

Exploring the Role of Probiotics in Psychiatric Disorder

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Abstract

The enteric system has been termed as the "Second brain". The gut-brain axis (GBA) consists of bidirectional communication between the central and the enteric nervous system, linking emotional and cognitive centers of the brain with peripheral intestinal functions. There is growing evidence of the fact that gut microbiota has a powerful influence on gut - brain axis and as the potential therapeutic target for many psychological disorders. Pre- and probiotics have been used to modulate the gut microbiota. Probiotics are defined as "live microorganisms when administered inadequate amounts; confer a health benefit on the host. The genus *Lactobacillus* and *bifidobacterium* belong to the normal mucosal microbiota of humans and animals. The purpose of this review is to examine data from recent interventional studies focusing on probiotics and the gut-brain axis for the treatment of depression, anxiety and schizophrenia.

Keywords: Gut microbiota, probiotics, gut – brain axis, second brain, psychiatric disorder.

1. Introduction

Mental disorders are alarming as many people are being diagnosed every year. WHO estimates that the burden of mental health problems in India is 2443 disability-adjusted life years (DALYs) per 100 000 populations; the age-adjusted suicide rate per 100 000 populations is 21.1[1]. The economic loss due to mental health conditions, between 2012 -2030, is estimated at USD 1.03 trillion. Mainly probiotics plays the major role in the Autism Spectral Disorder (ASD). ASD is a highly prevalent neurodevelopmental disorder that affects normal brain development and is characterized by poor communication skills, poor reasoning, and repetitive and obstructive behavioral patterns[2]. The enteric system has been termed as the "Second brain". The gut-brain axis (GBA) consists of bidirectional communication between the central and the enteric nervous system, linking emotional and cognitive centres of the brain with peripheral intestinal functions[3]. There is growing evidence of the fact that gut microbiota has a powerful influence on gut - brain axis and as the potential therapeutic target for many psychological disorders[4]. Pre- and probiotics have been used to modulate the gut microbiota.

Probiotics are defined as microorganisms that have a beneficial effect on the host intestinal microbial balance. According to WHO, probiotics are live microorganisms which when administered in adequate amounts confer a health benefit on the host. The average human gut contains 1 kg of diverse groups of bacteria that mostly perform beneficial activities often involved in metabolites production and transportation and maintenance of gut homeostasis [5]. *Lactobacillus* and *bifidobacteria* are the most common types of microbes used as probiotics [6]. Nowadays these bacteria are enriched in commercially

available numerous food products. Research studies increasing towards the beneficial role of probiotics in the conditions of neuropsychological disorders in worldwide [7]. Hence aim of the study is to examine data from recent scientific studies focusing on probiotics and the gut-brain axis for the treatment of depression, anxiety and schizophrenia.

2. Probiotic Rich Foods

- Yoghurt
- Unfermented and Fermented milk (sour milk)
- Cheese
- Some juices such as carrot, watermelon, banana.
- plants such as onion, garlic, oats, soya beans, oats, barley[8].

3. Gut – Brain Axis

The communication within the gut – brain – axis is occurs through nervous system (vagus nerve), hypothalamus-pituitary-adrenal (HPA) axis, immune responses (Cytokines) and neurotransmitters[9]. The enteric nervous system (ENS) and the central nervous system (CNS) is connected via the vagus nerve and form the Gut – brain – axis[10]. Activation of the HPA axis causes corticotrophin-releasing factor (CRF) to be released from the hypothalamus, adrenocorticotrophic hormone (ACTH) to be released from the pituitary and cortisol to be released from the adrenal. When cortisol is chronically elevated it can have a negative impact on immune function and mood. Around 90% of the neurotransmitters such as serotonin, are produced in the gut. It can influence our emotions through GBA[11].

4. Dysbiosis

The human gut microbiota is comprised of trillions of microbes including bacteria, viruses and fungi. Gut dysbiosis is a broad term that can be defined as the imbalance of gut microbiota associated with an unhealthy outcome[12]. Mounting evidence explains that gut microbial dysbiosis is implicated in the pathogenesis of many diseases such as inflammatory bowel disease, celiac disease, allergy, asthma, obesity, CVS, and neurological disorders[13].

5. Probiotics in Mental Health

- Specific probiotic *Bifidobacterium* and *Lactobacillus* within the gut appears to increase mood and reduces anxiety, depression and irritable bowel syndrome[14].
- It acts through the pathway of autonomic, enteric nervous system and HPA axis.
- Numerous animal studies substantiated the effect of probiotics in the mental health[15].

6. Conclusion

Roles for the resident gut microbiota and probiotics in alleviating mood disorders, including anxiety, are increasingly being recognized, especially in the settings of gastrointestinal diseases. Finding the right probiotic strain for use in the appropriate setting could well prove to have a clinically relevant effect in limiting mood disorders and altered composition and function of their gut microbiota.

7. References

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