

## Ayurvedic Perspectives on Gut Microbiome Dynamics through the *Trayoupastambha* perspective

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### Abstract:

The gut microbiome is a living ecosystem of bacteria, fungus, viruses, and protozoa that is very important for digestion, making nutrients, controlling the immune system, and fighting off germs. Its equilibrium promotes physiological and metabolic processes while also influencing mental health via the gut-brain axis. Diet continues to be the key determinant of microbial diversity; diets high in fiber, fruits, vegetables, and fermented preparations promote microbial resilience, while processed foods, high sugar, stress, lack of sleep, sedentary lifestyles, and drug usage lead to dysbiosis. Gut microbiota imbalances have been connected to autoimmune diseases, allergies, diabetes, gastrointestinal illnesses, and mental health issues. The three pillars of life—*Ahara* (diet), *Nidra* (sleep), and *Brahmacharya* (controlled lifestyle) are emphasized by *Ayurveda* as being essential to preserving harmony and good health. *Ayurveda's* ideas about personalized diets, restorative sleep, strict routines, and stress management are in sync with what we know now about microbiome science. Integrating traditional concepts with current findings provides a comprehensive framework for boosting gut health, preventing disease, and improving general well-being. By integrating modern scientific insights with traditional wisdom, we can promote gut health, enhance overall well-being, and prevent diseases linked to microbial imbalance.

**Keywords:** *Trayoupastambha*, Dysbiosis, *Brahmacharya*

### Introduction:

The human gut houses an estimated 100 trillion bacteria, from over 1,000 to as many as 1,150 prevalent bacterial species and each person subjects at least 160 of these species albeit mostly shared constitute a very rich and diverse microbial community. Of its numerous regions, the colon is most heavily colonized by an estimated  $10^{14}$  bacteria. Pathogenic, commensal and symbiotic organisms all belong to this intricate ecology of microbes. These microbes collectively called the gut microbiome have some 3.3 million genes, and are vital for good health.<sup>(1)</sup> They help digest food, produce essential substances such as vitamins and short-chain fatty acids (SCFAs), regulate the immune response and assist in stopping the growth of harmful bacteria. Dysbiosis (disturbance or imbalance of this microbial population) correlates with several chronic diseases including: inflammatory bowel disease, type 2 diabetes and cardiovascular disease. In a new study, correcting an unhealthy gut microbiome using fecal transplants could be a low cost way to reduce the risk of chronic diseases.

Because about 70% of your body's immune system is located in your gut, the gut microbiota has a big influence over our immune function as well as digestion. And the that crosses between the brain and gut reminds us that there are two directions to consider when it comes "brain-gut connection" and that this flow of communication also influences our feelings, thoughts and overall look health. Moreover, a well-regulated microbiome may play a role in obesity, metabolism and the incidence of long-term diseases such as diabetes, cardiovascular disease and certain cancers (as wells others metabolic diseases and mental disorders associated with it<sup>(2)</sup>). *Ayurveda*, an ancient system of medicine in India, considers the integration of body, mind, and spirit essential to health and accentuates the importance of balance for overall well-being. Nature's own healing process is encouraged by following dietary guidelines to meet specific personal needs, using herbal formulations, and adjusting lifestyle. The Dosha system is one of *Ayurveda's* core concepts: the idea that people are categorized into three principal bodily types – Vata, Pitta and Kapha. Each dosha has its own lifestyle and dietary needs. These three pillars are, *Nidra* (sleep), *Aahara* (Diet), and *Brahmacharya* (In The Limits or moderation or abstinence). When observed and practised, as strict obedience requires, they will tend to promote the growth and youthful appearance of the body, and contribute to preserving strength and brightness through long life provided superating habits are avoided<sup>(3)</sup>. *Aahara* tends to recommend a sattvic diet often, focusing on the importance of consuming fresh and healthy food that works for your dosha. *Nidra* encourages behaviours of good sleep hygiene and underscores the need for adequate, good-quality rest for physical and mental recovery. According to *Ayurveda*, *Brahmacharya* is a moderate way of living, which is defined by control of the senses and a peaceful mind. Texts like the *Ashtanga Hridaya* and the *Ashtanga Sangraha* also describe *Abrahmacharya*<sup>(4)</sup>, its opposite extreme, with a view to emphasising how moderation is essential

in our normal day-to-day life. Brahmacharya is included in Ayurveda to promote good health, strength and vitality through life.

