

EARLY GUT MICROBIOTA DEVELOPMENT AND CATCH-UP WEIGHT GAIN IN FULL-TERM SMALL FOR GESTATIONAL AGE INFANTS IN THE FIRST YEAR OF LIFE

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Background: The gut microbiota undergoes dynamic changes during infancy, a period that coincides with intensive early growth and metabolic development.

Objective: This study aimed to assess gut microbiota colonization patterns in full-term small for gestational age (SGA) infants with catch-up weight gain during the first year of life.

Subjects and methods: The longitudinal cohort study included 19 full-term SGA infants and 46 full-term infants born appropriate for gestational age (AGA). Stool samples and body weight measurements were collected at several points throughout the first year of life. Gut microbiota composition was assessed using 16S rRNA gene sequencing. Microbial composition and diversity across developmental stages were evaluated using alpha diversity, beta diversity, and taxa abundance analyses. The relationship between the rate of weight gain and the pace of gut microbiota maturation was also examined.

Results: SGA infants demonstrated higher alpha diversity than AGA infants at most time points. In the SGA group, the Shannon index, reflecting gut microbiota maturation, was positively associated with the rate of body weight gain over time ($p=0.015$), whereas no such association was observed in AGA infants. Genera characteristic of SGA group included *Citrobacter*, *Staphylococcus*, *Blautia*, *Veillonella*, *Klebsiella* and *Clostridium* XIVa.

Conclusions: Overall, SGA infants exhibited a distinct gut microbiota profile with higher alpha diversity compared with AGA peers. In this group, a more mature microbiota was associated with faster weight gain and a greater abundance of short-chain fatty acid-producing and obesity-associated bacteria, suggesting that early microbial development may contribute to the risk of overweight and obesity later in life.

Keywords: Small for gestational age; Catch-up growth; Gut microbiota; Body mass.

Acknowledgement / Funding Source: Grant MINIATURA 4 (2020/04 /X /NZ7/00308) from the National Science Centre (NCN), Poland.