

Probiotics and the Unani Paradigm of Health: A Critical Analytical Review

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ABSTRACT

The gastrointestinal tract harbors a complex microbial ecosystem that plays a central role in digestion, metabolic regulation, intestinal barrier integrity, and immune function. Disruption of this microbial equilibrium, termed dysbiosis, has been associated with gastrointestinal, metabolic, inflammatory, immune-related, and neurodevelopmental disorders. Probiotics, defined as live microorganisms that confer a health benefit when administered in adequate amounts, have therefore gained considerable scientific and clinical attention. The Unani system of medicine, although developed without the modern concept of microbiota, emphasizes gastrointestinal health, dietary regulation, and maintenance of internal equilibrium through the concepts of *mizāj* (temperament), *akhlāt* (humours), *quwwat ghādhīya* (nutritive faculty), and *ṭabīʿat* (innate healing power). This narrative critical review examines the conceptual and therapeutic relationship between contemporary probiotic science and the Unani paradigm of health through a critical analysis of relevant scientific and Unani literature. Particular attention is given to gut microbial balance, dysbiosis, immune modulation, digestion, and traditional fermented foods and preparations, including buttermilk, yoghurt, cheese, and fermented non-dairy products. The review identifies notable conceptual parallels between gut microbial homeostasis and *mizāj*, dysbiosis and *sūʿ-i-mizāj*, immunomodulation and *ṭabīʿat*, and digestive functions and *quwwat ghādhīya*. However, these relationships represent conceptual parallels rather than direct equivalents, as the two systems arise from distinct theoretical frameworks. Further microbiome-based investigations, pharmacological studies, and controlled clinical trials are warranted to scientifically evaluate the probiotic potential of traditional Unani dietary practices and explore their relevance to integrative healthcare.

Keywords: Gut microbiota, Mizāj, Probiotics, Ṭabīʿat, Unani medicine

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INTRODUCTION

The gastrointestinal tract harbors a complex ecosystem of microorganisms that plays a key role in the host's health. These microbiota offers many benefits to the host, through a range of physiological functions such as strengthening gut integrity or shaping the intestinal epithelium, harvesting energy, protecting against pathogens, and regulating host immunity. However, there is potential for these mechanisms to be disrupted as a result of an altered microbial composition, known as dysbiosis. Alterations in the gut microbiome can impair digestive and immune functions, contributing to the development of disorders such as obesity, diabetes, allergies, and inflammatory bowel disease. Growing evidence suggests that dysbiosis is associated with a broad spectrum of gastrointestinal, metabolic, inflammatory, immune-related conditions, and neurodevelopmental disorders underscoring the critical role of gut microbial homeostasis in maintaining overall health.^[1-4] Probiotics have gained attention as a means to restore microbial equilibrium and promote health. The term "probiotic" finds its roots in ancient Greek, and it means "for life." The term "probiotics" was used in 1965 by Lilly and Stillwell, who described them as factors secreted by one microorganism that stimulate the growth of another. Parker, in 1974, redefined the term as "organisms and substances which contribute to intestinal microbial balance" and, in 1989, Fuller inaugurated the modern era of probiotics by stating that there are live active cultures used in food fermentation, characterized microbial strains, which are used as additives to food products, and that probiotics have also been used in the form of dietary supplements, ointments, and beauty products (gels, soaps, etc.). Specifically, he referred to probiotics as a "live microbial feed supplement" beneficial to the host animal. At present, the most

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widely accepted scientific definition of probiotics, formulated in 2002 by the (Food and Agriculture Organization [FAO] of the United Nations) and the World Health Organization (WHO) is "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host." Different types of probiotics have different functions, and human health benefits have mainly been demonstrated for specific probiotic strains. Several genera are used as probiotics, including *Lactobacillus*, *Bifidobacterium*, *Bacillus*, *Pediococcus*, and several yeasts. Scientific data show the benefits of specific probiotics in certain types of gastrointestinal diseases: Irritable bowel syndrome, the elimination of *Helicobacter pylori*, inflammatory bowel disease, diarrhea, gastrointestinal disorders, allergic diseases (e.g., atopic dermatitis), non-alcoholic fatty liver disease, obesity, insulin resistance syndrome, type 2 diabetes, different types of cancer and the side effects associated with cancer, immune health, metabolic health, dental health, and brain health. Probiotics

are also being studied for a potential role as adjuncts in the treatment and prevention of COVID-19.^[2,5]

The Unani system of medicine, one of the oldest traditional healing systems, offers a holistic framework for understanding health and disease. Rooted in Greco-Arab medicine and enriched by scholars such as *Ibn Sina* and *Hippocrates*, it emphasizes the maintenance of health through the equilibrium of *akhlāṭ* (humors), balance of *mizāj* (temperament), and the regulatory action of *ṭabī'at* (the body's innate healing power).^[6-8] Central to this philosophy is the concept that efficient digestion and proper assimilation of food are essential for preserving physical and mental well-being.