### **TRAYOPASTAMBHA:-**

Trayopastambha -the three supports of life and its predominant ends. The name is made up of the words "Traya" (three) and "Upastamba" (support)<sup>(5)</sup>. The Ayurvedic doctrine of Trayopastambha, namely Ahara (food), Nidra (sleep) and Brahmacharya (simple living), considers that these three support life. They are believed to help sustain the good health of a human being. Very carefully selected Ahara brings Strength and Immunity and Mental Sharpness, apart from feeding the system. Similarly, that Nidra – sound sleep is also regarded to be essential in maintaining normal physiological functions, mental balance and general health of the body. The third pillar is Brahmacharya, which is often interpreted as self-control and moderation in one's life. It ensures that one stores and efficiently channels one's energy for optimum mental and physical stability. Ayurveda also stresses the importance of Yukti<sup>(6)</sup> (appropriate means) while observing those pillars. Pure nutrition or good sleep, or discipline is not enough; these have to be in line with one's constitution (prakriti), seasons, and stages of life. Trayopastambha in its perfect form is productive not only of physical nourishment and strength, but also of a glowing complexion, an even mind, and immunity from disease. Ignoring these fundamentals or living in ways that are unhealthy, however, leads to imbalance and loss of vitality.

Thus, *Trayopastambha* is a timeless guide for good living, reminding us that true well-being is founded on a balance of food, relaxation, and lifestyle choices applied with mindfulness and moderation.

### **AAHARA:-**

What is food (Ahara)? In order to live, grow and be healthy we all need food. Ahara: The Best Medicine (Mahabhaisajya): According to Kashyap, nothing is so remedial as adapted for looking after of the health.<sup>857</sup> Four sections (Swasthyachatushka) of Charaka Samhita describe the detailed aspects of Matra for food intake and its corresponding impact on Ojas, Varna, and Bala—immunity, complexion, and strength of a person<sup>(8)</sup>. Aahara (food) is one of the most important Chikitsa (treatment) employed in maintaining human body, which provides all the necessary elements for carrying out fundamental activities such as digestion and metabolism<sup>(9)</sup>. The condition of health or disease, which is represented either by happiness or discomfort, essentially depends on food both as to its chemical composition and the amount eaten<sup>(10)</sup>. So, Ayurveda favours healthy-nutritious foods as a means to good-health. Ayurveda therefore focuses on selection of healthy nutritious diet as very important for health lifestyle (11). The potency of Agni, the body's digestive fire, is also influenced by the impact of diet and varies according to Ritu (season) as per Ayurveda<sup>(12)</sup>. Among such lenses, Parigraha which deals with specific measures of each and every food such as bread or lentils, rice etc., and Sarvagraha which means 'total intake' taken at the time of meal are the two angles through which an amount of ingested food (Raashi) is perceived in Ayurvedic tradition. The well balanced diet is considered to contain all the six basic tastes (Shadrasa) necessary for the maintenance nutritional equilibrium<sup>(13)</sup>. The importance of macronutrients—fats, proteins and carbohydrates—is stressed in contemporary nutrition even though it mirrors closely the concept of Parigraha except for a few things. In addition, Ayurveda describes eight basic norms (Ahara Vidhi Vidhana) for sustenance including food type and mode of preparation, specificities in the form of quantity and method, timing and place to eat food, manner in which it should be consumed and specificity according to individual need<sup>(14)</sup>.

### **NIDRA:-**

Ahara (food), Brahmacharya (controlled lifestyle), and Nidra (sleep) are the three basic pillars of health according to Ayurveda. According to this holistic approach, sleep is essential for maintaining and reviving one's physical, mental, and spiritual well-being in addition to being a biological necessity. This is the time when our bodies and minds are renewed and restored. Sleep is thought to be the second most important component of good health<sup>(15)</sup>. In order to lead a balanced and healthy life, it is essential for many physiological and psychological processes. Physiological and Psychological Advantages of Sufficient Sleep for Weight Management (Sleeping well promotes metabolism, which helps control body weight.)

