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ANALYZING THE CORRELATION BETWEEN THE COMPOSITION OF THE HUMAN GUT, SKIN, AND ORAL MICROBIOTA AND INDIVIDUAL CONSTITUTION I.E. PRAKRITI AS DESCRIBED IN AYURVEDA

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ABSTRACT

Ayurveda has a profound historical background and is intricately interwoven with Indian culture. The concept of *Prakriti*, which defines an individual's unique constitution based on the balance of the three doshas (*Vata*, *Pitta*, and *Kapha*), plays a central role in personalized health management. While studies suggest that *Prakriti* has a genetic foundation, there is still a lack of extensive evidence directly associating it with disease manifestation. Recent next-generation sequencing research has established a connection between variations in the human gut, oral, and skin microbiomes and their impact on an individual's overall health and well-being. In *Ayurveda*, *Prakriti* (an individual's unique constitution based on *Vata*, *Pitta*, and *Kapha* doshas) influences the composition of the gut, oral, and skin microbiomes, affecting overall health and well-being. Gut Microbiome of *Vata Prakriti* individuals may have lower microbial diversity,

leading to digestive irregularities, while *Pitta Prakriti* is associated with pro-inflammatory bacteria, increasing susceptibility to acidity and gut inflammation. *Kapha Prakriti* tends to have a stable microbiome but a higher risk of sluggish digestion and weight gain. Oral Microbiome of *Vata* types may experience dry mouth and gum recession, *Pitta* types are prone to acidity-related dental issues, and *Kapha* types may have excess mucus, increasing the risk of plaque buildup. Skin Microbiome of *Vata* skin is dry and prone to irritation due to reduced microbial diversity, *Pitta* skin is more acne-prone due to excessive oil production and inflammatory bacteria, while *Kapha* skin is oilier but more resilient to aging. Understanding these microbiome variations through the lens of *Prakriti* can help personalize dietary, lifestyle, and healthcare interventions, aligning with Ayurvedic principles for holistic well-being.

KEYWORDS: Ayurveda, Prakriti, Microbiome, Doshas, Gut health.

INTRODUCTION

Ayurveda, as a branch of "*Upveda*," is an ancient field of knowledge with a deep-rooted history and significance in Indian culture.[1] It embodies the Indian approach to "personalized medicine,".[2] with its primary focus on maintaining health and eliminating disease.[3] *Ayurveda* emphasizes disease prevention and management by prioritizing the host rather than the disease itself.[4] A major aspect of its practice is understanding the manifestation and progression of diseases in relation to the host's factors,.[5] such as environmental influences, lifestyle habits, diet, and the use of herbal and traditional remedies, making it highly tailored to the individual. These treatment methods closely align with contemporary medical trends that emphasize disease management through lifestyle and dietary modifications.[6]

Introduction to the human gut, oral, and skin microbiomes and their role in health.[7] The microbiome refers to the trillions of microorganisms, including bacteria, fungi, and viruses, that inhabit various parts of the human body. These microbes play a vital role in maintaining overall health and supporting physiological functions such as digestion, immunity, and protection from harmful pathogens.[8] The gut microbiome, oral microbiome, and skin microbiome are the primary microbial communities that contribute significantly to the body's well-being.[9]

Gut Microbiome

The gut microbiome is located primarily in the intestines and consists of trillions of bacteria such as Firmicutes, Bacteroidetes, Actinobacteria, and Proteobacteria. These beneficial bacteria assist in digesting food, producing vitamins, regulating the immune system, and maintaining gut health. A balanced gut microbiome is essential for digestive function, metabolism, and mental well-being. Key beneficial bacteria like Lactobacillus, Bifidobacterium, and Faecalibacterium prausnitzii promote gut health, support immune defense, and help prevent diseases like inflammatory bowel disease (IBD) and obesity.[10]

Beneficial gut bacteria include

- **Lactobacillus**[11] Supports digestion, enhances nutrient absorption, and produces lactic acid, which prevents harmful bacteria from overgrowing.
- **Bifidobacterium**[12] Aids in breaking down dietary fiber, supports the immune system, and inhibits the growth of pathogenic bacteria.
- **Faecalibacterium prausnitzii**[13] Produces butyrate, a short-chain fatty acid that nourishes colon cells and has anti-inflammatory properties.

