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Exploring Grahani Roga through the Lens of the Gut-Brain Axis

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ABSTRACT

Modern neuroscience recognises the gut as the "second brain," highlighting pivotal role of the enteric nervous system, gut hormones, and microbiota in modulating brain function. *Ayurveda* similarly emphasises the importance of *samadosha*, *samagni*, *samadhatu*, proper *malakriya* and *prasanna atma indriya* for a healthy lifestyle. Thus, balanced digestion and metabolism governed by *agni* are central to overall well-being.

Grahani roga is commonly encountered in routine clinical practice. *Grahani* and *agni* share an *Adhara–Adheya Sambandha* (substratum- content relationship), wherein *Grahani* serves as the seat for *Agni*. Derangement of *Agni* plays a pivotal role in the pathogenesis of *Grahani Roga*. *Mandagni* leads to *Ama Dosha*, a key pathogenic factor implicated in various gastrointestinal disorders observed in day-to-day practice.

Ayurveda underscores the intricate interrelationship between *manas* (mind) and *sharira* (body), acknowledging their mutual interdependence. *Grahani roga* is predominantly influenced by *pitta–vata dosha*, while psychological factors (*Manasika Bhavas*), along with *rajas* and *tama doshas*, significantly contribute to its onset and progression. The entire process of digestion from ingestion to assimilation and excretion is influenced by psychological status. *Dushta ahara* and *vihara* lead to the formation of *ama* and obstruct the *annavaha* and *rasavaha srotas*, resulting in *grahani* dysfunction.

In contemporary medicine, *grahani roga* is interpreted with irritable bowel syndrome (IBS), as both conditions reflect disturbances in gut–brain interaction. Emerging evidence highlights the critical role of the gut–brain axis, a complex bidirectional communication network linking the central nervous system (CNS) and the enteric nervous system (ENS), in the pathogenesis of IBS. This axis operates through neuronal, endocrine, and immune pathways that regulate gut motility, secretion, and visceral perception. The *ayurvedic* perspective of maintaining the equilibrium of *agni*, *doṣha*, and the mind–body relationship closely parallels the contemporary understanding of gut–brain axis dysfunction in IBS.

Keywords: Grahani roga, agni, ama, gut-brain axis, IBS, CNS, ENS

INTRODUCTION

Rogaha Sarve Api Mandagnau.[1]

Grahani roga is mainly caused by *agnidushti*.

Grahani is *ashraya,* and *agni* is *ashritha*. When *agni* undergoes vitiation, *grahani* also gets vitiated and produces disease. It is the most important part of *mahasrotas.* According to *Acharya Sushrutha and Acharya Vagbhata, grahani is described* as the *pittadhara kala,* which can be corelated to mucosal lining of the small intestine. Anatomically, it is situated between *amashaya* and *pakwashaya*[2]. Normally *Grahani* retains the undigested food until proper digestion occurs and subsequently releases the digested food. However, when *agni* becomes weakened(*agnimandya*) *grahani* loses its retaining capacity and prematurely releases improperly digested food leading to condition called *grahani roga.*

Grahani roga is one among *ashtamahagada*[3]. It is a *tridoshaprakopaka vyadhi* with vitiation of *samana vayu*, *pachaka pitta* and *kledaka kapha*. Signs and Symptoms are *muhurbaddha - muhurdrava malapravritthi* (Altered bowel), *udarashoola* (Abdominal pain), *arochaka* (Anorexia) and *balakshaya* (Loss of strength). Based on these signs and symptoms *grahani* can be interpreted to irritable bowel syndrome.

Irritable bowel syndrome (IBS) is a common functional gastrointestinal disorder, with a high global prevalence (11.2%) and a strong impact on the quality of life[4].

Irritable bowel syndrome (IBS) is a functional bowel disorder characterised by abdominal pain or discomfort and altered bowel habits in the absence of detectable structural abnormalities. No clear diagnostic markers exist for IBS; thus, the diagnosis of the disorder is based on clinical presentation mentioned under Rome's 4 criteria[5].