Long before the advent of microbiology and modern probiotic science, Unani medicine highlighted the importance of gastrointestinal health and dietary regulation in disease prevention and treatment. *Buqrat* (Hippocrates, 460 BCE-370 BCE) stated, "All disease begins in the gut," while *Avicenna* (Ibn Sina) later emphasized, "The stomach is the house of disease, and diet is the head of healing."^[9,10] Classical Unani physicians regarded the gastro intestinal system as the foundation of bodily equilibrium and believed that its dysregulation leads to the production of abnormal humors and harmful metabolites, which subsequently contribute to disease development. This concept bears a notable resemblance to the modern understanding of dysbiosis, where disruption of gut microbiota composition is associated with gastrointestinal, metabolic, inflammatory, and neuropsychiatric disorders.

For centuries, Unani practitioners have employed natural dietary substances and fermented preparations such as yogurt, buttermilk, and other fermented products to improve digestion, stimulate appetite, strengthen intestinal function, and enhance resistance to disease. Although these interventions were not described in microbial terms, their therapeutic rationale closely parallels the contemporary concept of probiotics.

Despite their philosophical and functional convergence, the relationship between probiotics and Unani concepts remains scientifically underexplored. This review critically examines their conceptual and therapeutic links, existing evidence, and potential for advancing integrative healthcare research.

METHODOLOGY

This narrative critical review examined the relationship between probiotics, gut microbiota, and the Unani paradigm of health, with particular emphasis on *mizāj*, *akhlāt*, *ṭabī'at*, gastrointestinal function, and *ilāj bi'l-ghizā*. Relevant peer-reviewed articles, review papers, and classical and contemporary Unani texts were identified through literature searches of PubMed, Google Scholar, and relevant scientific and Unani literature, using combinations of the terms "probiotics," "gut microbiota," "dysbiosis," "immune regulation," "gastrointestinal disorders," "Unani medicine," "mizāj," "akhlāt," "ṭabī'at," and "ilāj bi'l-ghizā." Recent scientific literature was prioritized, while relevant foundational studies and authoritative Unani texts were retained for conceptual and historical context. The literature was critically analyzed and narratively synthesized to identify conceptual parallels, rather than direct equivalents, between contemporary evidence on gut microbiota and probiotics and the theoretical and therapeutic principles of Unani medicine.

PROBIOTICS: SCIENTIFIC BASIS AND CLINICAL RELEVANCE

FAO and WHO described the probiotic as "live microbes when administered in adequate quantities, confer health benefits on host organisms" Several bacteria belonging to the genera *Pediococcus*, *Lactococcus*, *Enterococcus*, *Streptococcus*, *Propionibacterium*, and *Bacillus* are considered potential microbes for probiotic status. The frequently used strains belong to the divergent group of *Bifidobacterium* and *Lactobacillus* that significantly affect health with various actions.^[11] The primary mechanisms of action of probiotics involve colonization and normalization of perturbed intestinal microbial communities in both children and adults; competitive exclusion of pathogens and bacteriocin production; microbial balance, and thus inhibit the proliferation of pathogens; and enzymatic activity and production of volatile fatty acids, namely, short-chain fatty acids (SCFAs) and branched-chain fatty acids (BCFAs), which play a role in the maintenance of energy homeostasis and regulation of functionality in peripheral tissues. In addition, probiotics increase intestinal cell adhesion and mucin production and modulate the activity of gut-associated lymphoid tissue and the immune system. Similarly, probiotic metabolites are able to interact with the brain-gut axis and play a role in behavior.^[4,5]

