





Abstract

Maternal Dietary Intervention during Lactation Impacts the Maternal Faecal and Human Milk Microbiota[†]

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Abstract: Diet is a key factor that shapes the gut microbiome. Maternal diet has been proposed as a potential modulator of the human milk microbiome. However, the effect of diet during lactation on the maternal microbiota remains unclear. This study, therefore, set out to determine the effect of a two-week reduced fat and sugar and increased fibre maternal dietary intervention on the maternal faecal and milk microbiota. Faecal swabs and human milk samples were collected from mothers ($n = 11$) immediately pre-intervention, immediately post-intervention, and 4- and 8-weeks post-intervention, and were analysed using full-length 16S rRNA gene sequencing. The maternal macronutrient intake was assessed across one week prior to the intervention using 24 h dietary recall and during the intervention using FoodWorks 10 Software. The maternal fat and sugar intake significantly decreased from pre-intervention (fat: 120.9 ± 39.4 g; sugar: 114.1 ± 40.9 g) to the first (fat: 52.9 ± 4.3 g, $p < 0.001$; sugar: 83.2 ± 5.1 g, $p = 0.005$) and second week of the intervention (fat: 52.3 ± 6.2 g, $p < 0.001$; sugar: 82.7 ± 6.5 g, $p = 0.005$). The dietary fibre intake significantly increased from pre-intervention (28.8 ± 8.3 g) to the first week of the intervention (34.6 ± 2.8 g, $p = 0.012$) but was not different in the second week of the intervention compared to pre-intervention. Significant changes in the bacterial composition of maternal faeces were detected after the dietary intervention, with decreases in the relative abundance of *Bacteroides caccae* and increases in the relative abundance of *Faecalibacillus intestinalis*. In human milk, a significant increase in *Cutibacterium acnes* and a decrease in *Haemophilus parainfluenzae* were detected. Significant differences in maternal faecal and human milk bacterial composition were maintained 4 to 8 weeks after the intervention. This pilot study demonstrates that short-term changes in maternal diet during lactation can alter the maternal faecal and human milk microbiota.

Keywords: diet; human milk microbiome; maternal faecal microbiome

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data described in the manuscript are freely available without restriction at <https://www.ncbi.nlm.nih.gov/bioproject/PRJNA898341> accessed on 4 November 2022. All raw sequencing data have been deposited on NCBI's Sequence Read Archive (accession number: PRJNA898341).

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