The pathogenesis of IBS is poorly understood, although roles of abnormal gut motor and sensory activity, central neural dysfunction, psychological disturbances, mucosal inflammation, stress and luminal factors such as bile acid malabsorption and gut dysbiosis have been proposed[6]. IBS negatively influences mental and physical quality of life, but factors that explain this impact are still unclear. [7]. Gut- brain axis is the bidirectional link between the CNS &ENS of the body. ENS is a web of sensory neurons, motor neurons and interneurons embedded in the wall of the gastrointestinal tract. stretching from the lower third of the oesophagus right through to the rectum. Gut-brain axis interaction occurs between endocrine (hypothalamic-pituitary-adrenal axis), immune (cytokines, chemokines) and the autonomic nervous system[8]. The chronic and recurrent nature of the disease causes significant distress to the patient socially, economically and financially[9].

Materials and Methods

The aetiology, clinical features and pathogenesis of irritable bowel syndrome are studied from modern textbooks of various authors and by electronic databases like PubMed, Google Scholar, and other national research databases. The conceptual aspects of *agni*, *ama*, *grahani* and *grahani roga* in *Ayurveda* are interpreted by gathering various scattered references from *Brihatrayi* and *Laghutrayi*.

Grahani roga

According to *Acharya Charaka* explained in *chikitsa sthana* 15th chapter, *grahani* is a site of *agni* and is situated above *nabhi*[10]. It is not only a site of *agni* but is also supported and strengthened by it (i.e. *Jatharagni*). It holds the indigested food for the duration of its digestion before the *kitta* or undigested food residue is propelled into the *pakwashaya*[11]. Thus, *grahana*, *dharana*, *pachana* and *Shoshana* become

the main functions of *grahani*. In abnormal conditions, when it gets vitiated because of *mandagni*, it releases the food in an undigested form.

The *nidana* (causative factors) of *grahani roga* include improper dietary habits and lifestyle factors that weaken *agni* (digestive fire)[12]. These include *abhojana* (prolonged fasting), *atibhojana* (excessive food intake), *vishamashana* (irregular or incompatible eating patterns), and *asatmya bhojana* (consumption of unwholesome or unsuitable food). The condition may also arise due to complications following improper administration of therapeutic procedures such as *vamana*, *virechana*, and *snehapana*. Suppression of natural urges (*vega vidharana*), intake of incompatible foods with respect to place (*desha*), time (*kala*), and season (*ruthu*), as well as psychological factors like grief (*shoka*), anger (*krodha*), and fear (*bhaya*)[13]further contribute to the vitiation of *agni*, ultimately leading to the development of *grahani roga* with symptoms [14]such as *muhurbhaddha- muhurdrava malapravrithi* (altered bowel habits), *arochaka*(anorexia), *aasya vairasya*(bitter taste of mouth), *adhmana* (abdominal distension), *tiktamlodgara*(acid eruction), *durbalata* (weakness), *udara shoola* (Pain abdomen).

Irritable bowel syndrome (IBS)

Irritable bowel syndrome is a functional bowel disorder characterised by abdominal pain or discomfort and altered bowel habits in the absence of detectable structural abnormalities. No clear diagnostic markers exist for IBS; thus, the diagnosis of the disorder is based on clinical presentation. In 2016, the Rome III criteria for the diagnosis of IBS were updated to Rome IV[15].

Pain is a key symptom for the diagnosis of IBS. Pain is often exacerbated by eating or emotional stress and improved by the passage of flatus or stool. In addition, female patients with IBS commonly report worsening symptoms during the premenstrual and menstrual phases[16].

Table 1: Rome IV Diagnostic criteria for irritable bowel syndrome[17]

Recurrent abdominal pain, on average, at least 1 day per week in the last 3 months, associated with >=2 of the following criteria:
1. Related to defecation 2. Associated with a change in frequency of stool 3. Associated with a change in form (appearance) of stool

Gut Brain Axis

The enteric nervous system (ENS) is one of the major divisions of the nervous system and is specifically responsible for regulating gastrointestinal function[18]. It is composed of a dense, mesh-like network of neurons embedded within the wall of the gastrointestinal tract, extending from the oesophagus to the anus[19]. Owing to its complexity and functional independence, the ENS is often referred to as the "second brain.[20]" The ENS has the remarkable ability to function autonomously; it can regulate digestive activities without direct input from the central nervous system (CNS). Although it usually communicates with the CNS through the parasympathetic pathways (mainly the vagus nerve) and sympathetic pathways (via prevertebral ganglia), experimental studies in vertebrates have demonstrated that even when the vagus nerve is severed, the ENS continues to coordinate gut motility and secretion. This independence highlights its intrinsic regulatory capacity[21].

