

# ABSTRACT

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Title of Doctoral Thesis: **Changes in nutrition, resting energy expenditure, and body composition of Czech women during pregnancy and lactation in relation to birth parameters and milk production**

**Introduction and objective:** During pregnancy, a woman's body undergoes many changes that support proper fetus development and prepare the mother's body for delivery as well as subsequent breast-feeding period. Monitoring of these changes, can detect a non-physiological course of pregnancy and thus prevent potential complications that disrupt fetus development, the delivery itself, lactation or newborn future life. This longitudinal study aimed to detect changes in maternal body composition, resting energy expenditure (REE) and nutritional intake during pregnancy and lactation and assess the relationship of these parameters with newborn characteristics (height, weight) and maternal milk production, which is not well known in women of the Czech population.

**Methods:** 92 healthy primiparous Czech women with a physiological pregnancy were included in the study. The examinations of women were performed in three pregnancy periods (G1 phase: 17th-27th gestational week, G2 phase: 28th-35th gestational week, G3 phase: 36th-38th gestational week), on the day of delivery, 24 hours after delivery and then four times during lactation (3 weeks and 3, 6, 9 months after delivery). The women's REE was measured by indirect calorimetry in all examinations except for examination on the day of delivery and 24-hour postpartum. REE was measured in the morning, after 12 hours of fasting. After that body composition of the mother was measured by using the bioimpedance spectroscopy method. Mentioned examinations were complemented by women's nutritional assessment (with the programme NutridDan) based on the analysis of 7-days nutritional records taken by women

before each examination. Milk samples were obtained after 6 hours of non-breast-feeding by breast pump until the breast was completely emptied.

**Results:** In the observed pregnancy periods, the median of women's weight gain was 13.5 kg with the contribution of body water (4.7 l), fat mass (2.3 kg) and fat-free mass (4.4 kg). The increase of mentioned components had a positive association with an increase in REE. REE in the second trimester and at the beginning of the third trimester was positively associated with the birth height of the newborn. The mentioned parameters of maternal body composition expressed in kg of woman's body weight were associated with the newborn weight per kg of woman's weight. 24 hours after delivery mother's weight decreased about 4.3 kg. Women's weight continued to decrease in the following period of lactation and nine months after delivery was about 0.6 kg lower than before conception. REE decreased significantly to three weeks postpartum. It's values seemed to be stable in the following phase of lactation. Although, nutritional intake didn't change significantly during pregnancy and lactation, the positive correlation of nutritional intake with NW/kg and maternal milk production expressed in kg of mother's weight (MV/kg) was observed. Milk production associated with a higher proportion of body water and maternal fat-free mass expressed in kg of her weight. On the other hand, higher fat mass per kg weight and higher women's BMI decreased MV/kg. The negative association of BMI was noticed just before the delivery.  $BMI > 25 \text{ kg/m}^2$  correlated with the lower MV/kg three weeks postpartum.

**Conclusions:** The study of Czech pregnant women showed a correlation between optimal nutritional intake, body composition and REE that were closely related to the parameters of the newborn. Moreover, maternal body composition and her nutritional intake were associated with maternal milk production. These findings not only contribute to the prosperity of mother and fetus but also can be used in clinical practice.