

Letter to the Editor

Gut microbiota: changing the disease architecture

Sir,

Gut microflora comprising of trillions of various bacteria, protozoan, virus and fungi who live as a super-complex ecosystem in human body mostly (around 70%) in gastrointestinal tract. In habitating skin, mouth, intestine and sexual organs they live as symbiotic, commensal or pathogenic organism in the human body. These gut microflora interplay with bodily metabolic, immune, endocrinal and nervous system which leads to various pathophysiological mechanism for the causation of related disorders. This altered 'Brain gut axis' is responsible for disorders like anxiety, depression, autism, schizoaffective or bipolar disorder and also diseases like Parkinson's disease and multiple sclerosis.¹

Stress along with injudicious use of antimicrobial influences these microflorae and contribute to stress related mechanism. These mechanisms operate either through dysbiosis (imbalance between beneficial lactobacilli and Bifidobacterium and colonization of harmful bacteria) or affecting hypothalamic pituitary adrenal (HPA) axis. The stimulation of HPA axis via stress leads to release of glucocorticoids from hypothalamus and release of adrenaline and non-adrenalin through autonomic nervous system. These products of neuroendocrine system binds to the immunocyte receptors and result in dysregulation of cell mediated immunity.²

The neuroactive substances of bacterial products like GABA or histamine further stimulates the peripheral nervous system. Over all the central nervous system alters the gut permeability and motility via neuroendocrinal and auto immune pathways thus modulating the composition of gut microflora.³

Neuropsychiatric disorders related with gut microflora predominantly present as anxiety and depression. High serum serotonin level and expression of c-fos protein in various brain nuclei (especially amygdala and hypothalamus) affects the brain gut axis supporting the basic concept that antianxiety or antidepressant drugs works better with dietary modification. The altered gut population of Bacteroides and Acinetobacter and their liberated toxins decreases the neurotransmitters like 5HT and brain derived neurotrophic factors which clinically manifest as depression.⁴ Plant aloe-vera and probiotic Bifidobacterium produces their therapeutic beneficial effect on stress by changing the neurotransmitter, growth factor and neuromodulators in these psychiatric disorders.

Autism of childhood is related to genetic, environmental factors, stress and altered microflora associated with significant colonisation of clostridium tetani, clostridium sporogens and desulfovibrio species. These bacteria produce metabolites which lead to mitochondrial dysfunction and energy failure thus affecting brain gut axis. The use hyperbaric oxygen therapy (HBOT) to reduce the mitochondrial related oxidative stress, ultimately improves the behavioral problems due to improvement of gut functioning.⁵ Similarly elimination of neurotoxins by vancomycin produces transient but substantial improvement in autistic behavior.

Gut microflora are helpful to induce myelination of prefrontal cortex so their therapeutic institution may help in remyelination. In remitting and relapsing multiple sclerosis (RRMS) several gut micro flora like Bacteroidetes and adlercreutzia are found less in these patients as compared to normal population. These microflora by altering the metabolism of bile acids and phytoestrogens evoke an intense inflammatory response accounting for autoimmune etiology of RRMS.⁶ Various clinical symptoms of established Parkinson's disease (PD) like gait difficulty, postural instability, tremors and motor impairments are attributed to reduce number of prevotellaceae bacteria and abundance of enterobacteria. The gastroparesis in PD may predispose to small intestinal bacterial overgrowth (SIBO) which intern alters the Levodopa absorption, damage to intestinal mucosal barrier leading to stimulation of immune system and further deterioration of neuronal functioning.⁷ Association of H. Pylori in patients of PD is responsible for detrimental motor functioning due to intense antral muscle relaxation because of reduced acetylcholine release.

The optimal composition of gut microflora can be achieved by a balanced diet commonly known as Mediterranean diet comprising of cereals, legumes, vegetables, fruit, fish, meat and olive oil.⁸ By restoring intestinal permeability and reducing endotoxemia, the deleterious effects on gut brain axis can be minimized. Thus, a healthy life style based on a healthy diet is probably the cheapest and the best way to treat and prevent various disorders linked with disturbance of gut microflora.

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