A balanced gut microbiome is essential for digestive function, metabolism, and mental well-being. Dysbiosis, or an imbalance in gut bacteria, has been linked to conditions such as inflammatory bowel disease (IBD), obesity, and mental health disorders.[14]

Oral Microbiome[15]

The oral microbiome is made up of microorganisms such as Streptococcus, Lactobacillus, Actinomyces, and Fusobacterium, which live in the mouth and are crucial for maintaining oral health. These microbes help break down food particles, protect against pathogenic bacteria, and maintain a healthy oral ecosystem. Streptococcus mutans is beneficial in maintaining a healthy balance, while an overgrowth of harmful bacteria can lead to dental cavities and gum disease. A balanced oral microbiome is also essential for preventing bad breath and supporting overall immune function.

Beneficial oral bacteria include

- **Streptococcus salivarius**[16] Inhibits the growth of harmful bacteria and supports oral health.
- **Lactobacillus reuteri**[17] Helps maintain a balanced oral microbiome and prevents gum disease.

- **Actinomyces naeslundii**[18] Contributes to the health of the oral cavity by preventing the colonization of pathogenic bacteria.

Maintaining a balanced oral microbiome is crucial for preventing dental cavities, gum disease, and bad breath. Good oral hygiene practices, such as regular brushing, flossing, and dental check-ups, are essential for supporting this microbial community.[19]

Skin Microbiome[20]

The skin microbiome comprises beneficial microorganisms such as Staphylococcus epidermidis, Propionibacterium acnes, Corynebacterium, and Lactobacillus. These bacteria act as a protective barrier against harmful pathogens, regulate the skin's immune responses, and help maintain moisture balance. A healthy skin microbiome is essential for preventing acne, eczema, and psoriasis. Staphylococcus epidermidis, in particular, plays a key role in protecting the skin from infections and promoting overall skin health.

Beneficial skin bacteria include

- **Staphylococcus epidermidis**[21] Produces antimicrobial peptides that protect against pathogenic bacteria and modulates the skin's immune responses.
- **Cutibacterium acnes**[22] Helps maintain skin pH and prevents colonization by harmful microbes.
- **Corynebacterium species.**[23] Contribute to skin health by preventing the overgrowth of pathogenic organisms.

A healthy skin microbiome acts as a protective barrier, preventing infections and inflammatory skin conditions such as acne, eczema, and psoriasis. Maintaining this balance involves proper skincare routines, including gentle cleansing and moisturizing, and avoiding excessive use of antimicrobial products that can disrupt the microbial equilibrium.[24]

Human Gut, Oral, Skin Microbiomes and *Prakriti*[25,28]

The human body is home to trillions of microorganisms that form distinct microbial communities in different parts of the body, collectively known as the microbiome. These microbial ecosystems—especially the gut microbiome, oral microbiome, and skin microbiome—play a fundamental role in maintaining digestion, immunity, skin health, and overall well-being. According to *Ayurveda*, an individual's unique constitution, or *Prakriti*, influences physiological and metabolic functions, including microbial diversity.

Understanding the connection between *Prakriti* and the microbiome can help develop personalized health and wellness strategies.

Gut Microbiome and Its Correlation with *Prakriti*[29,30]

The gut microbiome is one of the most diverse and essential microbial ecosystems in the body, regulating digestion, metabolism, immune function, and mental health. It consists mainly of bacteria from the Firmicutes, Bacteroidetes, Actinobacteria, and Proteobacteria phyla. The dominance of certain bacteria in an individual's gut has been correlated with Ayurvedic *Prakriti* types (*Vata*, *Pitta*, *Kapha*).

- ***Prakriti* Association**[31,32]

- ***Vata Prakriti*** (dominated by air and ether) may have lower microbial diversity, leading to irregular digestion and bloating. **Key bacteria:** Bacteroides fragilis, Lactobacillus.
- ***Pitta Prakriti*** (fire and water elements) tends to have higher levels of pro-inflammatory bacteria, increasing susceptibility to acid reflux and ulcers. **Key bacteria:** Helicobacter pylori, Escherichia coli.
- ***Kapha Prakriti*** (earth and water elements) is associated with a more stable gut microbiome, supporting strong digestion but also a tendency toward slower metabolism and weight gain. **Key bacteria:** Faecalibacterium prausnitzii, Bifidobacterium.

Oral Microbiome and Its Correlation with *Prakriti*[33,34]

The oral microbiome consists of bacteria, fungi, and viruses that influence oral health, digestion, and immune function. A balanced oral microbiome prevents issues such as cavities, gum disease, and bad breath.

