

# INNOVATION OF TRADITION: EXPLORING AYURVEDA'S FUTURISTIC TRENDS IN MEDICAL SCIENCES

## Abstract

This chapter explores about the interconnection of Ayurveda with modern medical sciences, focusing on the importance of herbal drugs discovery. It also highlights the understanding of challenges of integrating diverse traditional medical systems particularly ayurveda and significance of understanding the theoretical differences and harmonies. This chapter investigates the significant role of ayurveda in futuristic medicinal sciences and about the global popularity of ayurveda as alternative therapy along with the origin of Ayurveda, its fundamental principles, and the timeless nature of Ayurvedic knowledge. Furthermore, the study explores about personalized healthcare, plant-based medicine, and the mind-body connection, offering insights into its possible applications, paving the way for a holistic healthcare approach.

**Keywords:** Natural Remedies, Holistic Healthcare, Ayurvedic Therapies And Treatments.

## Authors

### **Subbalakshmi G**

Assistant Professor  
Department of Biochemistry  
Padmashree Institute of Management  
and Sciences  
Bengaluru, India.  
shubagsl@gmail.com

### **Dr. Anuradha M**

Principal  
Padmashree Institute of Management  
and Sciences  
Bengaluru, India.

### **Dr. Shilpa P**

Assistant Professor  
Department of Clinical Nutrition and  
Dietetics  
Padmashree Institute of Management  
and Sciences  
Bengaluru, India.

### **Dr. Dhanalakshmi G**

Assistant Professor  
Department of Biochemistry  
Padmashree Institute of Management  
and Sciences  
Bengaluru, India.

## I. INTRODUCTION

Ayurveda stands as an ancient and revered traditional system of medicine that holds the potential to enrich the discovery of herbal drugs. The word Ayurveda is a Sanskrit term where “Ayur” means life and “Veda” means knowledge. It is commonly referred to as the “Knowledge of Life”. The fusion of knowledge from various traditional medicinal systems can pave the way for significant advancements in this field. However, a crucial obstacle in this journey lies in the lack of comprehensive understanding regarding the disparities and resemblances in the theoretical aspects of these diverse systems. This knowledge gap has hindered the progress of plant-based medicine discovery [21]. In this chapter, we explore about the significance of Ayurveda and its integration with other traditional systems, aiming to shed light on their combined potential for the discovery of herbal remedies. Ayurveda is an ancient system of medicine that sees the human body as a reflection of the universe.

In recent years, Ayurveda has experienced revival resurgence as a prominent player in the domain of futuristic medicinal sciences. This ancient system of medicine, with its roots in the Indian subcontinent, is proving to be more than just a traditional practice; it is emerging as a source of innovative insights and solutions for modern healthcare challenges.

The role of Ayurveda in futuristic medicinal sciences is multi-faceted, combining its time-tested wisdom with the latest advancements in modern medicine. As a result, this ancient healing system is playing a vital role in shaping the healthcare landscape of the future, offering a promising blend of tradition and innovation to benefit humanity's well-being [15].

Approximately 36% of American adults utilize various forms of complementary and alternative therapies. One question arises: are the effects experienced due to the actual properties of the herbs, individual genetics, or merely a placebo effect, where the mind aids in healing the body through the anticipation of a cure? [16]

In ancient cultures, traditional medicine like Ayurveda was passed down through generations via oral tradition or written texts. Ayurveda, which dates to 1500 BCE, examines the entire human body, and prescribes natural herbs to treat specific ailments. This practice has endured in India for over 5000 years [11].

Even today, traditional medicine is still practiced in some parts of the world and has found its way into modern healthcare settings. It is not uncommon for doctors to integrate western medicine with naturopathy, complementary and alternative medicine, holistic medicine, or other forms of traditional healing. Scientists have long been intrigued by Ayurveda's mechanisms and how these herbs interact with the body to produce specific effects. The advancement of technology today brings us closer to uncovering the mysteries behind the efficacy of traditional medicine [13].

