

Chapter 11

Maternal Gut Microbiome- Role in Maternal and Fetal Mental Health

The maternal gut microbiome is a group of microorganisms living in a mother's gut during pregnancy and the postpartum period. It plays a crucial role in laying the foundation for fetal brain and infant mental health[1]. Recent studies are focusing on the association between the microbiome composition and maternal mental health [2].

11.1 Importance of Maternal Gut Microbiome

Maternal gut biome plays a crucial role in the following:

1. Maternal health: Gut biome influences the immune system development, metabolism, and overall well-being.
2. Fetal development: Maternal gut biome has an influence on the configuration of the fetal microbiome and potentially impacts fetal development and health.
3. Breastfeeding and infant health: Beneficial microbes are transmitted to the infant through breast milk.

11.2 Changes in gut biome during pregnancy and postpartum

Gut biome changes during pregnancy and postpartum. It is marked by the following key changes in the gut microbiome:

1. Marked abundance of certain bacteria (e.g., Bifidobacterium, Lactobacillus)
2. Decreased diversity and stability in early pregnancy
3. Alterations in the metabolic pathways and functions

Various factors influence the changes in the biome during pregnancy and postpartum:

1. Dietary and lifestyle factors like stress and physical activity variations.
2. Hormonal fluctuations like increased estrogen and progesterone levels

3. Changes in immune response to tolerate the fetus and avoid its rejection

4. Shifts in microbiome composition after delivery

11.4 Modulation of the gut microbiome

11.3 Role of maternal gut biome in maternal, fetal, and infant mental health

During pregnancy, various factors like stress, poor diet, antibiotics, or other medications alter the gut microbiota. The gut microbes modulate stress hormones (cortisol), produce neurotransmitters (serotonin and dopamine), and reduce inflammation. The altered maternal gut microbiome may affect mental health during pregnancy as well as the postpartum period, resulting in depression, anxiety, and other mood disorders. While the maternal gut biome affects maternal mental health, it also influences fetal neurodevelopment [3]. The maternal gut biome helps in fetal thalamocortical axonogenesis, possibly by transmitting signals of microbially modulated metabolites to the neurons in the developing brain of the embryo. Research has further shown that the alpha diversity in the fecal microbiota of pregnant mothers during the third trimester is associated with the internalizing pattern of emotional and psychosocial distress in the child at the age of two years [4].

Studies have reflected an association between the maternal gut microbiome and maternal and infant mental outcomes. These provide enough basis to emphasize that gut microbiome modulation poses an appealing target for disease prevention. This has resulted in an increasing number of pre- and *probiotic* interventions aimed at the prevention of various *pregnancy complications* and the optimization of mental and infant health outcomes.

Despite all research, many future longitudinal studies are needed to support the interventions further.

References:

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