Perspective
Volume 12:02, 2023

Journal of Trauma & Treatment

ISSN: 2167-1222 Open Access

Microbiome-Gut-Brain Axis and Memory loss: A Perspective

Jing Dang*

Department of Psychology, Ulster University, Magee Campus, Northern Ireland, UK

Introduction

Including bacteria, viruses, fungi, and protozoa, a microbiome is a group of microorganisms that develops in a particular habitat. Healthy human intestinal tracts contain microbiomes, which are dynamic and varied populations, with the ileum and colon housing the bulk of them. Various gastrointestinal disorders and brain function have been connected in the past to changes in gut microbiota. In order to address the intricate bidirectional interactions between the brain and the gut, the idea of the "microbiome-gut-brain axis" has acquired popularity. For instance, modifications to or lack of an intestinal microbiome may result in systemic immune activation, which aggravates intestinal barrier defects, harms the blood-brain barrier, causes neuroinflammation, and eventually leads to brain damage and degeneration.

A chronic syndrome called dementia is defined by progressive cognitive deterioration. Dementia is a leading cause of disability among the elderly globally and can affect memory, thinking, language, behavior, and everyday activities. There are currently an estimated 55 million dementia sufferers worldwide, and that number is projected to increase to 78 million by 2030 and 139 million by 2050. In addition, each year an estimated 10 million new instances of dementia are identified. In 60 to 80 percent of instances, dementia is caused by Alzheimer's disease. Vascular dementia, Lewy body dementia, Parkinson's disease dementia, and frontotemporal dementia are additional forms of dementia. The bulk of our bacterial microbes are housed in the gut microbiome, which is a diverse ecosystem. The gut epithelium, which contains more than 1,100 species from various phyla, is home to nearly 39 trillion microbes or one microbe for every eukaryotic cell in the human body. The gut microbiome appears to have an effect on brain function in addition to supporting digestion and food absorption for energy production, functioning as an endocrine-like organ and playing a critical role in immune system function. The production and release of various molecules serves as a conduit for the microbiome's different functions.

Description

Some studies have connected the gut bacteria to the beginning or development of dementia. Additionally, longitudinal studies have shown that individuals with inflammatory bowel disease related to the gut microbiome experienced dementia diagnosis on average earlier than healthy samples. Furthermore, in a number of psychiatric and neurological disorders, the microbiome-gut-brain axis has become a potential diagnostic and therapeutic focus. Similar to this, altering gut flora with probiotics or antibiotics can enhance success on tests of learning and memory. It's crucial to comprehend developments and trends in a particular area of research. A popular technique for determining important aspects of pertinent publications, such as primary research topics, methodologies, authors, institutions, and countries, is bibliometric analysis. For instance, bibliometric analysis can offer information on paper citations, which represent the influence of publications on academia. Compiling keyword frequencies can also help researchers spot previous trends and emerging ones on particular study topics. The network maps of co-authorship and co-occurrence analysis that bibliometric analysis offers also show international collaborations and let researchers look for potential interdisciplinary collaborators. Previous bibliometric manuscripts examined connections between the gut-brain axis and depression as well as ties between the gut microbiota and Parkinson's disease.

The distribution of neuroactive compounds released by microbiota around the axis may cause changes in cognitive function that aid in the development of dementia as the brain-gut axis reflects bidirectional communication between the central and enteric nervous systems. Dementia is believed to arise when immune activation is triggered by gut bacteria through an impaired intestinal barrier, resulting in systemic inflammation. This disruption of the blood-brain barrier then encourages neuroinflammation, which ultimately causes nerve injury and degeneration. Evidence from a large-scale population-based cohort survey across the country showing that IBS patients have a higher risk of dementia than healthy controls supports this hypothesis.

In adults, most of the gut bacteria in humans belong to the phyla Bacteroidetes and Firmicutes, while Proteobacteria, Actinobacteria, Fusobacteria, and Verrucomicrobia make up the percentage. While the Bacteroidetes phylum only has about 20 taxa, the most prevalent of which is Bacteroides, the Firmicutes phylum contains more than 250 genera of bacteria, including Lactobacillus and Clostridium. The balanced ratio of the Bacteroidetes or Firmicutes phyla and other nondominant phyla is evidence that the gut bacterial community is sustained by the symbiotic connection between both pathogenic and nonpathogenic bacteria. Significant changes to the microbial populations as a result of dietary modifications, antibiotic use, or pathogen invasions may result in a transition to an inflammatory state and have significant health repercussions.