It believes that our bodies are made up of five basic elements: space, air, fire, water, and earth. These elements combine to create three life forces called doshas - Vata, Pitta, and Kapha. Each person has a unique mix of these doshas, which influences their physical, mental, and emotional traits. Ayurveda uses this understanding to promote balance and well-being through various natural methods like herbal remedies, diet, and lifestyle changes

Another aspect of Ayurveda, known as Prakriti, examines an individual's natural constitution, divided into doshas (Vata, Pitta, Kapha). Researchers have investigated whether genetics may play a role in determining an individual's Prakriti classification. The study identifies specific genetic variants associated with a particular Prakriti type [17].

Recent studies have focused on herbs like Turmeric and Ashwagandha Rishta, as mentioned in ancient texts. Research has explored the medicinal properties of these herbs, such as their potential in treating neurological disorders and displaying anti-inflammatory effects. However, while promising, further in vivo and clinical studies are necessary to fully validate their benefits.

In our pursuit of better health, we often hear about various natural compounds like resveratrol, fish oil, or turmeric in the news. However, some of these claims might be based on preliminary research, and actual benefits may require further validation through in vivo studies and clinical trials. Additionally, the quality and potency of herbal supplements may also impact their effectiveness, with some products found to be of poor quality or contaminated [12].

Understanding the complexities of chemical compounds in herbs, their interactions with our bodies, and how our genetics influence our response to them is an ongoing challenge. As we look into the realm of personalized medicine, it is appreciated that not all treatments, whether traditional or western, work the same for everyone. It is intriguing to find that Ayurveda, with its knowledge of herbs and Prakriti, might hold some scientific validity. Uniting modern science with ancient traditional medicine opens up exciting possibilities for improving healthcare practices [14].

### 1. The role of Ayurveda in futuristic medicinal sciences encompasses several key aspects [11]:

- **Personalized and Holistic Healthcare:** Ayurveda's emphasis on individualized treatment based on one's unique constitution and imbalances aligns with the growing trend of personalized medicine. Integrating Ayurvedic principles into modern medical practices allows for a more holistic approach to healthcare, considering physical, mental, and emotional well-being.
- **Plant-Based Medicine and Natural Remedies:** In the face of increasing antibiotic resistance and the adverse effects of synthetic drugs, Ayurveda's reliance on plant-based medicines and natural remedies is gaining attention. The potential of these natural substances in preventing and treating various diseases offers a promising avenue for futuristic healthcare.
- **Mind-Body Connection:** Ayurveda recognizes the intricate link between the mind and body, emphasizing the impact of mental and emotional factors on physical health. Integrating this understanding into futuristic medical sciences can lead to more comprehensive treatment approaches that address both physiological and psychological aspects of health.
- **Preventive Medicine:** Ayurveda places a strong emphasis on preventive measures to maintain health and prevent diseases. Incorporating Ayurvedic practices into futuristic

medicine can promote a proactive approach to healthcare, reducing the burden of chronic diseases and healthcare costs.

- **Traditional Knowledge Meets Modern Science:** Ayurveda's vast repository of traditional knowledge is now becoming a subject of scientific exploration. Researchers are studying Ayurvedic formulations and practices to understand their mechanisms of action and potential applications in modern medicine.
- **Integrative Medicine:** The integration of Ayurveda into conventional healthcare systems is gaining momentum. As an integral part of integrative medicine, Ayurveda complements modern treatments and fosters a collaborative approach between traditional and allopathic practitioners.
- **Wellness and Lifestyle Management:** Ayurveda's focus on promoting a balanced lifestyle, including proper nutrition, exercise, and daily routines, aligns with the growing interest in wellness and preventive self-care in futuristic healthcare.
- **Global Recognition and Acceptance:** With its growing popularity worldwide, Ayurveda is finding a place alongside other medical systems, contributing to a diverse and inclusive approach to global healthcare.

## II. HISTORY

Ayurveda, an ancient system of medicine, originated in India over 5000 years ago during the Vedic period. Its wisdom and healing practices were passed down through generations of sages and healers before being compiled into written texts known as Samhitas. Notable among these texts are the Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya, which formed the foundation of Ayurvedic knowledge. The Gupta era saw significant advancements, with scholars like Charaka and Sushruta expanding the principles of Ayurveda and introducing the dosha theory and panchakarma therapies. Ayurveda's influence extended beyond India's borders, reaching neighbouring regions through trade and cultural interactions. Despite facing challenges and periods of decline, Ayurveda experienced a revival in the 18th and 19th centuries, and in the modern era, it has gained recognition as a valuable holistic healing system globally, integrating with mainstream healthcare practices and continuing to enrich lives worldwide [11].