Probiotics have been shown to be effective in varied clinical conditions- ranging from infantile diarrhea, necrotizing enterocolitis, antibiotic associated diarrhea, lactose intolerance, relapsing *Clostridium difficile* colitis, *H. pylori* infections, inflammatory bowel disease to cancer, female uro-genital infection, and surgical infections.^[4,12-18] Their beneficial effects are mediated through restoration of microbial balance, inhibition of pathogenic organisms, strengthening of intestinal barrier function, and modulation of immune responses. Partial lactose digestion and stimulation of the intestinal mucosal lactase activity has been postulated as a possible mechanism against some types of diarrhea. *Lactobacilli* used in the fermented milk industry have active beta-galactosidase to decrease the lactose concentration in dairy products, which may affect the severity of osmotic diarrhea due to organisms as rotavirus. Lactic acid bacteria produce several metabolites such as fatty free acids, hydrogen peroxide, and bacteriocins, which prevent the growth of food borne pathogens in dairy products. Probiotics can also use enzymatic mechanisms to modify toxin receptors and block toxin mediated pathology.^[4]

UNANI PARADIGM OF HEALTH

Unani medicine, also known as Yunani or Greco-Arabic medicine, is an ancient holistic healing system with roots in ancient Greece and the Arab world. It has been in use for centuries in various parts of the world, including South Asia, the Middle East, and North Africa. Unani medicine is centered on the principles of balance and harmony within the body, and it considers diet as a fundamental element in maintaining and restoring health. It is based on the theory of the four *khilṭ* and the concepts of *mizāj* and *ṭabī'at*. Health is maintained through equilibrium among these factors, while disturbance of this balance leads to disease.^[19]

The principles of Unani system of medicine include:

Ṭabī'at (Nature)

It is a profound concept in Unani medicine, representing the body's inherent self-regulatory, restorative, and defensive

capacity. Derived from the Greek concept of *Physis*, it was regarded by Hippocrates as the principal healing force in disease and encompasses the structural, functional, and psychological characteristics of the human being. Unani scholars emphasize that ultimately *ṭabī'at*, rather than the physician or drug, cures disease; the physician's role is to support and facilitate its action through appropriate interventions. A strong *ṭabī'at* enhances resistance to disease, while a weakened one increases susceptibility.^[8,20] This concept parallels modern immunological understanding, in which the immune system provides the body's primary defense and therapeutic interventions support or modulate this inherent capacity.

Mizāj (Temperament)

Mizāj is perhaps the most clinically pivotal concept in Unani medicine and constitutes the most individualized dimension of the system. It refers to the characteristic quality that emerges from the mutual interaction and counteraction of the contrary qualities of the four elements- fire (Nār), air (Hawā), water (Mā'), and earth (Arḍ) a resultant quality distinct from any of the constituent elements alone. Each individual and organ possesses a unique constitutional temperament; accordingly, the gut is also understood to possess its own characteristic *mizāj*, which contributes to its normal physiological functioning. This baseline constitution, when disturbed, represents the pathological temperament known as *sū'-i-mizāj* (morbid temperament), which is the central target of Unani therapeutic intervention.^[8,20,21]

Akhlāṭ (Humors)

The doctrine of four humors, introduced by *Hippocrates* and elaborated by *Galen*, *Rhazes*, *Avicenna*, and subsequent scholars, constitutes the central pathophysiological framework of Unani medicine. The four humors, Dam, Balgham, Safra, and Sauda, are conceived as the four primary body fluids produced from ingested food through a process of progressive elaboration. In their physiologically appropriate state, these humors are regarded as *khiḷṭ ṭabī'ī* (humors with a normal temperament), whereas deviations in their qualitative or quantitative characteristics result in *khiḷṭ ghayr ṭabī'ī* (humors with an abnormal temperament).^[8,20,21]

Closely linked to this concept is *quwwat ghādhīya* (nutritive faculty), which is considered essential for the proper digestion, transformation, and assimilation of food, ultimately ensuring the balanced formation of humors and sustaining vitality. Impairment of digestive function disrupts this process, leading to the production and accumulation of abnormal humors, which serve as a basis for disease development.^[20]

ANALYTICAL CORRELATION BETWEEN PROBIOTICS AND UNANI CONCEPTS

A detailed analysis reveals important conceptual parallels between probiotics and Unani principles, as shown in Table 1.