The sensory neurons report on mechanical and chemical conditions. Through intestinal muscles, the motor neurons control peristalsis and churning of intestinal contents. Other neurons control the secretion of

enzymes[22]. The enteric nervous system also makes use of more than 30 neurotransmitters, most of which are identical to the ones found in CNS, such as acetylcholine, dopamine, and serotonin. More than 90% of the body's serotonin lies in the gut, as well as about 50% of the body's dopamine; the dual function of these neurotransmitters is an active part of the gut–brain axis[23].

The first of the gut–brain interactions were shown to be between the sight and smell of food and the release of gastric secretions, known as the cephalic phase, or cephalic response of digestion.[24]. Chronic or acutely stressful situations activate the hypothalamic–pituitary–adrenal axis, causing changes in the gut microbiota and intestinal epithelium, and possibly having systemic effects[25]. Additionally, the cholinergic anti-inflammatory pathway, signalling through the vagus nerve, affects the gut epithelium and microbiota. Hunger and satiety are integrated in the brain, and the presence or absence of food in the gut and types of food present also affect the composition and activity of gut microbiota[26].

The relationship between gut microbiota and humans is not merely commensal (a non-harmful coexistence), but rather a mutualistic relationship[27]. Human gut microorganisms benefit the host by collecting the energy from the fermentation of undigested carbohydrates and the subsequent absorption of short-chain fatty acids (SCFAs), acetate, butyrate, and propionate. Intestinal bacteria also play a role in synthesising vitamin B and vitamin K as well as metabolising bile acids, sterols, and xenobiotics. The systemic importance of the SCFAs and other compounds they produce are like hormones and the gut flora itself appears to function like an endocrine organ; dysregulation of the gut flora has been correlated with a host of inflammatory and autoimmune conditions[28].

The gut microbiota can influence brain function through immune and inflammatory pathways. Gut microbes contain Pathogen-associated molecular patterns (PAMPs), such as lipopolysaccharides (LPS) and flagella, which are recognised by the body's immune cells[29]. When the gut microbial barrier is disrupted, these microbial components stimulate immune cells like B cells, neutrophils, macrophages, and dendritic cells, leading to the release of pro-inflammatory cytokines such as IL-1, IL-6 and TNF-α. These cytokines act on vagal afferents in the gastrointestinal tract, altering gut function, and can also cross the blood-brain barrier and directly modulate brain activity. They activate the kynurenine pathway, in which tryptophan is diverted away from serotonin production and converted into kynurenine instead. This results in reduced tryptophan and serotonin levels in the brain, contributing to depressive symptoms[30].

Role of Stress and Psychological Factors

In chronic stress, increased release of cortisol through activation of the HPA axis leads to a decrease in mucus production in the gut. As a result, the protective mucus layer becomes compromised and comes into closer contact with immune cells. Additionally, neuronal and hormonal signals from the stressed body can alter the permeability of the gut barrier. The gut microbiota also directly influences this permeability. Once the gut barrier permeability is affected, it can contribute to further pathological changes, as seen in conditions associated with chronic stress[31].

***Mano dosha* and their impact on *agni* and *grahani* function**

Ayurveda has described an important factor of digestion and metabolism in our body as *Agni*.

In *Ayurveda* texts, *manasika bhavas* like *chinta*, *bhaya*, *shoka*, *krodha*, *kshobha*, *irshya* are mentioned as causative factor (*Nidana*) of most of the diseases such as *ajeerna*[32], *aruchi*[33], *chardi*[34], *atisara*[35] etc. This clearly indicates that disturbances in mental emotions can aggravate *doshas*, impair *agni*, and ultimately lead to various psychosomatic disorders.

Manasika hetu (psychological factors) causes *agni dushti*, causes vitiation of *dosha* results in *agnimandya* leads to *avipaka*, later in *amashaya* it produces *shuktatva* and formation of *ama*. This *annavisha* produces *ajirna*. Thus, *amavisha* disturbs the *grahani*.

Neuro- stress pathway in *Grahani utpatti*

The changes that affect digestion actually begin in the brain. During anxiety, the "fight of flight" response is seen. This perceived threat is processed in the cerebral cortex and amygdala, which activate the hypothalamus to initiate sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis[36].

The sympathetic–adreno–medullary pathway rapidly releases adrenaline and noradrenaline and cortisol. Cortisol mobilises glucose and suppresses non-essential functions such as digestion and immunity[37].

