Relation Between Gut Brain Axis and Agni

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INTRODUCTION
The intestinal microbiota plays a major role in host's physiological and pathological conditions. This microbiota consists of bacteria, viruses, fungi and bacteriophages. This composition of microorganisms can be influenced by different environmental and lifestyle factors through the lifetime, this Gut microbial alteration is also known as DYSBIOSIS, a condition associated not only with gastrointestinal disorders but also with diseases affecting other distal organs. Recently, it became evident that the intestinal bacteria can affect the central nervous system (CNS) physiology and inflammation. The gut–brain axis is the two-way biochemical signaling that takes place between the gastrointestinal tract (GI tract) and the central nervous system (CNS)². According to Ayurveda, the digestion, metabolism and assimilation of nutrients is controlled and regulated by Agni³. Hence, it can also be said that Agni is responsible for dysbiosis. The site of Agni is Grahani it is so called because of its power to retain the food, It is situated above the umbilical region and is supported and nourished by the strength of Agni.Agni in Sama avastha (balanced state) is responsible for niroga avastha of an individual while in vaikrit avastha(vishama, teekshana, manda) it is responsible for roga utpatti. Negative psychological states

ABSTRACT:
"All diseases begin in the gut" - Hippocrates of Kos, this statement was made by Greek physician Hippocrates, regarded as the father of modern medicine¹; although the importance of Agni (the digestive fire) has already been sold by Acharya Charaka when he states that "the cause of all diseases is Mandagni" It has become evident that the intestinal bacteria and flora can affect the central nervous system (CNS) physiology and has an important role to play in the pathological conditions of the same. The nervous system and the gastrointestinal tract are communicating through a bidirectional network of signaling pathways called the gut-brain axis, which consists of multiple connections, including the vagus nerve, the immune system, and bacterial metabolites and products. It is clearly visible in the case of psychosomatic disorders like Ulcerative colitis, etc. that Gut is affected by Brain and vice-versa.

Keywords: Gut-brain axis, Agni, Ayurveda, Gut microflora
have a bidirectional impact on the body and, in particular, the homeostasis of agni. In other words, if agni is disturbed through physical means, such as eating foods which cause imbalance, then psychological difficulties like insomnia and disturbed thoughts will likely ensue. The same is true from a top-down perspective, implying that emotional imbalance caused by rajas or tamas can disturb agni, possibly leading to pathology.

Communication between the Gut and Brain
The Gut Brain axis involves different pathways such as the autonomic and enteric nervous system, the endocrine system, the hypothalamic-pituitary-adrenal axis (HPA), the immune system, and the microbiota and its metabolites. Several neurotransmitters and metabolites such as essential vitamins, secondary bile acids, amino acids, and short-chain fatty acids (SCFAs), modulate many immune system pathways that in turn influence behavior, memory, learning, locomotion, and neurodegenerative disorders.

Neurological Pathway
The neurologic pathway includes the Vagus nerve, the enteric nervous system, and the activity of neurotransmitters within the GI tract. Neurologic modulation of afferent sensory nerves directly produces molecules that can act as local neurotransmitters, such as GABA, serotonin, melatonin, histamine, and acetylcholine; this pathway also generates biologically active forms of catecholamines in the lumen of the gut. These neurotransmitters affect the physiological working of gut.

Endocrine Pathway
The nutrient available in the gut can be altered by gut microbiota and these alter the release of biologically active peptides from endocrine cells present in the gut which in turn can affect the gut-brain axis. Now, if there is dysbiosis in gut it will have an impact on the enteroendocrine cells, which in turn will influence the gut-brain axis.

Inflammatory Pathway
Inflammation metabolism within the GI tract is influenced by the gut microbiome, principally via the immune systems release of cytokines and other cellular communication mediators, such as interferon-gamma, during times of dysbiosis. In irritable bowel syndrome (IBS), as an example, abnormal microbiota populations activate mucosal innate immune responses, which increases gut epithelial permeability, activates gut pain sensory pathways, and dysregulates the enteric nervous system.

Role of Agni in Gut-brain axis
The bidirectional nature of the axis is crucial in understanding of agni as well. If agni (digestive fire) is disturbed through physical means, such as due to viruddha ahara, etc. which cause imbalance of doshas, then a lack of positive emotion and disturbed thoughts will likely ensue. The same is true from a top-down perspective, implying that emotional imbalance can disturb the agni, possibly leading to pathology.

The role of manasika nidana in vitiation of agni has been clearly told by Aacharyas.
Some of the factors mentioned in madhava nidana are:
Irshya – jealousy
Bhaya – fear
Krodha – anger
Lubdha – confused
Ruk nipidita – suffering from pain
Dainya nipidita – suffering from depression
Pradvesha yukt – aversion to food

He also states that, Even if foods that are wholesome (Pathya) are consumed in proper quantities (matraya), it does not get digested if the person is suffering from
Chinta – worry
Shoka – grief
Bhaya – fear
Krodha – anger

These, maansika karanas have a direct impact on the normal functioning of agni, for example, a person with ati krodhita nature will have an impact on Pitta dosha, there will not be proper pakaof ingested aahara due to impairment of agni and this will lead to Dysbiosis, which will have an impact of pathogenesis of various disorders related to nervous system.