Ayurveda is a very old system of medicine that started around 2nd Century BC. It was influenced by Hindu philosophical teachings like Vaisheshika and Nyaya. It is also related to a framework called Samkhya, which was established around the same time as Vaisheshika and Nyaya [15].

The Vaisheshika School emphasized the significance of observation and opinions in gathering vital information about a patient's medical condition, essential for effective treatment. Additionally, it classified the elements of any artifact into six distinct categories in Sanskrit: Dravya (substance), Vishesh (specific), Karma (action), Samanya (common), Samavaya (inherent), and Guna (quality). These classifications provided a profound understanding of the nature and attributes of medicinal substances, laying the groundwork for Ayurvedic formulations [20].

The Nyaya School propagated the fundamental belief that a comprehensive understanding of the disease and the patient's condition is paramount before initiating

treatment. This emphasis on thorough knowledge shaped the way Ayurvedic practitioners approached patient care, promoting accuracy and efficacy in their therapeutic interventions.

Over time, the Vaisheshika and Nyaya schools merged which brought about a profound impact on the propagation of Ayurvedic wisdom. This unified approach expanded the understanding of disease pathology, diagnostics, and treatment, elevating the reputation of Ayurveda as a respected healing system [1].

### III. IMPORTANCE OF AYURVEDA IN MODERN SCIENCE

Ayurvedic schools in India have been advocating for the scientific foundation of Ayurvedic principles, unlike the global trend. However, the lack of scientific appreciation among the Indian scientific community hindered collaboration between science and Ayurveda. Recently, Ayurveda has been making a comeback with stronger proof and support. Understanding Ayurveda's fundamentals has become crucial for its effective utilization. Some individuals have emerged as intermediaries, bridging the gap between Ayurveda and science, making it more accessible globally while preserving its essence.

Modern science supports the concept that five Tanmatras (basic formative particles) are the ancestors of their visible counterparts, resembling to electrons, protons, and neutrons combining to form atoms, elements, and compounds. Ayurveda echoes this idea, stating that everything in the universe is composed of only five basic elements. This indicates a conceptual similarity between modern science and Ayurveda in understanding substance generation [14].

The theory of Tridosha (Vata, Pitta, and Kapha) presents the Mahabhuta theory in a practical and comprehensible format for its application to human health. Tridosha represents the physico-biological properties of compounds formed through different combinations of Mahabhutas. It serves as the foundation for Ayurvedic physiology and clinical applications, where a balance of Tridosha signifies health, and an imbalance leads to disease.

Panchamahabhuta is responsible for creating both living and non-living things. Ayurveda's generalization that all substances on Earth have medicinal potential establishes the idea that everything can be considered medicine (Nanaushadhibhutam jagat kinchit).

In the 21st century, some crucial observations have helped rediscover the connection between modern science and Ayurveda. New models have emerged to understand Ayurvedic principles in ways accepted by the Western world. Ayurveda's philosophy has been linked to human physiology and behavioural science. Genomic studies have explored the theory of Prakriti, leading to possible personalized medical treatments based on Ayurvedic concepts [14].

Recent research supports Ayurvedic concepts like taste, after taste, special effects, and pharmacological impacts of medicinal plants. Ayurvedic pharmaceuticals are gaining new momentum with studies on Bhasma preparations, showing their nano-technological applications. Research on Bhasma demonstrated its composition and targeted cellular action, addressing concerns about heavy metal presence in Ayurvedic medicines.

Efforts have been made to reduce toxicity in Ayurvedic formulations through purification methods (Shodhana). Ayurveda's clinical applications, such as Rasayana for anti-aging, are being explored. Molecular science is now helping to understand Ayurvedic pharmacology, with insights into the mechanism of action of certain herbs. Ayurveda is being considered in cancer therapy, with common features between Ayurvedic and modern cancer concepts.

The components of ancient herbs now appear to target specific molecules known to play a role in cancer development. Several works have presented Ayurveda in a scientific and comprehensible manner. Reappraising Ayurveda with the knowledge of modern science can help understand it better and appreciate its scientific basis [18].