In the enteric nervous system, sympathetic dominance and reduced vagal (parasympathetic) tone inhibit gastric acid secretion, pancreatic enzyme release, intestinal motility, and mucosal blood flow. Neurotransmitters such as CRH and altered serotonin signalling further disrupt gut regulation[38]. Thus, during acute stress, the central nervous system prioritizes survival, while the enteric nervous system downregulates digestive activity, leading to reduced appetite, slowed digestion, or altered bowel movements.

The fight-or-flight response described in modern physiology can be correlated in *Ayurveda* with *manasika dushti* leading to *agni* and *grahani* dysfunction. When a perceived threat activates the CNS, it resembles aggravation of *rajo guna* in the *manas*, which stimulates *prana vata* and *vyana vata*. This aggravated *vata* disturbs *samana vata*, the subtype governing digestion and located in the *Grahani*.

The diversion of blood flow and suppression of digestive secretions correspond to impairment of *jatharagni*, as the body's energy is redirected away from digestion. Initially, this may manifest as *vishama agni* due to *vata* predominance (irregular appetite, variable bowel habits), and with sustained stress, it progresses to *mandagni*, resulting in incomplete digestion and *ama* formation (*Amotpatti*). Since *grahani* is the seat of *agni* (*agni-ashraya–ashrayi bhava*), disturbance of *agni* directly weakens *grahani*, leading to symptoms such as anorexia, bloating, altered stools and fatigue. Thus, through *shareerika–manasika paraspara sambandha*, psychological stress (*Manasika nidana*) converts into physiological digestive impairment, ultimately manifesting as *grahani roga*.

Tridosha also plays very important role in the digestion process. *Pitta* and *kapha* are collectively controlled by vata. Among *panchavidha vata*, *samana vata* present near *agni*, helps in *pachana* (enzymatic digestion), *vivechana* (absorption and separation), and *munchana karma* (Peristalsis and motility). In *Grahani roga* this disturbed *samana vata* leads to instability of *jatharagni*, impaired coordination between motility and secretion, accumulation of *ama* within *grahani* leading to *Grahani roga*.

Similar explanation emphasised in contemporary science; The ENS consist of two major network that are intrinsic to the gastro intestinal tract; the mysentric plexus (Auerbach's plexus) and sub mucosal plexus (Meissner's plexus)[39]. The ENS connected to the CNS by parasympathetic and sympathetic fibers, but can function autonomously without these connections. Submucosal plexus is involved in the control of intestinal secretion[40].

Chikitsa

Grahani roga the *samprapti* involves both *manas* and *agni dushti*. So, for successful management of *grahani roga trividha chikitsa* plays a major role; *yuktivyapashraya chikitsa*, *daivavyapashraya* and *sattvavajaya chikitsa*.

Grahaṇi roga chikitsa can be understood as restoring *agni*, regulating *samana vata*, and re-establishing balanced neuro-humoral communication between the gut and the brain. *Ayurveda* emphasises *nidana parivarjana*[41] as the first line of treatment, as improper diet, lifestyle and psychological stress directly disturb gut motility, secretion and central regulation of digestion. *Ama pachana* and *Agni deepana* using appropriate *deepana-pacana dravyas* help normalize digestive secretions and metabolic process, intestinal function and absorption. According to *dosha* predominance, *shodhana* therapies—especially *basti chikitsa*[42]—plays an important role by correcting *vata* dysregulation, which parallels normalisation of the enteric nervous system and gut–brain signaling. Dietary regulation with *laghu*, *ushna* and easily digestible foods supports stable *agni* and prevents *ama* formation.

Satvaavajaya chikitsa[43] plays a vital role in reducing stress-induced gut dysfunction, reinforcing the concept of *grahani roga* as a psychosomatic disorder. *Satva* is the *prakrita avasta of manas*. A *Satvika Manas* will be always *sukhadhayaka*. Hence *satva* is considered as *mano guna* unlike *rajas* and *tamas*. *Satvaavajaya chikitsa* aims to restore mental stability through *ashvasana*(reassurance), jnana (right knowledge), *dhairya* (mental strength), *smrithi*(memory) and *samadhi* (inducing a state of tranquillity to manage stress/anxiety) reduces stress- induced *vata* vitiation and normalises *agni*. Practices such as counselling, regulation of sleep, meditation, relaxation techniques, control of negative emotions, and adopting *achara rasayana*(ethical lifestyle) support balanced neuro-psychological functioning. By calming the mind, *satvavajaya chikitsa* indirectly stabilises gut motility, secretion and absorption. From a modern science; gut-brain axis perspective, *satvaavajaya chikitsa* correlates with reduction of stress-induced autonomic imbalance, improvement in vagal tone and normalization of neurotransmitters such as serotonin, thereby improving gastrointestinal function.

