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Review Article

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"GUT–BRAIN AXIS AND THE AYURVEDIC CONCEPT OF AGNI: AN INTEGRATIVE REVIEW"

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ABSTRACT:

Background: Ayurveda regards Agni, the digestive and metabolic fire, as the basis of health, and holds that impaired Agni produces Ama, a toxic residue that underlies many diseases. Classical texts also state that grief, fear, anger and worry impair digestion even of wholesome food. Modern research on the microbiota–gut–brain axis has shown two-way communication between the gut, its microbial community and the brain, with links to stress, anxiety and depression. **Objective:** To compare the Ayurvedic concepts of Agni, Ama and the mind–digestion relationship with current evidence on the gut–brain axis, and to identify research opportunities. **Methods:** Narrative review of classical texts on Agni, Ama and Grahani, and of selected experimental, clinical and review literature on the microbiota–gut–brain axis, Prakriti-related microbiome differences and Ayurvedic herbs with prebiotic activity. **Results:** Classical texts describe a bidirectional relationship: mental disturbances impair Agni, and impaired Agni with Ama formation disturbs the mind. Modern studies show that gut microbes influence stress responses, serotonin synthesis and behaviour in animals; that depression-associated microbiota can transfer depressive-like behaviour to rodents; that specific bacterial taxa are associated with depression and quality of life in humans; and that probiotics have small but significant effects on depressive symptoms. Gut microbial signatures differ between Prakriti types, and Triphala shows prebiotic activity in vitro. **Conclusion:** Agni and the gut–brain axis describe overlapping phenomena. Agni assessment could serve as a clinical entry point for gut-directed approaches to mental health, but requires standardised measurement and testing against microbiome and psychiatric outcomes.

Keywords: Agni; Ama; gut–brain axis; microbiome; depression; anxiety; Triphala; Prakriti

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INTRODUCTION:

Few concepts are as central to Ayurveda as Agni. Charaka states that lifespan, complexion, strength, health, enthusiasm, nourishment, lustre, Ojas, Tejas, the other Agnis and Prana all depend on the body's fire; when it is extinguished the person dies, when it is balanced the person lives long and healthy, and when it is disturbed the person falls ill[1]. Disorders of Agni are therefore treated as the root of a very wide range of diseases.

Ayurveda has also long held that the mind and digestion influence each other. Charaka describes how even wholesome food taken in the right quantity is not properly digested when a person is affected by grief, fear, anger, sorrow, excessive sleep or sleeplessness[1]. This is an early statement of what modern science calls the brain–gut connection.

Over the last two decades, research on the gut microbiota has transformed understanding of this connection. The microbiota–gut–brain axis is now described as a bidirectional communication system involving the vagus nerve, immune signalling, the hypothalamic–pituitary–adrenal (HPA) axis, and microbial metabolites such as short-chain fatty acids and neurotransmitter precursors[2]. It has been linked to stress responses, anxiety, depression and neurodevelopmental conditions[3].

This review compares the Ayurvedic and modern accounts, summarises the relevant evidence, and suggests how Ayurvedic concepts could guide research in this area.

METHODS:

Classical descriptions of Agni, Ama and Grahani were drawn from Charaka Samhita (Sutra Sthana, Vimana Sthana 2 and Chikitsa Sthana 15) and Ashtanga Hridaya[1,4]. Modern literature was identified through PubMed and Google Scholar using microbiota–gut–brain axis, gut microbiome and depression, probiotics and anxiety, irritable bowel syndrome and depression, Prakriti and microbiome, and Ayurvedic herbs and prebiotic. Priority was given to systematic reviews, meta-analyses and landmark experimental studies. This is a narrative review.

AGNI IN AYURVEDA:

Types of Agni

Ayurveda describes thirteen Agnis: one Jatharagni (the principal digestive fire in the stomach and intestine), five Bhutagnis (acting on the five elements in food) and seven Dhatvagnis (acting at the level of each tissue)[1]. Jatharagni is regarded as the chief, and its strength governs the others. This hierarchy resembles the modern view that digestion in the gut sets the conditions for absorption and tissue metabolism.

