Summary

The potential role of the intestinal microbiome (the community of bacteria existing in the gastrointestinal tract) during pregnancy has become of considerable interest.

The microbiota has been proposed to be playing a prominent role in this process. Pregnancy is also accompanied by immune changes that allow the foetus to survive and immune cells to constantly interact in the gut. All bacteria that live inside the body are known as the microbiome.

A variety of factors influence the composition of the intestinal microbiota, such as genetic factors of the host, comorbidities, antibiotic / prebiotic / probiotic use, eating habits, and pregnancy. The intestinal microbiome can modulate metabolic health and affect insulin resistance and lipid metabolism.

Dysbiosis, the altered composition of the microbiota, has been hypothesized to be playing a key role in the pathogenesis of many acute and chronic conditions, including metabolic diseases such as obesity, insulin resistance, and type 1 and type 2 diabetes (T2DM). A distinct aspect of the microbiota and the microbiome is present in gestational diabetes mellitus (GDM).

The host’s immune system can also contribute to the composition of the intestinal microbiota and therefore affect maternal hormones. Growing evidence suggests that the intestinal microbiota plays a role in the pathogenesis of the GDM. The impact of diet on the microbiota of patients with GDM was recently addressed by an observational study.

The aim of this study was to evaluate the relationships between the composition of the intestinal microbiome, the potential relationship between the placental microbiota and the GDM. These results suggest that manipulation of the composition of the intestinal microbiome may influence pregnancy metabolism.

Further studies are needed on this important topic.

Keywords:

gestational diabetes, microbiome, intestinal microbiota
Introduction

The potential role of the intestinal microbiome (the compound of bacteria existing in the gastrointestinal tract) in pregnancy has become of considerable interest.

The term intestinal microbiota refers to all microorganisms that colonize the human gastrointestinal tract. There is a growing interest in understanding how the microbiome and the human body interact.

The crucial role of the intestinal microbiota in modulating the insulin resistance and the inflammatory response in gestational diabetes mellitus (GDM) has been reported by several studies (1-4). Gestational diabetes is one of the most common obstetric complications, characterized by hyperglycaemia during pregnancy (5,6).

During normal pregnancy, the gut microbiota has been reported to remain relatively stable. Women with GDM have a modified placental microbiota compared to normoglycemic women (7).

A particularly alarming trend is that GDM has grown dramatically.

Only a few studies have evaluated the microbiota of patients with GDM, showing contrasting results: whether there are no differences, or decreased placental abundance of Pseudomonadales and Acinetobacter or increased placental proteobacteria and reduced placental Bacteroidetes and Firmicutes compared to normoglycemic mothers (8-13), (Fig.1).

The placental microbiota could be related to GDM. Variations in the placental microbiota could be associated with pregnancy disorders. Overweight and obese women have a higher risk of GDM (14,15), (Fig.2).

Fig. 1 Dysbiosis and gestational diabetes (11)
The emergence of molecular methods for the identification and characterization of the microbiome has led researchers to understand the role of the microbiota in different clinical conditions. The growing prevalence of maternal obesity and its subsequent health outcomes is a major public health issue and a major challenge for obstetric practice.

Gestational diabetes, the main endocrine pathology in pregnancy, has been associated with the development of an intense inflammatory process and increased insulin resistance.

Gestational diabetes, one of the most common complications in pregnancy, is associated with a moderately increased risk of maternal and perinatal complications.

In general, there is a growing awareness that the microbiome - which is essentially the bacteria that live in the human body - can play a role in the development of many diseases that occur in humans.

The potential role of the intestinal microbiome (the community of bacteria existing in the gastrointestinal tract) in pregnancy has become of considerable interest.

During pregnancy, about 5-8% of women develop gestational diabetes, which often resolves after birth, but is associated with an increased risk of subsequent T2DM.

Imbalances in the composition of intestinal microbiota are related to a number of metabolic disorders. Not all bacteria that live inside the body are beneficial. When endotoxin levels...
in the body increase during an infection, they cause the immune system to respond, with some producing a harmful substance known as endotoxin.

Some species of intestinal bacteria can contribute to obesity and T2DM. The intestinal microbiome can modulate metabolic health and affect insulin resistance and lipid metabolism.

Metabolic hormone levels as well as microbiome profiles differ in overweight and obese women.

Bacteria living in the digestive tract have been linked to obesity and inflammation, both of which contribute to the production of T2DM.

The interaction between the microbiome and the body’s immune system could be a factor in triggering T2GDM. Gestational diabetes and obesity during pregnancy can affect the maternal microbiome and bacteria that mothers transmit to their children during birth and breastfeeding, contributing to obesity in offspring later in life.

In contrast, patients with GDM had a specific composition of the vaginal and intestinal microbiome, which was less diverse than those found in the control group, with genes related to dysbiosis.

There is a relationship between the composition of the intestinal microbiome and the metabolic hormonal environment in early pregnancy. There is a change in the composition of the microbiota in the second to the third trimester of pregnancy, with greater diversity, increased Firmicutes ratio and reduced Bacteroidetes and actinobacteria.

Medical nutritional therapy is the first line approach in the management of GDM. Diet is also a potent modulator of the intestinal microbiota, the impact of which on insulin resistance and inflammatory response of the host are well known (19).

In most cases, diet alone is enough to control blood sugar levels, however, up to half of women fail to get good metabolic control and require treatment with insulin or hypoglycaemic drugs (20-23).

Manipulation of the composition of the intestinal microbiome can influence the metabolism in pregnancy.

It is known that the diet is able to change the composition of the microbiota quickly, in a few days.

Diet is one of the most important factors that modulate the intestinal microbiota. Food influences the composition of the microbiota through direct and indirect mechanisms. Unlocking the secrets of the microbiome could help cure gestational diabetes.

Therefore, the intestinal microbiota may contribute to gestational metabolic changes through different mechanisms, although further studies are needed on this topic.

Gestational diabetes has significant implications for the future health of the mother and child.

Until recently, it was widely accepted that the placenta is “sterile”, essential for the protection of the foetus from infections (24). However, growing evidence indicates that microbes exist in normal placenta.

However, the relationship between the placental microbiota and the GDM is insufficiently understood.
Conclusions

Gestational diabetes is associated with changes in the placental microbiota and microbiome. A distinct profile of the placental microbiota exists in gestational diabetes.

The intestinal microbiota can be considered a large virtual endocrine-metabolic organ, controlling many human physiological pathways.

A distinct microbiota and microbiome profile exists in the GDM. The human intestinal microbiome may play an important role in the aetiology of the GDM.

Changes in the composition of the vaginal and intestinal microbiome could be involved in the development of the GDM.

Our results showed a change in the composition of the microbiota from the second trimester to the third trimester of pregnancy.

The results indicate that the placental microbiota is a new target for the GDM therapy.

When considering the diet as a modulation factor of the microbiome, the general diet cannot be applied to all patients since the microbiome is unique to each patient, and this is why a personalized diet is needed based on the observations of each case.

Conflict of interest

The author does not report any conflict of interest.

References

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