Discussion

The gut produces neurotransmitters like serotonin, dopamine, and gamma-aminobutyric acid (GABA), which play a critical role in regulating mood and emotions. Interestingly, about 90% of the body's serotonin, a key mood stabilizer, is produced in the gut.

Emotions significantly affect gastrointestinal (GI) function through the gut-brain axis, a bidirectional communication system linking the central nervous system (CNS) and the enteric nervous system (ENS). This explains how psychological factors impact digestive processes and vice versa. Impact of Emotions on the GI Tract:

- Stress and Anxiety: Stress alters gut motility, increases intestinal permeability, and heightens visceral sensitivity, activating the HPA axis and releasing stress hormones like cortisol. This can cause abdominal pain, diarrhoea, or constipation.
- Negative Emotions: Anger, anxiety, and depression lead to visceral hypersensitivity, making individuals more sensitive to gut sensations. Anger can increase colonic motility, cause diarrhoea, while suppressed anger may delay gastric emptying.

All hormones are chemical in nature, similar to *agni*. The multiple activities of cells, tissues and organs of the body are coordinated by the interplay of several types of chemical messenger systems, which are nothing but *agneyamshas*. The neurotransmitters, endocrine hormones, and neuroendocrine hormones deliver actions at various levels.

GABA normally reduces gut hyperexcitability, relaxes smooth muscle tone, and modulates visceral pain; therefore, decreased GABA may lead to intestinal spasm, pain, urgency, and features resembling disturbed *praṇa* and *apana vata*, while increased GABA supports proper evacuation and calming of gut activity**.**

Norepinephrine (stress mediator) reduces gut motility, secretion, and blood flow;it increase during stress can cause constipation and anorexia, reflecting vitiation of *praṇa* and *samana vata* due to sympathetic dominance.

Acetylcholine, the main parasympathetic neurotransmitter, enhances gut motility and secretion; reduced acetylcholine weakens *samana vata* function (impaired digestion and propulsion), whereas increased acetylcholine supports coordinated digestive activity.

Serotonin, about 90% of serotonin is produced in the gut and controls intestinal motility, secretion, and visceral sensitivity. When serotonin levels increase, intestinal motility becomes excessive, leading to rapid transit and diarrhoea-predominant IBS (IBS-D); this corresponds to *samana vata vriddhi*, where hyperactivity near the *grahani* causes improper digestion and *drava mala pravritti*.

Conversely, when serotonin levels decrease, gut motility slows, resulting in constipation-predominant IBS (IBS-C); this correlates with *samana vata kshaya* and *apana vata avarana*, leading to *mandagni*, *vibandha*, and *adhmana*. Thus, serotonin imbalance in IBS can be understood as the biochemical counterpart of *samana vata dushti* causing *agni* disturbance and *grahani* dysfunction.

Conclusion:

Grahani roga can be understood as a psychosomatic disorder because it involves both brain and gut interactions, where psychological stress and emotional states directly influence digestive function, and vice versa. The gut–brain axis is a two-way communication system linking the central nervous system with the enteric nervous system via neural (vagus nerve), hormonal and immune pathways. Stress, anxiety and emotional disturbances can disrupt this axis by altering neurotransmitters (e.g., serotonin), gut motility, secretions and immune responses, leading to symptoms such as irregular bowel habits, pain, bloating and loss of appetite. In *Ayurvedic* understanding, *vata* (especially *Samana vata*) governs digestion process. Emotional stress, aggravates the *vata*, which destabilises *jatharagni*, impairs digestion, and leads to *ama* formation and *grahani* dysfunction. Thus, emotional or mental stress does not stay confined to the mind but manifests in the digestive system, showing that *grahani roga* arises from psychological factors affecting physiological digestive processes and exemplifies how mind and body are interconnected.

Ayurveda emphasises *nidana parivarjana*, *deepana-pachana*, *ama pachana*, along with *shodhana* therapies such as *basti chikitsa*, *takra kalpana* and *satvaavajaya chikitsa* to regulate the gut-brain axis.

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