**Table 1: A Comparative Overview of Ayurveda and Modern Science [18, 19]**

Aspect	Ayurveda	Modern Science
Origin	An ancient system of medicine from India	Evolved from the scientific method and empirical data
Approach	Holistic, focusing on balance and individuality	Reductionist, seeking cause-and-effect relationships
Theoretical Foundation	Rooted in ancient texts and philosophical concepts	Based on scientific theories and empirical evidence
Understanding of Body	Doshas (vata, pitta, kapha) and prakriti (individual constitution)	Anatomy, physiology, and genetic makeup
Treatment Methods	Herbal medicines, diet, lifestyle adjustments	Pharmaceuticals, surgery, advanced medical technology
Personalized Medicine	Emphasizes individualized treatments based on constitution	Growing interest in personalized medicine and genomics
Mind-Body Connection	Recognizes the interconnectedness of mind and body	Acknowledgment of mind-body interaction and health
Disease Prevention	Focus on maintaining balance and prevention	Emphasis on preventive medicine and vaccinations
Research Validation	Historical evidence and some modern research studies	Extensive scientific research, clinical trials, and studies
Global Recognition	Gaining popularity worldwide	Universally recognized and practiced

#### IV. EXPLORING AYURVEDIC THERAPIES AND TREATMENTS

Ayurveda embraces a holistic view of health, considering the interconnectedness of the mind, body, and spirit. It recognizes that imbalances in any aspect of life can impact an individual's health and well-being. The concept of Ojas, the vital essence that nurtures the body and mind, underscores Ayurveda's focus on building resilience and immunity to prevent

diseases. Ayurveda is an ancient holistic approach to health, promoting balance and well-being. Integrating Ayurvedic practices is vital for achieving overall wellness. Scientific studies highlight the healing benefits of herbs like ashwagandha and vasa, showing anti-stress, anti-inflammatory, and other properties. Ayurveda adopts various modalities like yoga, meditation, Panchakarma therapies, and personalized diets to alleviate stress and chronic diseases. Integrating Ayurveda with modern healthcare can promote optimum health and prevent chronic ailments. Comprehensive Healing in Ayurveda through diagnosis, therapies, and relevance in modern healthcare is explained below [11,19].

- 1. Diagnosis and Assessment:** Ayurvedic diagnosis involves observing and evaluating an individual's physical, mental, and emotional states through techniques like Pulse Diagnosis (Nadi Pariksha), Tongue Examination (Jihva Pariksha), and the Eightfold Examination (Ashtavidha Pariksha). This personalized assessment enables practitioners to identify Dosha imbalances and tailor treatments accordingly.
- 2. Lifestyle and Diet:** In Ayurveda, lifestyle and diet are considered powerful tools for healing. Following a daily routine (Dinacharya) and seasonal regimen (Ritucharya) helps align individuals with nature's rhythms. Ayurveda advocates individualized dietary guidelines (Aharvidhi Vidhan) that consider one's constitution, current imbalances, and specific health needs.
- 3. Ayurvedic Herbal Medicine:** Herbs and medicinal plants play a vital role in Ayurveda's healing arsenal. Ayurvedic practitioners employ various herbs and formulations to address specific health conditions and promote wellness. The science of Ayurvedic pharmacology and dosage ensures safe and effective use of herbal remedies.
- 4. Ayurvedic Therapies and Treatments:** Ayurveda offers a range of therapeutic interventions to detoxify, rejuvenate, and restore balance in the body. Panchakarma, a set of five cleansing actions, aids in the elimination of toxins. Abhyanga, an Ayurvedic oil massage, promotes relaxation and nourishment. Shirodhara, the pouring of warm oil on the forehead, soothes the nervous system. Basti, an enema therapy, aids in cleansing and rejuvenation.
- 5. Integrating Yoga and Meditation:** Ayurveda recognizes the synergy between Yoga and healing. Yoga practices, including asanas (postures), pranayama (breathwork), and meditation, complement Ayurvedic therapies by enhancing physical strength, mental clarity, and emotional balance.
- 6. Relevance in Modern Healthcare:** Ayurveda's holistic approach to healing finds relevance in modern healthcare systems. Integrative medicine embraces Ayurveda's personalized approach and preventive strategies to complement conventional treatments.