Complexion and Skin Health (Getting enough sleep promotes tissue regeneration and repair, which enhances the health and appearance of the skin.) Energy and enthusiasm (Restorative sleep boosts energy and excitement for everyday tasks by replenishing energy stores.)

Sensory Alertness (Getting enough sleep helps the senses recover, which enhances sensitivity and awareness of outside stimuli) Tissue Repair and Metabolic Balance (The body repairs and regenerates itself while you sleep, keeping your body's tissues and metabolism in balance). Emotional Stability and Mental Clarity (Getting enough sleep promotes emotional control, mental clarity, and cognitive abilities, all of which are important for psychological well-being)<sup>(16)</sup>.

Sleep is a natural physiological process that revitalizes the body and mind, according to *Ayurvedic* literature. Its importance in maintaining health and reestablishing equilibrium makes it a sub-pillar of life (*Upastambha*). According to *Ayurveda*, sleep is crucial for preserving balance among the three doshas (*Pitta*, *Kapha*, and *Vata*), with *Tamas* guna (inertia) and *Kapha* being mostly in charge of promoting sleep. *Nidra*, according to *Acharya Charaka*, is "the state in which the mind, having been detached from sensory and motor organs due to exhaustion, falls into a state of rest"<sup>(17)</sup>.

According to *Aacharya Dalhana*, there are three types of sleep. *Tamasi Nidra* is created when *Sangyavahastrotas* are

filled with *Shleshma* dominated by *Tamoguna*. *Vaikariki* (abnormal) occurs when physical and mental problems arise, while *Svabhaviki* (natural) occurs every day for everyone<sup>(18)</sup>. According to *Aacharya vagbhatt*, Getting enough sleep has numerous advantages for both mental and physical health. These effects are as follows<sup>(19)</sup>

Aspect	Proper Sleep	Improper Sleep
<b>Happiness</b>	Brings joy and emotional well-being.	Leads to misery and emotional distress.
<b>Nourishment</b>	Promotes physical nourishment and vitality.	Causes emaciation and depletion.
<b>Strength</b>	Enhances physical strength and resilience.	Results in weakness and fatigue.
<b>Potency/Fertility</b>	Supports reproductive health and vitality.	Leads to sterility and diminished reproductive function.
<b>Knowledge</b>	Facilitates mental clarity and cognitive function.	Impairs memory and cognitive abilities.
<b>Longevity</b>	Contributes to a long and healthy life.	Increases the risk of premature death.

When sleep at the appropriate time, which is typically at night, it nourishes the body, improves mental clarity, and stabilizes emotions. On the other hand, getting too little or too much sleep can lead to a number of physical and mental health problems, such as exhaustion, depression, weakened immunity, and digestive problems.

### ***Brahmacharya:-***

*Brahmacharya* is a fundamental idea in *Ayurveda* that is sometimes misinterpreted as rigorous celibacy. Its definition and use, however, extend beyond simply refraining from sexual behaviour. According to *Aacharya Chakarpani*, controlling the senses, which promotes mental relaxation and facilitates *Bhramgyan* (learning about Brahma, means spiritual knowledge)<sup>(20)</sup> *Aacharya Dalhan* stated “*Samastindriyasaiyam*” This refers to controlling all of the *indriyas*’ (*Gyanedriyas*, *Karmendriyas*, and *Manas*) activity. It is the best course of action to follow in order to keep up a healthy lifestyle. While it is frequently linked to abstention from sexual activity (*maithuna*), practicing sexual activity responsibly also fits with *Brahmacharya*’s teachings by most of the *Aacharyas*. *Smarana* (thinking), *Keerthana* (saying), *Keli* (indulging), *Prekshana* (seeing), *Guhyabhashanam* (speaking with women in secret), *Sankalpa* (deciding), *Adhyavasaya* (starting), and *Kriyanivritti* (completing of coitus) are the *Ashta Maithuna*, as explained by *Yagyavalkya smriti*<sup>(21)</sup>. The larger goal of *Brahmacharya*—mastery over one’s senses and desires—is reflected in these guidelines, which place an emphasis on timing, moderation, and self-awareness. Therefore, self-control and mindful living, ethical conduct, achieve general well being and spiritual enlightenment rather than absolute celibacy—are the essential meaning of *Brahmacharya*.