States of Agni

Four states of Jatharagni are described: Samagni (balanced), Vishamagni (irregular, associated with Vata), Tikshnagni (sharp, associated with Pitta) and Mandagni (weak, associated with Kapha)[1,4]. Each produces characteristic symptoms. Vishamagni, for example, is described as sometimes digesting food properly and sometimes not, with bloating, colicky pain and irregular bowel habits. These features resemble functional bowel disorders such as irritable bowel syndrome.

Ama

When Agni is weak, food is incompletely digested and forms Ama, an uncooked, sticky, heavy residue. Ama is said to block channels (Srotas), mix with Doshas and tissues, and produce symptoms such as heaviness, lethargy, loss of appetite, indigestion and coating of the tongue[4]. Ama is considered the starting point of many diseases. In modern terms, Ama has been compared to a range of phenomena, including undigested food residues, endotoxins, metabolic by-products and low-grade inflammation, but no single equivalent has been established.

Grahani

Charaka devotes a chapter to Grahani, the organ of digestion between the stomach and colon, and its disorders[1]. Grahani Roga, characterised by alternating loose and hard stools, abdominal discomfort and weakness, arises from disturbed Agni. Psychological factors are among the listed causes.

Mind and Agni

The bidirectional link between mind and digestion is explicit in classical texts. Mental states such as grief, fear, anger and anxiety impair digestion[1]. In the other direction, Ama and Dosha disturbances arising from poor digestion are said to produce lethargy, heaviness and mental dullness, which resemble the effects of Tamas on the mind. Treatment of mental disorders in Ayurveda therefore often begins with correction of Agni, using Deepana (appetiser) and Pachana (digestive) measures before Shodhana or Rasayana.

The microbiota–gut–brain axis

Structure and pathways

The gut contains trillions of microbes that interact with the host through several pathways[2]. The vagus nerve carries signals from the gut to the brainstem. Its importance was shown in mice fed a Lactobacillus strain, which reduced stress-induced corticosterone and anxiety- and depression-related behaviour and altered brain GABA receptor expression; these effects were absent in mice whose vagus nerve had been cut[5]. Microbes influence the immune system, and immune signals reach the brain. Microbial metabolites, including short-chain fatty acids, tryptophan metabolites and neurotransmitter-like molecules, act locally and systemically. In the other direction, the brain alters gut motility, secretion, permeability and the microbial environment through the autonomic nervous system and the HPA axis[6].

Microbes shape stress responses

An early landmark experiment showed that germ-free mice, raised without gut microbes, had an exaggerated HPA response to restraint stress, which could be partly reversed by colonisation with specific bacteria at an early age[7]. This established that gut microbes help programme the stress system.

Microbes and serotonin

About 90% of the body's serotonin is produced in the gut. Yano and colleagues showed that spore-forming bacteria from the gut microbiota promote serotonin biosynthesis in colonic enterochromaffin cells, and that this affects gut motility and platelet function[8]. This links gut microbes to a neurotransmitter central to mood regulation, although gut serotonin does not cross the blood–brain barrier directly.

Transfer of depressive-like behaviour

Two independent studies transplanted faecal microbiota from people with depression into rodents. In one, rats that received microbiota from depressed patients showed anhedonia and

anxiety-like behaviour, along with changes in tryptophan metabolism[9]. In another, germ-free mice that received microbiota from depressed patients showed depressive-like behaviour compared with mice that received microbiota from healthy controls[10]. These findings suggest that microbial composition can contribute to depressive states, at least in animals.