Ayurveda's concepts and principles may appear simple and universal, but their true sophistication becomes evident in their practical applications for diagnosing and treating health issues. This ancient system's perspective on nature, the universe, and its connection with human beings offers valuable opportunities for advancements in present-day health and nutrition research.

Understanding health, food, and nutrition in Ayurveda provides profound insights into its relevance in contemporary research. It lays a strong foundation for further exploration and enhances our comprehension of Ayurveda's role in modern healthcare. By embracing Ayurveda's wisdom, we can unlock its potential for improving overall well-being and promoting holistic health in today's world.

## V. AYURVEDIC MEDICINAL PLANTS: A BRIEF OVERVIEW

Around 60% of the world's population, both in developing and developed countries, turns to alternative medicines, a significant portion of which is derived from traditional plant sources. The vast Indian subcontinent is a treasure trove of medicinal flora, contributing to both primary healthcare in rural areas and complementing modern medical practices. While traditional systems rely on herbs, minerals, and organic matter, medicinal plants take center stage in crafting herbal remedies. This age-old practice remains integral to India's healthcare, supporting around 70% of its rural population through the Ayurvedic system [10].

In Western countries, herbal medicine use is surging, now embraced by approximately 40% of the populace due to escalating concerns about modern medication's side effects, adverse reactions, and costs. India stands as the foremost producer of medicinal plants, boasting a massive pool of over 250,000 registered Ayurvedic practitioners compared to around 700,000 modern medical counterparts. Among India's extensive botanical diversity, about 20,000 medicinal plants have been documented, yet traditional healers leverage only 7,000–7,500 species for disease management [12].

Distinct systems of Indian traditional medicine, including Ayurveda, Siddha, Unani, Homeopathy, and Tibetan practices, allocate different plant resources for their remedies, with a cumulative impact on healthcare. More than 25,000 potent plant-based formulations drive India's traditional and folk medicine, supported by a network of more than 1.5 million practitioners, this dynamic sector encompasses 7800 manufacturing units, caters to the demand for natural health products and traditional plant-derived formulations, necessitating an annual supply of over 2000 tons of medicinal plant materials. The market also boasts over 1500 herbal products sold as dietary supplements or cultural indigenous treatment.

These alternative medicines provide solace to those unaided by conventional treatments, and several medicinal plants with nutraceutical potential continue to play pivotal roles in traditional healing practices.

Turmeric (*Curcuma longa* L.), a staple in Ayurvedic medicine, is known for its anti-inflammatory, antioxidant, and digestive properties. It has been used to alleviate joint pain, enhance digestion, and promote overall well-being. Contemporary research has extensively focused on its active compound, curcumin, revealing its potential to manage conditions such as arthritis, cardiovascular diseases, and neurodegenerative disorders [5,17].

Ashwagandha (*Withania somnifera* (L.) Dunal) holds a revered place in Ayurveda as an adaptogen, aiding stress management and vitality. Traditional uses encompass mental clarity, immunity boosting, and energy enhancement. Recent studies suggest anti-stress, anti-anxiety, and immune-modulating effects, while exploring its potential in cognitive support and managing stress-related disorders [8].



Tulsi (*Ocimum sanctum* L.), or holy basil, is a sacred plant in Ayurveda known for enhancing immunity, respiratory health, and overall well-being. Its historical uses are underpinned by modern research revealing potential antioxidant, anti-inflammatory, and immunomodulatory effects. Contemporary investigations also highlight its role in supporting respiratory health, stress management, and immune enhancement [4].

Amla (*Phyllanthus emblica* L.), Indian gooseberry, a vitamin C-rich fruit, finds its place in Ayurveda for rejuvenation and antioxidant benefits. Utilized to aid digestion, promote hair and skin health, and boost immunity, modern research confirms its potential by showcasing its antioxidant prowess, contributing to skin health, supporting the immune system, and combating oxidative stress [7].

Neem (*Azadirachta indica* A. Juss.), known for antimicrobial properties, has historical significance in purifying the blood, supporting skin health, and detoxification. Research investigates into its wound healing, immune modulation, and skin health properties, validating its traditional uses [6].

Brahmi (*Bacopa monnieri* (L.) Pennell), a cognitive enhancer in Ayurveda, has been studied for its neuroprotective effects, cognitive improvement, and potential in managing stress-related disorders, aligning with its traditional role in mental clarity and relaxation [1].