### ***Microbiome:-***

The phrase “microbiome” describes the diverse group of microorganisms that live in different regions of the human body and other habitats, such as bacteria, viruses, fungus, and archaea. In regions such as the mouth, skin, gut, and respiratory and urogenital tracts, these microbial communities are particularly numerous and varied<sup>(22)</sup>. Microbiomes are not passive occupants; rather, they actively support critical physiological functions and are crucial for preserving health. Bacteria make up the majority of the various microbial species that make up human-associated microbiomes. Firmicutes, Bacteroidetes, Actinobacteria, and Proteobacteria are important bacterial phyla found in the gut.<sup>(23)</sup> These microorganisms coexist symbiotically with their host, and depending on lifestyle, habitat, and genetics, each individual’s makeup might differ significantly. There are distinct microbiomes in other parts of the body as well. For example, *Lactobacillus* species, which maintain an acidic environment to suppress harmful microorganisms, frequently dominate the vaginal microbiome, whereas *Staphylococcus epidermidis* and *Cutibacterium acnes* inhabit the epidermis<sup>(24)</sup>.

### ***Functions of the Microbiome:-***

Microbiomes carry out crucial functions required for host survival. In order to support colonocytes and preserve intestinal integrity, gut bacteria create short-chain fatty acids (SCFAs) like butyrate, break down complex carbohydrates, and synthesis vitamins (such as K and B12)<sup>(25)</sup>. Microbes teach the immune system to discriminate between benign and dangerous substances. This improves pathogen resistance and lowers the risk of autoimmune reactions<sup>(26)</sup>. Commensal microorganisms serve as a biological barrier on mucosal surfaces by competing with pathogens for nutrition and space. Neurological Impact: According to new study, there is a gut-brain axis in which microbial metabolites affect behaviour and brain function. Neurotransmitters like serotonin, which affect mood, anxiety, and cognition, are produced by gut microbes<sup>(27)</sup>.

### ***Components Affecting the Gut Microbiota:-***

The microbiome is shaped by a variety of internal and external factors. Infants born vaginally pick up germs from the mother’s birth canal, whereas neonates born via cesarean section are exposed to bacteria linked to the skin<sup>(28)</sup>. Diverse microbial populations are supported by diets high in fiber and fermented foods. Conversely, Western diets that are low in

fiber and heavy in fat decrease microbial diversity<sup>(29)</sup>. Eating a diet heavy in processed foods, sweets, and bad fats can have a detrimental effect on microbial diversity and composition, a diet strong in fiber, fruits, vegetables, and fermented foods fosters a varied and healthy gut microbiome. Microbial variability is influenced by stress, sleep patterns, physical activity, and personal cleanliness habits<sup>(30)</sup>

### Dysbiosis and Its Effects on Health:-

The imbalance in microbial populations, known as dysbiosis, has been connected more and more to a variety of illnesses. Disturbances in gut flora damage intestinal integrity and immunological responses, and it is closely linked to gastrointestinal illnesses such inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), and celiac disease<sup>(31)</sup>. A function in energy balance and metabolic control has been suggested by the correlation between altered gut microbiota compositions and metabolic diseases, such as obesity, type 2 diabetes, and non-alcoholic fatty liver disease<sup>(32)</sup>. Additionally, studies have linked dysbiosis to depression, Parkinson's disease, and autism spectrum disorders, suggesting that it may affect neurological health through the gut-brain axis<sup>(33)</sup>.

