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It Matters, How Your Mother was Born?

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Review Article

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Abstract

The first scientific evidence that microorganisms are part of the normal human system emerged in the mid-1880s but not much importance was attached to it. Human are dependent on these bacteria for digestion, to produce certain vitamins, regulate the immune system, and fight with disease-causing bacteria. Babies born by c-section lacked strains of commensal bacteria those typically found in healthy individuals whereas these bacteria made up most of the gut community of vaginally delivered infants. Epidemiological studies have suggested that children born by c-section have an increased risk of asthma and obesity later in life. The increase on the global rates of c-section births is a cause of concerned since at least in Caenorhabditis elegans these characters pass on epigenetically more than 10 generation. If this is so in human population, whole world population will suffer with such ailments.

Keywords: Microorganisms; C-Section; Epigenetic Factor; Microbiota; DNA; Vaginal Delivery

Abbreviations: H_2S: Hydrogen Sulphide; GABA: Gamma-Aminobutyric Acid; WHO: World Health Organization.

Introduction

As soon as a woman gives birth to a child she becomes the mother, however, she existed before as women but not the mother. A mother is something absolutely new. Women experience a flood of hormones during pregnancy, childbirth, and breast-feeding that primes the brain for dramatic change in regions thought to make up the maternal circuit [1]. Mother-Child interaction to begin with very crucial, in the first few months, a mother's interaction with her infant serves as further stimulus to link her brain quite tangibly to her baby's. What a baby looks like and how it will act are, to a certain extent, determined by the genes the child inherits from it parents. But children's environments also play a role in which they will ultimately become, and that environment starts in the womb [2]. Earlier we have shown that mother's diet (epigenetic factor) during her pregnancy months have lot of influence not only on the development of fetus but even wellbeing in later years [3,4].

Two Modes of Deliveries

Babies can enter this world in one of two ways; pregnant women can have either a vaginal birth which more natural like a woman may feel as if she is giving birth the way nature intended them to [5,6], a surgical delivery by caesarean section, but the ultimate goal of both delivery methods is to safely give birth to a healthy baby. In some cases, c-sections are planned for medical reasons that make a vaginal birth too risky. One can inherit some physical quality that caused her mother had reasons to undergo c-section, like a small or unusually shaped pelvis; there's absolutely no reason to believe that her c-section increases chance of daughter also needs one. Unless, the daughter inherited from mother some physical quality that caused the mother to need to deliver via c-section, like a small or unusually shaped pelvis. There is emerging evidence that babies born by caesarean section are more likely to develop metabolic and chronic disorders, compared to those born by vaginal delivery [6,7]. Several of these chronic conditions have been associated with deviations in the colonization of the gut microbiota, with observed decreases in overall bacterial diversity and lack (or delayed colonization) of protective bacterial taxa among

individuals born by c-section.

While babies born by c-section delivery do not transit through the environment of the mothers' vaginal bacteria, they still acquire human microbes shortly after birth, possibly through contact with the operating room environment [8,9] as well as through breastfeeding, diaper changes, and other close contact. After infancy, the vaginal microbiota undergoes significant transitions. In early childhood, girls tend to be colonized by stable aerobic, anaerobic, and enteric bacteria. Important findings by Hickey, et al. suggest that the vaginal microbiota of girls begins to resemble those of adults (typically dominated by Lactobacillus spp) before menarche, while girls are still in the early and middle stages of puberty [10,11]. It is thought that the composition and function of the vaginal microbiota change in puberty due to increased estrogen production [12]. Studies are needed to confirm the hypothesis that any effect of birth mode on the vaginal microbiota persists through infancy and puberty to adulthood.

Physiological Changes Due to Microbiota

Just like the endocrine system synthesizes and secrete hormones to regulate physiological processes the gut microbiota is also acts like endocrine organ. Metabolomic and metagenomic studies have revealed bacterial metabolites and components that affect organ function and subsequently, physiological outcomes. Bacterial- derived metabolites and components may act locally with the host, activating cell receptors or neural terminations, as well as distally through circulatory dissemination the probiotic B. Infant is reduced serotonin breakdown in the brain Gupta PD [13] suggesting that this probiotic species possesses antidepressant properties. Other neurotransmitters produced by the microbiota include gamma-aminobutyric acid (GABA), and catecholamines [14], such as norepinephrine and dopamine, all of which are key modulators of the neuroendocrine system. The microbiota may also release gases which act as neurotransmitters. These include nitric oxide [15] and hydrogen sulphide (H_2S).

