



The relationship between birth routes and the development of the microbiota in the newborn

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Introduction

Over time the view of the time of childbirth has changed. In ancient times childbirth was seen as something intimate and familiar, but in the Renaissance people changed their way of seeking knowledge, so practices and techniques began to be more used, increasing hospitalization. From this, the woman becomes only a supporting factor, losing her individuality and autonomy in the birth process [1]. Nowadays, there are still divergent thoughts among pregnant women about the best type of delivery. Some highlight the importance of their role and the active participation of the child during natural childbirth, in addition to the postpartum benefits for mother and baby, such as better recovery, the ease and speed of this route and the fact that it is more comfortable. In the long term, vaginal delivery has advantages still studied in terms of immunity, maternal-fetal bonding, breastfeeding and child development [1].

On the other hand, women who have a preference for cesarean delivery emphasize the benefits of better organization of family life, analgesia during delivery, and transfer of responsibility for their health to the doctor for convenience and comfort. Family and cultural influences still play a major role in this decision through the transfer of past experiences [2]. In April 2015, the WHO declared an epidemic of cesarean sections in Brazil, which reached the level of 2.7 million births in 2017, 41.9% of which were cesarean sections, exceeding by 26.9% the recommended by the WHO [3]. Concomitant to the increase in this procedure, a significant increase in immunological disorders has been reported, which can result in chronic diseases such as type 1 diabetes, Crohn's disease, rheumatoid arthritis, and multiple sclerosis [4].

The human body has cells as a defense system that may be influenced by several factors such as maternal genetics, intra and extrauterine exposure and the type of delivery [5]. There are two divergent theories regarding the formation of the human microbiota, the first being that neonatal colonization starts still in the intrauterine life through the microbiota of the placenta and amniotic fluid, and the second that the baby is born sterile and colonization starts at birth [4,6,7]. Thus, the microbiota of the baby will be modulated depending on which microorganisms he/she comes into contact with at birth, thus, those born by cesarean delivery present prevalence of maternal skin colonization, while those born by normal delivery present prevalence of vaginal colonization [4,5]. Based on the aforementioned reasoning, we seek to understand the relationship of birth routes in the formation of the microbiota to prevent possible diseases, consequently influencing the quality of life of the population.

Thus, this study aimed to analyze the relationship between birth routes and the development of intestinal microbiota in the neonate.

Methods

This is a systematic literature review based on the following scientific questions: 1 - Is there a relationship between birth routes and the formation of the neonatal microbiota? 2 - How does the birth route interfere in this structure? 3 - What are the benefits of cesarean or vaginal delivery for the optimal formation of intestinal microbiota? The articles selected for the study had to meet the following eligibility criteria: (1) be published in a national and international journal; (2) in the period from 2016 to 2021; (3) and be available free of charge in full. Articles that did not answer the scientific

questions proposed by the study were excluded. A literature search was conducted in the electronic databases BVS/LILACS, Scielo and PubMed in the period August 2021. The search strategy included the following terms: "Fetal Gut Microbiota", "Intestinal Microbiota", "Type of Birth", "Mode of Delivery" and "Immunity". In a first step for the selection of studies, duplicates were removed and the research team screened the titles. Then, the abstracts of eligible studies were selected to perform the full-text screening. The selected articles underwent peer review and disagreements between evaluators were analyzed by the study supervisor.

After screening the full texts, the research team members extracted the data from the included studies using a data extraction form, which included information on study characteristics (title, year and country of publication), methods (study design) and scientific questions were answered through the content of the articles.

Results and Discussion

A total of $n = 298$ articles were found, and those that met the inclusion criteria were found $n = 14$ in total. The other 271 publications were not used because they did not meet the eligibility criteria. The consensus among authors is that the type of delivery influences the composition and formation of the microbiota of newborns. The type of delivery represents the route that will be taken by the baby.

The vaginal route offers the newborn contact with the maternal microbiota present in the vaginal mucosa, which is a determining factor for the colonization of the gastrointestinal microbiota of the newborn, which will remain different from those of neonates born by cesarean section until 7 years of age. In addition, those born by natural delivery have a defense system working differently, producing more cytokines. Newborns born by cesarean section are not exposed to the mother's vaginal and fecal microbiota, however, as reported in the studies above, the non-sterility of the placenta and uterus will provide some colonization of gastrointestinal microbiota in uterine life even if reduced compared to those born by vaginal delivery [8].

Neonates born vaginally have a higher prevalence of Bacteroides, Bifidobacterium, Bacteroidales, Enterobacteriales, Bacilli and Lactobacillus in the composition of the microbiota and an increasing diversity of microorganisms during the weeks after birth. In contrast, those born by cesarean delivery present a microbiota with reduced variability, mainly consisting of Staphylococcus, Streptococcus and Clostridium, Bacillales, Lactobacillales. Thus, it can be confirmed that babies born vaginally acquired the bacteria from the

vaginal tract, forming their intestinal microbiota, while babies born by cesarean delivery acquired these bacteria by contact with the skin, nasal cavity, oral cavity and urethra or by the hospital environment [3,9,10-12].

The microbiota is important in modulating immune responses and in maturing the immune system. Therefore, its lack or alteration may interfere in the individual's defense, with the possibility of deregulating T cells, responsible for immunological tolerance and thus causing allergic problems or autoimmune diseases [3,13]. Furthermore, the ideal development of this microbiota prevents the manifestation of chronic diseases. It also promotes resistance to colonization, establishing an environment of competition with pathogenic organisms, not allowing their development.

Conclusion

This review denotes the existence of divergences on the issues studied, but what is agreed among the authors is that the routes of delivery influenced the formation of the microbiota of the neonate, and consequently will lead to pathological manifestations such as chronic, autoimmune and allergic diseases. Some authors suggest performing nebulization procedures with vaginal microbes in newborns born via cesarean delivery, seeking to resemble their microbiota to neonates born from normal delivery. However, the technique is still undergoing studies to prove its efficacy.

Keywords: Fetal Gut Microbiota. Intestinal Microbiota. Type of Birth. Mode of Delivery and Immunity.

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Data sharing statement

No additional data are available.

Conflict of interest

The authors declare no conflict of interest.

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