- ***Prakriti* Association**[35]

- ***Vata Prakriti*** may have a drier oral environment, making them prone to bad breath and gum recession. **Key bacteria:** Streptococcus salivarius, Actinomyces naeslundii.
- ***Pitta Prakriti*** individuals, with their high fire element, tend to produce more acid, increasing the risk of cavities and gum inflammation. **Key bacteria:** Streptococcus mutans, Porphyromonas gingivalis.
- ***Kapha Prakriti,*** with its dominance of earth and water elements, is more prone to mucus accumulation, leading to oral bacteria overgrowth and plaque formation. **Key bacteria:** Lactobacillus reuteri, Fusobacterium nucleatum.

Skin Microbiome and Its Correlation with *Prakrit*[36]

The skin microbiome is composed of bacteria such as Staphylococcus epidermidis, Cutibacterium acnes, and Corynebacterium, which help maintain skin barrier function and prevent infections.

➢ ***Prakriti* Association[37,38,39]**

- ***Vata Prakriti*** individuals often have dry and sensitive skin, making them prone to eczema and irritation due to reduced microbial diversity. **Key bacteria:** Staphylococcus epidermidis, Cutibacterium acnes (low levels).
- ***Pitta Prakriti*** individuals have heat-prone, oily skin, leading to acne and inflammatory conditions caused by excess Cutibacterium acnes. **Key bacteria:** Cutibacterium acnes (high levels), Corynebacterium.
- ***Kapha Prakriti*** skin is generally thicker and oilier, making it more prone to clogged pores and fungal infections, but it also tends to be more resilient against aging. **Key bacteria:** Malassezia, Staphylococcus hominis.

Table No. 1: Correlation of Vaata, Pitta and Kapha gunas with human Gut, Oral and Skin Microbiomes.[40]

Sr. no.	Ayurvedic Insight		Microbiome Correlation		
	Dosha	**Guna**	**Gut microbiome**	**Oral microbiome**	**Skin microbiome**
1.	Vaata	**Ruksha** (Vata is characterized by dryness, irregularity, and lightness. The Ruksha (dry) guna reflects a tendency towards dryness in bodily systems.)	Individuals with dominant Vata Prakriti may show lower microbial diversity or reduced levels of mucus-producing microbes like Akkermansia muciniphila, which could lead to a drier gut lining, contributing to constipation or irregular bowel movements.	Vata-dominant individuals often experience dry mouth (xerostomia) due to reduced salivary flow. This dry environment favors acidogenic and cariogenic bacteria like Streptococcus mutans, which thrive in low-saliva conditions, potentially increasing the risk of dental caries and oral mucosal irritation.	lipid-dependent skin microbes such as Cutibacterium acnes and may instead favor resilient, desiccation-tolerant bacteria like Staphylococcus epidermidis. Dryness also reduces microbial diversity, potentially increasing susceptibility to skin irritation, cracks, and

					barrier disruption.
2.	Pitta	**Ushana** (Pitta is associated with heat, sharpness, and transformation. The Ushna (hot) guna reflects increased internal heat and metabolic activity.)	A Pitta-dominant gut may exhibit a higher abundance of bile-tolerant bacteria (e.g., Bilophila wadsworthia, Bacteroides spp.), which thrive in high bile acid environments typical of strong digestion and higher gut temperature — consistent with Ushna guna.	Pitta dominance may predispose to inflammatory oral conditions such as gingivitis or periodontitis. This environment may support higher levels of pro-inflammatory bacteria like Porphyromonas gingivalis and Prevotella intermedia, which are commonly linked to heat-associated oral disorders and periodontal disease.	Pitta individuals tend to have warm, oily, and sensitive skin. The heat and oiliness may support the overgrowth of pro-inflammatory microbes, such as Cutibacterium acnes and Malassezia spp., contributing to acne, rosacea, or other inflammatory skin conditions.
3.	Kapha	**Snigdha** (Kapha is defined by heaviness, stability, and lubrication. The Snigdha (unctuous) guna signifies moisture and cohesiveness.)	A Kapha-predominant gut might show higher levels of mucin-degrading bacteria or those associated with increased short-chain fatty acid (SCFA) production like Faecalibacterium prausnitzii, reflecting a more nourished and lubricated gut environment — in alignment with the Snigdha quality.	Kapha individuals typically have excess salivation and a well-lubricated oral cavity, supporting commensal and protective microbial populations such as Streptococcus salivarius and Actinomyces spp. This promotes oral health stability but may also predispose to plaque accumulation and coating on the tongue, which is characteristic in Kapha imbalance.	Kapha-dominant skin is typically thick, oily, and well-hydrated, promoting the growth of lipophilic microbes like Malassezia spp. and Cutibacterium acnes. While this supports a stable and protective skin microbiota, it may also predispose to clogged pores, seborrheic dermatitis, or fungal infections under poor hygiene or humid conditions.