In the Unani framework, gastrointestinal health is closely related to *Quwwat Ghādhīya* and the *mizāj* of the gut, which are considered important for maintaining gastrointestinal and systemic physiological balance. The maintenance of an appropriate gut *mizāj* is also associated with the formation and regulation of *akhlāṭ* (humors). From a modern perspective, the gut microbiota contributes to host physiology through enzymatic activities and

Table 1: Analytical correlation between probiotics and Unani concepts

Modern concept	Unani concept	Analytical interpretation
Gut microbial balance	<i>Mizāj</i>	Both concepts emphasize the maintenance of equilibrium of the gut as a prerequisite for health and normal physiological functioning. Disturbance in microbial composition in modern science and imbalance of temperament of gut in Unani medicine are both considered as the factors in disease development. Probiotics enhance immune responses through modulation of host immunity, while <i>ṭabī'at</i> represents the body's innate self-regulatory and defensive capacity. Probiotics promote efficient digestion and nutrient absorption, conceptually aligning with <i>quwwat ghādhīya</i> , the Unani nutritive faculty responsible for digestion and nourishment. ^[22]
Dysbiosis	<i>Sū'-i-mizāj</i>	
Immunomodulation	Strengthening of <i>ṭabī'at</i>	
Digestion	<i>Quwwat Ghādhīya</i>	

the production of microbial metabolites, particularly volatile fatty acids such as SCFAs and BCFAs, which contribute to energy homeostasis and the regulation of peripheral tissue functions. Probiotics may additionally enhance intestinal epithelial cell adhesion and mucin production, while modulating gut-associated lymphoid tissue and systemic immune responses. These microbial activities and metabolites can be viewed as a modern physiological context for understanding the broader Unani emphasis on gastrointestinal function, *mizāj* of the gut, and the generation of biologically active substances associated with systemic balance. However, *akhlāṭ* and microbial metabolites represent distinct concepts within different theoretical frameworks and should not be considered direct equivalents.

UNANI ALTERNATIVES WITH PROBIOTIC LIKE EFFECTS

Although the Unani system does not explicitly describe probiotics, several dietary and herbal interventions exhibit functional similarities by promoting digestion and supporting gut health.

Traditional Unani practice includes the use of fermented foods such as:

- Chhachh and Lassi (Buttermilk)
- Yoghurt (Curd)
- Paneer
- Fermented non-dairy preparations

Chhachh and Lassi (Buttermilk)

Traditional Unani literature describes buttermilk as a digestive and therapeutic food with both beneficial and precautionary aspects depending on temperament, season, and associated ingredients. Buttermilk is considered beneficial particularly for individuals with

a hot temperament (*hārr mizāj*). It is considered useful in improving appetite, correcting bad taste in the mouth, relieving flatulence, reducing phlegmatic disorders, and managing gastrointestinal weakness. It has also been recommended for indigestion, dysentery, bilious diarrhea, bloody stools, and intestinal irritation, *sangrahni* (chronic diarrhea), piles, colic, excessive thirst, and inflammatory conditions of the gastrointestinal tract. Traditional Unani literature describes it as an appetizer and digestive tonic that helps to improve appetite and to promote healthy weight gain. It is believed to cool the body, reduce excessive heat and inflammation of the stomach and liver, relieve thirst, and calm excessive blood flow.^[23,24]

In pediatric and gastrointestinal conditions, buttermilk combined with bread, barley, or rice preparations has been recommended to improve digestion, reduce intestinal heat, and support nourishment. In some traditional practices, buttermilk was administered with specific dietary modifications to manage chronic dysentery and bowel disorders.^[23]

Yoghurt/Curd

It is considered more nourishing than buttermilk due to its higher fat content and its close similarity to buttermilk in terms of therapeutic properties. Due to its rich and moist nature, it provides strength and sustenance to the body. According to traditional understanding, curd generally does not produce harmful vapors or irritation in the stomach unless it is consumed in combination with incompatible foods, dominant humoral imbalances, or excessive bodily heat that disturbs digestion. It has been traditionally regarded as beneficial in conditions such as bilious diarrhea and bloody dysentery due to its soothing and restorative effects on the gastrointestinal tract. Furthermore, when the butter or excessive fat is completely removed and the curd is administered in a properly digestible quantity, it has been described in classical literature as supportive in chronic debilitating conditions, including tuberculosis, by helping to improve nourishment and bodily strength.^[24-27]

Paneer/Cheese

Cheese possesses significant nutritional and therapeutic value in traditional medicine. It is regarded as beneficial for the stomach, intestines, and kidneys, and is believed to support overall organ nourishment. Fresh cheese is also considered useful in improving appetite control and sustaining satiety.