**Table01: Disorder and impact of gut microbes**

Category	Disorder	Gut Microbiome Impact	Health Consequences
Food-related	Unhealthy Diet (high sugar/fat, low fibre)	Decreased microbial diversity; overgrowth of harmful bacteria	Obesity, metabolic syndrome, inflammation, weakened immunity
	Eating Disorders (e.g., anorexia, bulimia)	Reduced beneficial bacteria; altered gut barrier function	Malnutrition, hormonal imbalance, mood disturbances
	Irregular Eating Patterns	Disruption of circadian rhythm in gut microbes	Gastrointestinal discomfort, poor nutrient absorption
	Processed Foods & Low Fiber	Dysbiosis; reduced beneficial microbes; increased gut permeability	Allergies, inflammatory diseases, increased susceptibility to infection
	High Saturated Fat Intake	Promotes growth of pro-inflammatory bacteria	Cardiovascular diseases, systemic inflammation
	Low Nutrient Diet & Additives	Weakens gut lining; alters immune signaling	Autoimmune diseases, impaired immunity
Sleep-related	Chronic Sleep Deprivation	Reduced microbial diversity; altered Firmicutes/Bacteroidetes ratio	Increased risk of obesity, diabetes, cognitive decline
	Irregular Sleep-Wake Cycles (e.g., shift work)	Disrupted gut microbiota rhythmicity	Hormonal dysregulation, digestive issues
	Poor Sleep Quality	Impaired microbial circadian rhythm and immune function	Increased susceptibility to infections, worsened cardiovascular and autoimmune conditions
Brahmacharya	Hypersexual Behaviour/Excessive Sexual Activity	Stress affects gut-brain axis; may dysregulate hormones	Fatigue, mood instability, focus problems
	Repressed Sexuality/Stress from Suppression	Chronic stress affects microbial balance and gut barrier	Anxiety, IBS, immune suppression
	Regulated Sexual Behaviour (Brahmacharya)	Promotes hormonal balance; supports stable gut-brain axis	Enhanced vitality, immune support, emotional balance
Combined Effects	Cardiovascular Diseases	Inflammation from diet and poor sleep disturbs microbial composition	Arterial stiffness, high BP, poor heart health
	Autoimmune Diseases	Gut barrier dysfunction; immune overactivation due to diet/sleep/emotions	Chronic inflammation, fatigue, tissue damage
	Inflammatory Bowel Disease (IBD)	Triggered by processed food, stress, and sleep issues	Gut inflammation, pain, bowel irregularities

### Ayurveda and Gut Microbiome:-

Microbiome are the colony of microorganism present in large intestine which are helps in maintenance of PH of the gut and also helps in absorption of the food that means if gut microba is well in the ratio then absorption will be good, if this ratio disturbs it will create diseases<sup>(34)</sup> and *Ayurveda* knows it from very beganing tht every disorders starts from the “*Mandaagni* (digestive power)” which further leads to “*Ajeerna*” which is a root cause of almost every disorder<sup>(35)</sup>. *Acharya Charaka* stated that if there is no Agni that means person is dead and if the Agni is proper then the person will have long lifespan because *Agni* is a seat of digestion, Good *Agni* means proper digestion which further leads to proper absorption and assimilation<sup>(36)</sup>. This *Agni* present at *Aamashya* and *Pakwashya madhya* (in between stomach and intestine)<sup>(37)</sup> Futhermore, There is 2 brain in human body one is CNS brain and other one is Gut brain (enteric nervous system) these are connected with vagus nerve<sup>(38)</sup> and *Ayurveda* says that to maintain the healthy status of *Pakwashya*