Human population evidence

In a large population study in Belgium, with validation in a Dutch cohort, Valles-Colomer and colleagues found that butyrate-producing bacteria (Faecalibacterium and Coprococcus) were consistently associated with higher quality-of-life scores, and that Coprococcus and Dialister were depleted in people with depression[11]. They also mapped the neuroactive potential of gut bacteria, including their ability to produce a dopamine metabolite.

Clinical trials of probiotics and prebiotics

A systematic review and meta-analysis of controlled trials found that probiotics produced small but significant reductions in depressive and anxiety symptoms, while prebiotics did not differ from placebo[12]. Effects were larger in clinical than in community samples. The evidence remains preliminary because trials are small, heterogeneous and of short duration.

Functional gut disorders and mental health

Irritable bowel syndrome is strongly associated with anxiety and depression. A meta-analysis found that anxiety and depression levels were significantly higher in people with irritable bowel syndrome than in healthy controls[13]. This comorbidity is a clinical expression of gut–brain interaction and resembles the classical association between Grahani disorders and mental disturbance.

Integrating Agni and the gut–brain axis

Table 1: Conceptual parallels

Ayurvedic concept	Modern counterpart	Comment
Agni as the basis of health	Gut function and microbial metabolism as determinants of systemic health	Broad parallel
Mind impairs Agni (grief, fear, anger)[1]	Stress alters gut motility, permeability and microbiota through the HPA axis and autonomic nerves[6]	Strong parallel
Ama disturbs the mind	Microbial and inflammatory signals affect brain and behaviour[2,9,10]	Moderate parallel
Vishamagni with irregular bowels	Irritable bowel syndrome with anxiety and depression[13]	Strong clinical parallel
Prakriti-specific digestion	Prakriti-specific microbial signatures[14]	Emerging evidence
Deepana, Pachana, Triphala	Prebiotics, probiotics, dietary modification[12,15]	Testable hypothesis

Prakriti and the microbiome

A study of 113 healthy individuals of extreme Vata, Pitta and Kapha Prakriti in a rural western Indian population found that, although overall gut community composition did not cluster by Prakriti, specific signature taxa differed between groups[14]. Kapha females were enriched in Prevotella copri, Pitta females in several Blautia species and other butyrate producers, and Vata females in Eubacterium rectale, Roseburia hominis and Bacteroides vulgatus. This suggests that the Ayurvedic constitution may partly reflect differences in gut ecology, which in turn may relate to digestive tendencies described in classical texts.

Ayurvedic herbs and gut microbes

Several Ayurvedic digestive herbs may act on the microbiota. In an in vitro study, Triphala, licorice (Yashtimadhu) and slippery elm increased beneficial bacteria, reduced some potential pathogens and promoted short-chain fatty acid producers in faecal cultures from healthy donors[15]. Triphala is classically used as a gentle laxative, Rasayana and Deepana. These results support the hypothesis that some Agni-correcting therapies may work in part through the microbiota, but they need confirmation in humans.

Diet

Ayurvedic dietary principles, such as eating at regular times, eating only after the previous meal is digested, preferring warm and freshly cooked food, and adjusting diet to Agni and season, are consistent with practices that support a stable gut environment. Modern evidence that dietary improvement can reduce depressive symptoms is discussed in the lifestyle psychiatry literature, and the gut microbiota is one proposed mechanism.

CLINICAL ASSESSMENT AND MANAGEMENT OF AGNI IN MENTAL DISORDERS:

Assessing Agni at the bedside

In routine Ayurvedic practice, Agni is assessed through history and examination: appetite and its timing, the capacity to digest a normal meal, the time taken for a meal to be digested, belching, bloating, heaviness after food, bowel frequency and consistency, coating of the tongue and the sense of lightness or heaviness in the body. Charaka includes the capacity for food intake and digestion (Aharashakti and Jaranashakti) among the factors to be examined in every patient[1]. These observations are used to

classify Agni as Sama, Vishama, Tikshna or Manda and to detect **Ama.**

For research purposes, these clinical observations can be turned into a structured questionnaire. Several Ayurveda institutions have developed such tools, but few have been validated against objective measures. Possible reference measures include gastric emptying time, breath tests, stool consistency scales, faecal short-chain fatty acids and microbiome profiles. A validated Agni score would allow researchers to test whether impaired Agni is more common in people with depression or anxiety, and whether its correction improves mental symptoms.