Therapeutically, unsalted fresh cheese has been described as beneficial for joint and back weakness, intestinal ulcers, diarrhea, and fresh wounds. Traditional physicians also recommended it for reducing swelling and promoting wound healing. Boiled cottage cheese water was considered helpful in increasing breast milk production in nursing mothers. Cheese combined with herbs such as mint, walnut, and aniseed was believed to improve digestion and reduce some of its heavy and mucus-forming effects. Salted and aged cheese were considered more digestive and appetite-stimulating due to their warming and drying properties.^[27,28]

These fermented dairy products are recommended for strengthening digestion and improving gastrointestinal function. Modern studies confirm that fermented dairy products contain beneficial microorganisms, particularly *Lactobacillus* species, which help restore gut microbial balance and reduce the duration of diarrhea.^[11]

Fermented Non-dairy Preparations

Several non-dairy fermented foods and preparations such as *ābkāma/murri* (kanji), raw sirka, fermented cereals preparations, and fermented vegetables preparations used traditionally in Unani medicine may possess probiotic or microbiota-supportive potential, although most have not been scientifically validated as true probiotics according to modern criteria. In Unani practice, these foods were primarily valued for correcting *sū'-i-mizāj* (morbid temperament), stimulating appetite, and strengthening *quwwat ghādhīya* (nutritive faculty).

Conventionally, *ābkāma* has been used in the early stages of smallpox to prevent or reduce boils and pustules when applied to the eyes. Its gargle is beneficial for swelling of the lips and helps improve taste and oral odor. It produces warmth in the stomach and liver, softens greasy foods, and counteracts the harmful effects of excessive fatty intake. It is considered useful in colic, intestinal worms, sticky secretions, foul-smelling stools, abdominal discomfort, hip pain, vaginal discharge, intestinal ulcers, and abrasions. Its decoction is applied to festering ulcers and infected wounds, while *ābkāma* prepared from fish and salted meat is believed to prevent the spread of malignant wounds and promote strength and health.^[24,28,29]

According to *Muhammad ibn Zakariya al-Razi*, *murri* (*ābkāma*) acts similarly to salt but is stronger and subtler in action. It relieves constipation, removes thick gastric mucus, stimulates appetite, creates warmth in the stomach, and helps eliminate intestinal worms, though excessive use may lead to overeating and indigestion.^[28]

Contemporary studies have demonstrated the presence of lactic acid bacteria and fermentation-derived bioactive compounds in some of these foods, suggesting possible microbiota-modulating and functional probiotic potential.^[11,30]

DISCUSSION

The present review demonstrates important conceptual similarities between modern probiotic science and the Unani paradigm of health. Both systems emphasize the importance of internal balance, proper digestion, and maintenance of the body's natural defense mechanisms in preserving health and preventing disease. Modern medicine explains these processes through the gut microbiota, immune modulation, and metabolic regulation, whereas Unani medicine interprets them through concepts such as *mizāj* (temperament), *akhlāṭ* (humors), *quwwat ghādhīya* (nutritive faculty), and *ṭabī'at* (innate healing power). The modern concept of dysbiosis closely resembles the Unani idea of *sū'-i-mizāj of the gut*, where imbalance within the gut leads to disease development. Similarly, probiotics improve digestion, intestinal barrier function, and immunity, which functionally parallels the Unani emphasis on strengthening digestion and supporting *Ṭabī'at*.^[4,5,8,20,21]

Both systems also recognize alternatives such as curd, buttermilk, cheese, and certain fermented non-dairy preparations, exert probiotic-like effects by promoting gut health and microbial balance.^[4,11,23,24,27-30]

Despite these similarities, important differences exist. Modern probiotic science is supported by microbiological and clinical evidence, while Unani concepts are largely qualitative and philosophical in nature. Moreover, the probiotic potential of many traditional Unani fermented preparations has not yet been scientifically validated. Variability in probiotic strains, dosage,

preparation methods, and host response also remains a challenge in both traditional and modern applications.

Overall, this review suggests that significant scope exists for integrative and interdisciplinary research linking microbiome science with Unani principles. Future studies involving microbiome analysis, pharmacological evaluation, and controlled clinical trials are needed to scientifically explore the therapeutic relevance of traditional Unani dietary practices within the framework of contemporary probiotic research.

CONCLUSION

This review demonstrates that important conceptual similarities exist between modern probiotic science and the Unani paradigm of health, particularly regarding gastrointestinal balance, and the body's innate healing mechanisms. Traditional Unani fermented foods and dietary practices possess microbiota-supportive and probiotic-like properties that contribute to gastrointestinal and systemic health. Although these correlations are largely theoretical and require scientific validation, emerging microbiome research provides a promising framework for re-evaluating classical Unani concepts in the context of modern medicine.

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