

## The Effects of Energy and Macronutrient Content of Human Milk on the Growth of Preterm Infants: A Prospective Cohort Pilot Study

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### ABSTRACT

**Objective:** To assess the effect of energy and macronutrient content of expressed breast milk on the growth of preterm infants.

**Design:** An observational prospective cohort pilot study.

**Setting:** At the NICUs following the three main hospitals in the Kingdom of Bahrain, Salmaniya Medical Complex (SMC), Bahrain Defence Force Royal Medical services (BDF), and King Hamad University Hospital (KHUH).

**Methods:** Expressed breast milk samples from 15 mothers of preterm infants were analyzed for protein, total lipids, and total carbohydrates using Bradford, Folch, and phenol-sulfuric acid methods respectively. The energy was calculated using the Atwater general factor system. Anthropometric measurements of 19 preterm infants were taken and growth rates were calculated.

**Results:** The mean energy content of the samples was  $72.77 \pm 12.86$  kcal/dL ( $21.83 \pm 3.86$  kcal/ounce) and mean macronutrient content was as follows: Protein ( $2.11 \pm 0.35$  g/dL), total lipids ( $3.63 \pm 1.49$  g/dL) and total carbohydrates ( $7.90 \pm 1.29$  g/dL). The protein to energy ratio was lower than the recommended ESPGHAN ratio. The energy content was positively correlated to total lipids. Total lipids were negatively correlated to gestational age and weight at birth. The protein content was significantly higher in milk samples from mothers who were vaginally delivered. The mean daily growth rates were found to be lower than the recommended growth rates. ESPGHAN recommended levels of protein and total carbohydrates combined with low total lipids levels yielded a better daily weight gain.

**Conclusion:** Most of the studied subjects failed to reach the recommended daily growth and head circumference increment rates. The growth rates were found to be affected by the macronutrients composition of breast milk.

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