					The oily nature promotes microbial richness, but with a tendency for biofilm formation if imbalanced.

DISCUSSION

Ayurveda and modern microbiome science—highlighting how both traditions converge around a shared principle: personalized medicine. Ayurveda, one of the oldest systems of holistic health, emphasizes the importance of individual constitution, or *Prakriti*, in diagnosing and treating disease. Similarly, microbiome research underscores how individual microbial ecosystems, such as those in the gut, mouth, and skin, profoundly influence health outcomes. This discussion explores how the Ayurvedic perspective and microbiome science complement each other in promoting personalized, preventive healthcare.

Ayurveda categorizes individuals into three main *Prakriti* types—*Vata*, *Pitta*, and *Kapha*—based on physical, psychological, and metabolic characteristics. These constitutional types are believed to influence everything from digestion to immunity and even disease susceptibility. Interestingly, recent microbiome studies have begun to validate these ancient insights by showing correlations between *Prakriti* types and microbiome compositions. For instance, *Vata* types, characterized by dryness and irregularity, often have lower gut microbial diversity, which may contribute to digestive issues like constipation. In contrast, *Kapha* types, marked by heaviness and moisture, tend to have a more stable microbiome, possibly due to higher levels of beneficial bacteria like *Faecalibacterium prausnitzii*.

The gut microbiome, central to both modern health paradigms and Ayurvedic practices, exemplifies this convergence. Ayurveda's dietary and lifestyle recommendations for each *Prakriti* aim to maintain gut health through balance. For instance, *Pitta* individuals, who are prone to inflammation, are advised to avoid spicy, oily foods, which aligns with findings that they may harbor more pro-inflammatory gut bacteria. Similarly, *Kapha* types benefit from lighter, drier foods to counterbalance their heavier constitution and reduce risks associated with slow metabolism and microbial overgrowth.

The oral and skin microbiomes are also discussed in relation to *Prakriti*. The oral cavity, a critical entry point for pathogens, is shown to differ among *Prakriti* types, with *Vata*

individuals more prone to dry mouth and related microbial imbalances, while *Kapha* individuals may experience excessive mucus and plaque accumulation. Ayurveda has long prescribed herbal mouth rinses, oil pulling, and dietary adjustments to manage such imbalances—practices now being validated by microbiome studies for their effects on bacterial populations.

Similarly, the skin microbiome, which plays a role in inflammation, barrier function, and infection prevention, reflects *Prakriti*-specific patterns. *Pitta* types, with their oily and heat-prone skin, may harbor more *Cutibacterium acnes*, making them susceptible to acne and inflammation. *Kapha* types, while having resilient skin, can suffer from clogged pores and fungal infections. Ayurveda's external therapies, such as herbal pastes, oil massages, and steam treatments, are thus not merely cosmetic but aimed at maintaining a healthy microbial ecosystem.

What makes this integrative perspective particularly compelling is its focus on host-centric health management. Rather than targeting the disease alone, Ayurveda and microbiome science both advocate modifying the internal environment—through diet, behavior, and lifestyle—to restore balance. This approach not only supports prevention but also provides tailored strategies for managing chronic and lifestyle-related diseases, which are often resistant to one-size-fits-all treatments.

CONCLUSION

The integration of Ayurveda and microbiome science offers a powerful framework for personalized health care rooted in both tradition and modern biology. Ayurveda's concept of *Prakriti*—the individual's unique physical and mental constitution—closely aligns with the modern understanding of microbiomes, particularly those of the gut, oral cavity, and skin. Each *Prakriti* type—*Vata*, *Pitta*, and *Kapha*—displays distinct microbial patterns that influence health outcomes, susceptibility to diseases, and response to treatments. For example, *Vata* individuals tend to have lower microbial diversity, which may lead to digestive and skin imbalances. *Pitta* types often show a predisposition to inflammation due to the presence of heat-associated microbes, while *Kapha* types, though microbially stable, are prone to mucus buildup and slower metabolism. These correlations mirror Ayurvedic principles, which advocate for customized dietary, lifestyle, and herbal interventions based on one's constitution. The convergence of these fields underscores a shared philosophy: focusing on the host's internal environment rather than just the disease. By maintaining microbial

balance through individualized care, both Ayurveda and microbiome science support preventive health, better disease management, and holistic well-being. As scientific research continues to validate these ancient insights, integrating Ayurveda with microbiome-based medicine holds promise for creating more sustainable, effective, and personalized approaches to health in the modern world.

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