Vaginal Delivery v/s Caesarean Section

A vaginal birth is generally the preferred method of delivery; women say that giving birth vaginally feels like more of a natural experience. Some advantages for a baby who is delivered vaginally are that a mother will have more early contact with her newborn than a woman who has undergone surgery, and she can initiate breast feeding sooner. During a vaginal delivery, muscles involved in the process are more likely to squeeze out fluid found in a newborn's lungs, which is beneficial because it makes babies less likely to suffer breathing problems at birth [5,13]. Babies born vaginally also receive an early dose of good bacteria as they travel through their mother's birth canal, which may boost their immune systems and protect their intestinal tracts [16].

The increase on the global rates of c-section remains a continuing public health concern [17,18]. The World Health Organization (WHO) stated that priority should remain the provision of CS to all women in need, rather than the achievement of an ideal level [19]. There are complex reasons behind the significant increase in CS [20] believed in principle to correlate with higher risk profiles of pregnant women and their babies [21]. However, Betran, et al. [18] suggested that it responds to a multifactorial phenomenon including healthcare organizations as well as financial aspects among others [22].

Microbiota as Epigenetic Factor

Recently it was realized that genes haven't a fixed, predetermined program, they are also regulated by epigenetic factors; among those macrobiotics consider as an important candidate [23]. A woman's vaginal microbiota in adulthood is associated with her mode of birth history. Recent studies suggest that birth mode (Cesarean section or vaginal delivery) is an important event in the initial colonization of the human microbiota and may be associated with long-term health outcomes [16,24,25]. As mentioned above the C-section baby suffer with many disorders even in their adult life and when they get pregnant they suffer with many pregnancy complications and their offspring also suffer to some extent if not more at least to same extent as their mothers suffered. These studies override the classic genetics [23-26]. Women will explain that they have the same size pelvis as their mother, "assuming that this means a vaginal delivery is out of the question," but they really don't know that," she says. Besides, other factors come into play that determines whether a caesarean is necessary, like the baby's position in the uterus [22].

Ancestral Legacy Effects

Environmental change can critically affect the lifestyle [27], reproductive success, and life span of adult animals (including human beings) and their generations. Klosin, et al. [28] Showed that in the nematode worm Caenorhabditis elegans, exposure to high temperatures led to expression of endogenously repressed copies of genes. This effect persisted for>10 generations of worms. The changes in chromatin occurred in the early embryo before the onset of transcription and were inherited through eggs and sperm. Inheritance is primarily in cis with the locus, occurs through both oocytes and sperm, and is associated with altered trimethylation of histone H3 lysine 9 (H3K9me3) before the onset of zygotic transcription. Expression profiling reveals that temperature-

induced expression from endogenous repressed repeats can also be inherited for multiple generations. Long-lasting epigenetic memory of environmental change is therefore possible in this animal.

Mother's Mode of Birth can Influence Offspring's Pregnancy

The human microbiota plays a role in maintaining maternal child health outcomes. However, factors related to the labour and birth environment have been shown to influence the initial colonization process of the newborn microbiota [29]. Studies have shown that there are distinct differences in the microbiota profiles of newborns born vaginally compared to those born by caesarean [30]. The birth process influences a first major microbial colonization and therefore, it is essential that labour and birth nurses be aware of factors that may alter the composition of the microbiota during the labour.

In light of recent discoveries, epigenetic mechanisms such as alteration of DNA methylation, chromatin modifications and modulation of gene expression during gestation [31] are believed to possibly account for various types of plasticity such as neural tube defects, autism spectrum disorder, congenital heart defects, oral clefts, allergies and cancer a growing catalogue of genetic associations that will provide insight into the contribution of host genotype to gut micro biome. Despite this, the uncertain origin of association signals will likely complicate future work looking to dissect function or use associations for causal inference analysis [32]. The gut microbiota composition affects the expression of genes in their hosts. Microbiota is a key player in health outcomes due to the potential myriad of metabolites that can produce and interact with cells of the body through systemic circulation. A disruption in the composition of the gut microbiota may lead to unbalanced key metabolites that sequentially may impact epigenetic pathways and alter gene expression [33]. Rapidly growing evidences link maternal lifestyle and prenatal factors with serious health consequences and diseases later in life [34-36].

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