Along with the maansika factors other factors also play a role in disruption of normal working of agni, for example, an individual continuously adopting ratrijagrana in his lifestyle will have vruddh of vata dosha in his body which will cause vishamta of agni and hence disrupt the gut microbiome, causing the dysbiosis and in turn playing a vital role in causation of mental disorders.

Example of a few diseases in which the gut affects brain and vice versa:

1. Rasa Pradoshajā vikara- While mentioning the nidana for rasavaha srotodushhti, Aacharya Charaka has quoted "rasvahini dushaynti chintyana chaaitchitnaar" which means that excessive stress and other psychological factors are responsible for rasavaha srotodushhti and can cause
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CONCLUSION

To conclude the above discussed facts and findings, it can be stated that the agni and gut microbiome have a vital role to play in the homeostasis and healthy functioning of nervous system as well as in maintaining the behavioral and psychological homeostasis of the body. Agni, although is an individual entity but has an influence over various factors such as Sharirika and Maansika doshas, Aama, Aahara Paka, etc. so one must be very careful about the proper working of their Agni. Hence, it is rightly said by Acharya Charaka, “Without Agni there is nothing left in the body”

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DISCUSSION

The role played by the Gut and the enteric nervous system in the maintenance of homeostasis of nervous system and body cannot be ignored, although this field requires extensive research in order to properly and deeply understand this topic but there is proof of relationship in working of between gut microbiome and brain.

Agni is a much broader concept as compared to gut microbiome and it will not be false to state that maintaining homeostasis of gut and gut microbiome is one amongst the many functions of agni.

Agni in its normalcy helps in maintaining the physiological state of microbiome of gut, while Teekshna agni may be directly proportional to gut microbiome and hence lead to increase in the number of microorganisms present in the gut, this may be validated by the increased metabolism in people with Teekshna agni, on the other hand a person with Manda agni will have decrease in the number of microorganisms present in the gut.

A comparison between pathogenesis of disease caused by involvement of gut brain axis and agni: Flow Chart

MANOVIKARA

- Manovikaras are classified into three types-
  a) Manoadhisthana
  b) Nanatmaja
  c) Ubhayadhisthana

Here, Ubhayadhisthana is again classified into two groups like based on the involvement of Manas as primary in first group and based on the involvement of Sareera as primary in second group, this classification itself is a proof to the argument that psychological factors have an impact on gut as well as agni and are involved in samprapti of somatic conditions, example Kushtha.

5. UNMADA

- While mentioning the nidana of Unmada, Acharya Charaka has first mentioned "Viruddha, dushta, Ashuchi Bhojana" this also acts as a nidana for vikruti of agni, which lead to the disturbances in Sharirika followed by Manasika doshas.

The above examples present evidence that Ayurveda as well as modern science have accepted the role of Agni/Gut microbiome in the causation of various nervous system related disorders. Hence, it can be considered that Agni has a vital role to play in normal working of maansika and sharirika doshas, as well as it has a high level of impact in causation of manoragas too.

1. Bhayaja Atisara/Shokaja Atisara: A simple example in which emotional state of a person can affect the Bowel movements in the person, even the treatment of these two aims at treating the cause of these, the patient suffering from diarrhea caused by fear (Bhayaja) is exhilarated, and the patient suffering from Diarrhea caused by Shoka (grief) is consoled for their cure.

3. Grahani (IBS): Grahani is a disease for which Acharya have described Maansika nidana as well, according to its symptoms it can be compared to IBS, there has been established the role of psychological factors as a cause of IBS.

The response to stress is mediated by corticotrophin releasing factor (CRF) secreted by the enteric neurons, enteroendocrine cells and immune cells. CRF binds to CRF receptors present on smooth muscle cells and increase the number of discrete cluster contraction.

Emotions significantly affects colonic response in IBS. Stressfull stimuli disrupt upper GI motility in several ways.

4. Manovikara: Manovikaras are classified into three types-
   a) Mano adhisthana
   b) Nanatmaja
   c) Ubhayadhisthana

Here, Ubhayadhisthana is again classified into two groups like based on the involvement of Manas as primary in first group and based on the involvement of Sareera as primary in second group, this classification itself is a proof to the argument that psychological factors have an impact on gut as well as agni and are involved in samprapti of somatic conditions, example Kushtha.
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Flow Chart A comparison between pathogenesis of disease caused by involvement of gut brain axis and agni:

**Gut-Brain axis**
- Lifestyle, dietary and environmental causes associated causes dysbiosis
- Microbial dysbiosis in GI tract
- Inflammatory response of gut
- Increased permeability of toxins
- Diseases (somatic and psychological)

**Agni**
- *Nidana Sevana*
- Vitiation of *Dosha*
- Formation of *Aama*
- Localization of vitiated *dosha* and *aama*
- Disease