Agni-first approach in mental disorders

Ayurvedic treatment of mental disorders often begins with the digestive system. In the treatment of Unmada and Apasmara, Charaka recommends purification (Shodhana) and the use of medicated ghee, preceded by preparation of the body[1]. In clinical practice, a patient with Ama signs (coated tongue, heaviness, loss of appetite, lethargy) usually receives Langhana (lightening measures such as light diet or fasting as tolerated) and Deepana-Pachana herbs to clear Ama before stronger therapies are given. Commonly used preparations include Trikatu (long pepper, black pepper and ginger), Hingvashtaka Churna and Chitrakadi Vati, alongside Triphala for bowel regulation.

This sequence reflects a clinical logic that resembles modern thinking about gut-directed therapy: correct the gut environment first, then address the brain. However, the Agni-first approach has not been evaluated in controlled trials in mental disorders. It is an obvious candidate for pragmatic research, for example comparing standard Ayurvedic treatment of anxiety with and without an initial Agni-correction phase.

Diet and meal regulation

Ayurvedic dietary rules (Ahara Vidhi) are among the most practical tools for regulating Agni. They include eating warm, unctuous food in proper quantity, eating only after the previous meal is digested, not eating too fast or too slowly, eating in a pleasant place with attention, and avoiding incompatible combinations (Viruddha Ahara)[1]. Several of these rules, such as regular meal timing and mindful eating, are compatible with modern advice for functional gut disorders and with circadian aspects of metabolism.

DISCUSSION:

The Ayurvedic concept of Agni and the modern gut–brain axis describe overlapping clinical observations: that digestion affects the mind and the mind affects digestion. Ayurveda has recognised this relationship for centuries and built treatment around it. Modern science has now identified some of the mechanisms, including microbial regulation of stress responses and neurotransmitter synthesis, and has shown in animals that microbiota can transfer behavioural traits.

There are important limits to the comparison. Agni is a functional and clinical concept, assessed by appetite, digestion, bowel habit and other signs, while the gut microbiome is measured by sequencing. The two are not the same thing, and it is not yet known how well clinical assessment of Agni corresponds to microbial composition or function. Similarly, Ama should not be equated with any single modern entity without evidence.

The modern evidence itself has limitations. Much of it comes from animals. Human studies are mostly cross-sectional, so causality is unclear. Probiotic trials show modest effects. The field is also prone to overstatement in popular media.

Several research directions are promising. First, a standardised, validated Agni assessment tool is needed, ideally combining patient-reported symptoms with simple clinical signs. Second, studies could test whether Agni states correspond to measurable differences in microbiome composition, short-chain fatty acids, gut permeability markers or inflammatory markers. Third, studies in people with depression or anxiety could test whether Agni impairment is more common than in controls and whether it predicts response to treatment. Fourth, randomised trials could test Agni-correcting regimens, such as Triphala, Deepana-Pachana herbs and Ayurvedic dietary guidance, as adjunct treatments in depression, anxiety or irritable bowel syndrome, with both psychiatric and microbiome outcomes.

CONCLUSION:

Ayurveda's teaching that Agni underlies health, that mental disturbance impairs digestion, and that impaired digestion disturbs the mind is broadly consistent with current understanding of the microbiota–gut–brain axis. The two frameworks offer complementary strengths: Ayurveda offers a clinical vocabulary and treatment tradition centred on digestion, while modern science offers mechanistic understanding and measurement tools. Integrating them through standardised Agni assessment and well-designed trials could open new avenues for gut-directed care in mental health.

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