(Gut) keep *vaat dosha* under control means seat of *Vaat* is *Pakwashya* and all diseases start from Gut<sup>(39)</sup>. Gut indirectly influence the main brain, for instance *Basti* procedure used in this regard which is consider as *Half chikitsa* (half treatment) to keep the *Vaat* under control keep the *Pakwashya* (Gut) balanced<sup>(40)</sup>. Additionally, In *Ayurveda* importance of food also taken into consideration, *Takra* (buttermilk) is recommended for use in conditions like *Mandagni* (reduced digestive strength) because it is *deepaniya* in nature and *Grahani* (irritable bowel syndrome)<sup>(41)</sup>. Buttermilk also contains *Lactobacillus*, (part of microbiome) that aids in effective digestion and nutritional absorption, according to recent studies. *Takra* is a natural probiotic which aid in immunological regulation, gut barrier strengthening, and bacterial growth inhibition<sup>(42)</sup>. Consuming foods high in probiotics on a daily basis (such as curd, buttermilk, pickles, kanji etc) can significantly improve the gut microbiome's stability and diversity Via neuronal connections, immunological signaling molecules, and neurotransmitters, the gut microbiota interacts with the central nervous system through the gut-brain axis to affect mood, behaviour, and cognitive processes<sup>(43)</sup>. In *Ayurveda*, It's crucial to eat while feeling relaxed and positive state of mind. If a person is overtaken by emotions like anxiety, grief, fear, wrath, restlessness, or irritability as a result of not getting enough sleep, digestion may be compromised even when they are eating healthful food in the proper amounts<sup>(44)</sup>. When the mind is clouded by greed, ignorance, desire, attachment, jealousy, shyness, arrogance, enthusiasm, or fear, eating should be avoided<sup>(45)</sup>. *Ama*, or toxins from undigested food, and other metabolic diseases might result from these negative emotions' disruption of digestion<sup>(46)</sup>. The three types of *Kostha* (gut constitution) described by *Ayurveda* each represent a unique gut microbiome profile of an individual and are influenced by *Prakruti* (inherent nature), *Vikruti* (current health imbalances), and *Satva* (mental state) as well as external factors like age, seasonal changes, lifestyle choices, and digestive capacity. *Mridu Kostha* (*Kapha*-dominant) is associated with slow digestion and a tendency toward lethargy, while *Madhya Kostha* (*Pitta*-dominant) reflects a stable and effective digestive process<sup>(47)</sup>. It's interesting to note that these ancient classifications bear a striking resemblance to the modern microbiological concept of enterotypes, which are microbiome patterns typically dominated by *Bacteroides*, *Prevotella*, or *Ruminococcus* species. The digestion and gut play leading roles in immunity also. *Ayurveda* speaks about a substance or a process called *Ojas*, (the finest product of healthy digestion), which strengthens the immune system and has many beneficial effects on the mind and body<sup>(48)</sup>. According to contemporary science, The structural, metabolic, and defensive roles of the intestinal lining are greatly aided by enteric bacteria, which are also essential for preserving the gut's inherent defenses<sup>(49)</sup>. A healthy digestive system not only boosts immunity but also improves mental clarity, energy levels, skin health, metabolism, weight control, and general strength. To put it briefly, gut health has a significant influence on the body's immune system and preserving gut health is essential to attaining general wellbeing.

### Discussion:

The basic principles of *Ayurveda*, specifically the theory of *Trayopastambha* i.e., diet (*Aahaara*), sleep (*Nidra*), and regulated lifestyle (*Brahmacharya*) is consistent with the emerging understanding of the crucial role of gut microbiome in maintaining health. We know that the gut has a big hand in controlling immunity, digestion and metabolism; more recently, research has added mental well-being to that list. With its exceptional genetic diversity, the gut microbiome is essential for shaping how the body reacts to internal and external stimuli. This holistic approach in *Ayurveda*, which emphasizes balance within the body, tallies with contemporary research that obliterates (dysbiosis) in the gut microbiome drives a spectrum of chronic diseases such as inflammatory bowel disease, obesity and diabetes cardio-vascular condition and neuropsychiatric illness. The *Ayurvedic* principle of tailoring diet to the individual's *Dosha*, or constitution, aligns with current findings which emphasize the importance of personalized nutrition in maintaining microbial diversity and balance. *Ayurveda* stresses the role of recuperative sleep (*Nidra*) and balanced, routine living (*Brahmacharya*) to sustain gut health, immune strength and mind wellness. Now, a new study reports what followers of these traditions have known for centuries: chronic stress and poor sleeping habits can lead to changes in gut microbiota populations. When combined, microbiome science and *Ayurveda* philosophy share the ideation that health is produced via a delicate interdependence of the mind, body, diet and lifestyle. Combining these perspectives might offer a comprehensive conceptual basis for improving gut health and reducing disease risk stemming from microbial dysbiosis.

### Conclusion:

Both modern microbiome science and *Ayurvedic* wisdom concur on a principle that is fundamental to health according to both of these systems: the principle of balance — in diet, sleep, and overall lifestyle. *Ayurveda*'s concept of *Trayopastambha* the three pillars of health, is a model that has stood the test of time and remains relevant in light of newer scientific knowledge about human microbiome diversity and its resilience.

People can optimally develop gut health, immunity, cognitive function and reduce the risk of chronic disease with a comprehensive plan that encompasses customized diet therapy along with restorative sleep and intentional lifestyle practices. The union of time tested philosophy and emerging scientific facts describes the opportunity to combine preventive *ayurvedic* strategies with microbiome targeted treatments for longevity and vitality.

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