In addition to increasing brain volume in the frontal lobes and left superior temporal lobe, which are crucial for cognition and the regulation of attention and memory, regular aerobic exercise has been shown to prevent age-related global brain atrophy. The improvement of functional activation in the brain, which enables for increased efficiency when finishing tasks as well as regulating behaviour and mood, has also been promoted (in older adults aged 60-79 years). More recently, it has been demonstrated that aerobic exercise affects the gut by enhancing microbiome diversity and functional metabolism in both rodents and people. Exercise may have the power to reverse the conditions related to obesity, metabolic diseases, and behavioural disorders by altering the bacterial profiles and affecting the by-products generated by gut flora.

When it comes to maintaining human health and preventing illness, the gut has long been disregarded. Recent studies have shown that the microbiome's makeup is significantly influenced by an unbalanced diet that includes large amounts of extremely saturated fats, sugar, and little to no fibre. Poor dietary practises change the digestive system, which can further cause GI dysfunction and the emergence of inflammatory diseases. It's interesting to note that a prebiotic intervention that encouraged adjustments to the diabetic rats' microbiome decreased inflammation while enhancing glucose intolerance. Additionally, it has been discovered that people with inflammatory diseases like IBS and obesity have poorer cognitive function and more instances of stress-related psychiatric symptoms like anxiety [1-6].

Since the CNS and the enteric nervous system (ENS) are formed from the same tissues during the gestation period, the connection between the gut and

***Address for Correspondence:** Jing Dang, Department of Psychology, Ulster University, Magee Campus, Northern Ireland, UK, E-mail: liejing@uter.ac.uk*

Received: 01 February, 2023, Manuscript No. JTM-23-93820; **Editor assigned:** 03 February, 2023, PreQC No. P-93820; **Reviewed:** 15 February, 2023, QC No. Q-93820; **Revised:** 20 February, 2023, Manuscript No. R-93820; **Published:** 27 February, 2023, DOI: 10.37421/2167-1222.2023.12.555

the brain starts in utero. The vagus nerve, which transmits efferent and afferent signals from the autonomic nervous system (ANS), the hypothalamic-pituitary-adrenal axis (HPA axis), and serotonin (5-HT) regulation all play a role in the bidirectional communication between the gut and the brain. It is now known that changes to the gut microbiome have some impact on the neural pathways that connect the stomach and the brain.

Conclusion

This bibliometric analysis of the microbiome-gut-brain axis and dementia has shown a rapid rise in the number of related publications over the last ten years, with a sharp rise in papers released in the two most recent years highlighting the present popularity of this field. The most active universities were Zhejiang University in China and Kyung Hee University in Korea, and the most active publications in research on the microbiome-gut-brain axis and dementia were the Journal of Alzheimer's Disease and Nutrients. High-frequency keywords that reflect current patterns and possible future directions in this area in relation to populations of interest, mechanisms, and methodologies include "Alzheimer's Disease," "Parkinson Disease," "chain fatty acids," "inflammation," and "mouse model.".

Acknowledgement

None.

Conflict of Interest

There is no conflict of interest by authors.

References

1. Claesson, Marcus J. and Paul W. O'Toole. "Evaluating the latest high-throughput molecular techniques for the exploration of microbial gut communities." *Gut Microbes* 1 (2010): 277-278.
2. Parker, Aimée, Sonia Fonseca and Simon R. Carding. "Gut microbes and metabolites as modulators of blood-brain barrier integrity and brain health." *Gut Microbes* 11 (2020): 135-157.
3. McKee, A.C. “The spectrum of disease in chronic traumatic encephalopathy. *Brain* 136 (2013): 43-64.
4. Angelucci, Francesco, Katerina Cechova, Jana Amlerova and Jakub Hort, et al. "Antibiotics, gut microbiota, and Alzheimer's disease." *J Neuroinflammation* 16 (2019): 1-10.
5. Martin, Clair R., Vadim Osadchiy, Amir Kalani and Emeran A. Mayer, et al. "The brain-gut-microbiome axis." *Cell Mol Gastroenterol Hepatol* 6 (2018): 133-148.
6. Wang, T., X. Hu, S. Liang and W. Li, et al. "Lactobacillus fermentum NS9 restores the antibiotic induced physiological and psychological abnormalities in rats." *Benef Microbes* 6 (2015): 707-717.

How to cite this article: Dang, Jing. “Microbiome-Gut-Brain Axis and Memory loss: A Perspective.” *J Trauma Treat* 12 (2023): 555.