
- the analysis of the nutritional status of breastfeeding women assessed with body mass index (BMI) and the analysis of body composition with bioelectrical impedance analysis (BIA) comprising changes during the 1st, 3rd and 6th month of lactation,
- the analysis of human milk composition comprising the changes in its composition during the 1st, 3rd and 6th month of lactation.

Material and methods

It was a long-term study consisting of three phases planned for the 1st (phase I), 3rd (phase II) and 6th month of lactation (phase III). 40 women were qualified for phase I, 22 women for phase

II and 15 for phase III. During every phase of the study breastfeeding women underwent anthropometric measurements (body weight and height) and body composition assessment. Moreover, a 3-day list of consumed products and meals was verified and the composition of milk samples was analyzed. The milk was collected according to the developed procedure of daily milk collection. The milk was tested in terms of the content of protein, fat, carbohydrates, dry matter and energy value. Statistical analyses of the results were performed with Statistica, version 10 PL and version 12 PL and IBM SPSS Statistics software, version 21. Statistical significance was set at $p < 0.05$.

Results

The risk of insufficient energy supply and vitamin D was reported in all women participating in the study. At the same time, we did not observe significant differences as regards the maternal nutrition between the 1st, 3rd and 6th months of lactation. The nutritional status was assessed with BMI index which showed normal values in the majority of women (75%; $n = 30$) and excess body weight in the remaining women (25%; $n = 10$). A statistically significant difference was shown between BMI value in the first month of lactation and pre-pregnancy BMI calculated on the basis of pre-gestational body weight declared by the women. No statistically significant differences were noted between the first and the third phase of the study as regards body composition of breastfeeding women. The lack of reference ranges concerning body composition in the group of breastfeeding women prevented us from determining whether the obtained values were normal. Furthermore, no differences were demonstrated for body composition over individual phases of lactation. During the first month of lactation the content of macronutrients in human milk expressed as the median was 1.1 g/100 ml for proteins, 7.0 g/100 ml for carbohydrates and 3.5 g/100 ml for fats. BMI value correlated positively with the content of fats, dry matter and the energy value of woman's milk. The assessment of correlations between body composition of breastfeeding women and the composition of human milk showed that protein content in woman's milk correlated positively with the percentage of adipose tissue content and muscle mass expressed in kilograms. No correlation was revealed between the energy and nutritional value of the diet of breastfeeding women and the composition of produced milk.

Conclusions

We did not find correlations between the dietary habits of breastfeeding women and the composition of produced milk which suggests that the nutritional needs of the baby are satisfied

at first. Insufficient energy and nutritional value of the mother's diet did not translate directly into their deficiency in the milk. Protein content in woman's milk correlated positively with the percentage of adipose tissue and muscle mass (kg) in the mother's body. This confirms that the nutritional status of breastfeeding women determined by the body composition influences the nutritional value of the milk.

Key words: breastfeeding, nutrition, body composition, human milk composition