

Microbial DNA signatures in Breast Milk: Boon for Child's Health

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Abstract:

Breast milk (BM) is a "perfect and complete food," for a new born baby. It differs qualitatively, quantitatively and the stage of feeding. The microbiota in mother's milk confirmed by DNA signatures contributes to the colonization of the intestinal bacterial population of the newborn. Breast milk proves to be a source of potential probiotics to maintain infant health since, it contains nutritional components, antioxidants, enzymes, immune factors or principles, live antibodies from the mother, immunomodulatory molecules including immunoglobulins and antimicrobial peptides. Breast feeding also helps to provide long-term benefits for the child as well as for the mother to come out of the stress. Healthy mother and a child reduce social and behavioural problems as well.

Keywords: p breast feeding; microbiota; natural immunity; long term benefit

Introduction:

Breast milk (BM) is a "perfect and complete food,". It is really much more than that. In a unique way, BM is "alive!". Unlike other food and processed beverages, BM contains no "added" ingredients. In addition to major components it has components in minute quantities that are not yet identified. Qualitatively the levels of proteins, fats, sugars, hormones and other constituents vary. Though BM doesn't just differ from mother to mother, it can also differ when the same mother nurses different babies, and across the span of an infant's development. BM is always clean and at the right temperature (1).

In contrast to the earlier concept that mother's milk is sterile, truly speaking, BM is not sterile since, it contains as many as 600 different species of various bacteria which were identified by microbial DNA signatures (2). BM is a natural source of lactic acid bacteria and considered as a symbiotic food for the babies. The normal concentration of bacteria in BM from healthy women was about 10³ colony-forming units (CFU) per milliliter including beneficial bacteria such as, *Bifidobacterium breve*. In fact, it is very important, as it contributes to normal colonization of the intestinal bacterial population of the newborn. The other evidence for the presence of microbiota in mother's milk is matching of DNA signatures in mother's milk and infant's faeces (3).

Bacterial Composition and contribution:

BM was initially considered as a sterile fluid and microbes isolated were considered as contaminants, but it is widely accepted that BM is a home to its own unique microbiome. The origin of bacteria in BM has been a subject to much debate, however, the possibility of an entero-mammary pathway allowing the transfer of microbes from the maternal gut to the mammary gland is one potential pathway. Human milk derived strains can be regarded as potential probiotics; therefore, many studies have focused on isolating strains from mother's milk for subsequent use in infant health and nutrition markets (4).

The microbiome of the often thought of as harmful, but can be harmless or even beneficial to the infant (5). Though, human BM contains many known antimicrobial and immunomodulatory molecules, including immunoglobulins, antimicrobial



peptides, and fatty acids; the low concentration present not enough to fight with atmospheric or "outside" bacteria when come into contact with BM .

Although BM has low overall biomass, milk microbes play an important role in seeding the infant gut. BM bacteria were largely comprised of *Staphylococcus*, *Streptococcus*, *Acinetobacter*, and *Enterobacter* primarily derived from maternal areolar skin and infant oral sites in the breast (feeding pairs) (6).

Breast milk and immunity:

BM provides babies with abundant and easily absorbed nutritional components, antioxidants, enzymes, immune factors or principles, and live antibodies from the mother. BF (breast fed) babies take advantage of mother's more mature immune system which can easily make antibodies to the germs to which she and her baby have been exposed. These antibodies enter mother's milk to help protect BF baby from illness. Ig A coats the lining of the baby's immature intestines helping germs and allergens from leaking through. Thus BF baby is protected from disease like allergies, eczema, asthma, childhood cancers, diabetes, etc. because of well developed functional immunity. BM also contains substances that naturally soothe an infant's intestine.

When BF babies become teens and adults they were observed to be benefited and less prone to rheumatoid arthritis, and lupus, heart disease in adulthood, multiple sclerosis, pre- and postmenopausal breast cancers.

Surprisingly it is it's not only BF babies are benefited, even moms physically returns to normalcy very fast, for example, lose weight, contraction of uterus, postpartum bleeding, urinary tract infections and postpartum depression.

Breastfeeding produces the naturally soothing hormones oxytocin and prolactin that promote stress reduction and positive feelings in the nursing mother in addition to increasing confidence and self-esteem and calmness. Breastfed babies cry less overall, and have fewer incidences of childhood illness probably due to high immunity. Breastfeeding promotes more skin-to-skin contact, more holding and stroking as well as can support the wellness of body, mind, and spirit for the whole family. Many feel that affectionate bonding during the first years of life helps reduce social and behavioural problems in both children and adults. It makes travel easier.

The long-term benefits for the child (and the mother) even after weaning is very essential to modify the infant gut microbiome by BM microbes and bioactive components, which provide a potential areas for research and novel therapies in preterm and other high-risk infants (7).

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