

## EDITORIAL

**Deteriorating human microbiome – An emerging global health challenge****Rahul Bansal**

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E Mail ID: [rbansal13579@gmail.com](mailto:rbansal13579@gmail.com)**Citation**Bansal R. Deteriorating human microbiome – An emerging global health challenge. Indian J Comm Health. 2021;33(3):417-418. <https://doi.org/10.47203/IJCH.2021.v33i03.001>**Source of Funding:** Nil **Conflict of Interest:** None declared**Article Cycle****Received:** 15/09/2021; **Revision:** 22/09/2021; **Accepted:** 26/09/2021; **Published:** 30/09/2021This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

The study of human microbiome and its relationship with health and disease is one of the most exciting areas of research in health all over the world, especially after the failure of human genome project to deliver its expected results.

Our body is composed of 30 trillion human cells. But it is host to close to 100 trillion bacterial and fungal cells. 70 – 90% of all cells in our body are non-human. They reside on every inch of our skin, in our nose, mouth, ears, in our oesophagus, stomach and most abundantly in our gut. They are not a random phenomenon but have co-evolved with us humans over millions of years. Collectively these bacteria weigh about 3 pounds. The more we read about research on microbiome or microbiota, the name given to all these friendly symbiotic partners, the more we get interested in their role in health and disease.

According to Martin J. Blaser, director of the Human Microbiome Program, who has also served as the president of Infectious Disease Society of America, in his best seller '**Missing Microbes**' (1), "It is our microbiome that keeps us healthy and parts of it are disappearing. The reason for this disaster is all around us – overuse of antibiotics in humans and animals, caesarean sections and widespread use of sanitizers and antiseptics, to name just a few."

From a well written article – '**Role of Gut Microbiota in Gut Nutrition and Health**' (2) by Ana M Valdes and colleagues following are the key messages about the microbiome:-

- Gut microbiota influences many areas of human health, from innate immunity to appetite and energy metabolism.
- Targeting the gut microbiome with prebiotic or dietary fibre benefits human health and could potentially reduce obesity.
- Drugs, food ingredients, antibiotics and pesticides could all have adverse effects on the gut microbiota.
- Microbiota should be considered a key aspect in nutrition, the medical community should adapt their education and

public health messages accordingly.

- Fibre consumption is associated with beneficial effects in several contexts.

The above message looks very simple but there are a lot of conflicting issues when we think of recovering the lost diversity of human microbiome, for instance antibiotics definitely save lives but in their recently published book '**Let Them Eat Dirt**' (3) B. Brett Finlay and Marie – Claire Arrieta have compared using broad spectrum antibiotics with carpet bombing the microbiota. The excessive and often unscientific use of antibiotics in paediatric and other age groups has been highlighted in many books- '**Missing Microbes**'; '**Let Them Eat Dirt**'; '**Gut- The inside story of our body's most underrated organ**' and different articles (1,3,4,5,6).

So, the million-dollar question is when to use and when not to use antibiotics? Moreover, another big public health disaster related to this issue is the slowly growing worldwide phenomenon of multidrug resistant bacteria. Even far bigger an issue is the use of antibiotics in small doses to fatten the farm animals. Martin J. Blaser (1) has clearly highlighted this practice by the meat industry. These antibiotics enter our food chain and are grossly affecting our microbiome's diversity leading to both short and long term health consequences.

The third controversial issue regarding human microbiome is the use and overuse of Caesarean section for delivery of human child. Over the years a growing trend of Caesarean sections has been noted worldwide. According to an article in Science Daily (7) Caesarean section use has almost doubled globally since 2008. When a child is not delivered naturally he/ she loses the golden opportunity to kick start his microbiome through exposure to secretions of mother's birth canal and faecal matter.

The fourth contentious issue in post COVID era is the use and overuse of sanitizers and other antimicrobial products. Already there are concerns that the overuse of antimicrobial agents through hygiene products may lead to changes in microbiome pattern among human beings globally. (8)

We are already aware about the debate going on over the 'hygiene hypothesis' which in simple terms says too much of cleanliness in early childhood, which is quite common these days in urban India and the western world may compromise the proper diversification of microbiome leading to dire long term consequences such as diabetes type 1 (9), obesity, Bronchial Asthma and other auto immune diseases.(3,10) Interestingly there are well written review articles and books showing a two way pathway between the gut microbiome and mental well being. As given in a review article in *Gastroenterology* (11) there appears to be a closer relationship between intestinal microbiota and the central nervous system in normal gastrointestinal function and diseases. Diseases like depression and anxiety are being linked with health of microbiome.

In a mini review article the '**Human Microbiome and Cancer**' the authors Seesandra V. Rajagopala et. al (12). have highlighted the role of human microbiome in cancer as the resident microbiota plays an essential role in activating and modulating the host immune response. Immunological dysregulation is likely to provide mechanistic explanation as to how our microbiome affects cancer development and cancer therapies.

Also, there are studies showing the relationship between gut microbiome and coronary artery disease and heart failure. (13) Martin J. Blaser compares this man-made destruction of our 'micro ecology' (partial destruction of microbiome) with the transformation of the 'macro ecology' of our planet through global warming and other environmental catastrophes. He even goes on to say that the ill effects of the former may be equally disastrous and on a shorter time frame.

What are the solutions? They are simple but need collective and focused action by the mankind with the same urgency as is being shown about climate change.

#### To name a few obvious solutions

- Strictly restrict the use of antibiotics and accompany every broad spectrum antibiotic course with probiotics among human beings – an issue which looks simple but needs a lot of hard work in training doctors, the public and owners of medical stores.
- Ban the use of low dose antibiotics among farm grown animals – which has already been done in many European countries.
- Caesarean section should be done only as a life saving measure for the mother and child and no other reason. This again needs training of doctors and sensitization of would be mothers.
- The children from early age should be allowed to mix freely with their family and friends and breastfeeding should be the only choice in early childhood as there is enough evidence to link healthy microbiome in breastfed babies compared to the bottle fed babies. (14)

- Over sanitizing the child's world should be avoided – though cleanliness is definitely the need for the growing child.
- The foods which harm the microbiome should be avoided such as tobacco, alcohol, fast foods, artificial sweeteners, and foods containing insecticides and pesticides.
- The foods which help the healthy microbiome to flourish (prebiotics) should be encouraged from early childhood such as – fresh fruits and vegetables, whole grains, other natural foods with high fibre content and fermented foods like curd, buttermilk, etc.  
We know enough about the role of microbiome and human health and also its strong link with our health and well being. It is up to us to act now or face the consequences at individual and collective levels.(15)

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