Triphala, a blend of amla, bibhitaki, and haritaki, functions as a gentle detoxifier in Ayurveda, promoting digestive health and overall well-being. Its modern exploration highlights potential antioxidant, anti-inflammatory, and digestive effects, as well as contributions to gut health [3].

Guggul (*Commiphora wightii* (Arn.) Bhandari), endorsed in Ayurveda for joint health and cholesterol management, shows potential in anti-inflammatory and lipid-lowering effects as per contemporary research [2].

Shatavari (*Asparagus racemosus* Willd.), in Ayurveda is known for women's reproductive health, aligns with modern studies indicating adaptogenic and hormone-modulating effects, promising support for female reproductive health [12].

*Garcinia cambogia* (Gaertn.) with traditional culinary applications, has gained modern interest for weight management, appetite suppression, and lipid profile enhancement, though caution is advised due to variable research outcomes [13].

Bitter melon (*Momordica charantia* L.), historically celebrated for its bitter taste, showcases potential blood sugar regulation, antioxidant properties, and anti-diabetic effects, though research outcomes may vary [13].

Ginger (*Zingiber officinale* Roscoe), a culinary and medicinal staple, boasts anti-inflammatory, digestive, and immune support properties, attributed to its bioactive compounds with individualized responses [13].

Pippali (*Piper longum* L.), valued in Ayurveda for its warmth, has been subject to recent studies highlighting its potential contributions to digestive support, anti-inflammatory effects, and overall well-being, though ongoing research is essential [13].

Moringa (*Moringa oleifera* Lam.), historically treasured for its nutritional value, is a subject of contemporary exploration due to its antioxidant defense, blood sugar regulation, and overall health support potential. The variable outcomes emphasize the need for cautious interpretation [18].

Guduchi (*Tinospora cordifolia*), historically revered for its medicinal properties, is currently undergoing modern scrutiny for its potential health benefits. It has garnered attention for its immunomodulatory effects, liver protection, and overall well-being support. However, the diverse research outcomes underscore the importance of thoughtful consideration and further investigation [11].

**Table 2: Exploring Ayurvedic Medicinal Plants: Benefits and Key Compounds at a Glance**

Medicinal Plant	Traditional Benefits	Important Compounds
Turmeric ( <i>Curcuma longa</i> L.),	Anti-inflammatory, antioxidant, digestive support, joint pain relief	Curcuminoids, curcumin [5,17]
Ashwagandha ( <i>Withania somnifera</i> (L.) Dunal)	Adaptogen, stress relief, mental clarity, immune support	Withanolides, withaferin A [8]
Tulsi ( <i>Ocimum sanctum</i> L.)	Immune system support, respiratory health, stress reduction	Eugenol, rosmarinic acid [4]
Amla ( <i>Phyllanthus emblica</i> L.)	Rejuvenation, antioxidant, digestion, skin & hair health	Vitamin C, tannins [7]
Neem ( <i>Azadirachta indica</i> A. Juss.)	Antimicrobial, detoxification, skin health	Nimbin, nimbidin [6]
Brahmi ( <i>Bacopa monnieri</i> (L.) Pennell),	Cognitive enhancement, memory support, stress reduction	Bacosides [12]
Triphala	Cleansing, detoxification, digestive health	Tannins, gallic acid [2]
Guggul ( <i>Commiphora wightii</i> (Arn.) Bhandari)	Joint health, inflammation reduction, cholesterol support	Guggulsterones [2]
Shatavari ( <i>Asparagus racemosus</i> Willd.),	Women's reproductive health, hormonal balance, fertility	Saponins, flavonoids [12]

Medicinal Plant	Traditional Benefits	Important Compounds
Garcinia cambogia (Gaertn.)	as appetite suppression, support for weight management	Hydroxycitric acid (HCA)[13]
Bitter melon (Momordica charantia L.),	support digestion, manage blood sugar levels, and as a traditional remedy for various ailments.	vitamins, minerals, and antioxidants[13]
Ginger (Zingiber officinale Roscoe)	Promote digestive health, anti-inflammatory, and supports immune function	Gingerol, Zingerone, volatile oils, phenolic compounds and antioxidants[13]
Pippali (Piper longum L.),	Potent activator for digestive and respiratory system, increase bioavailability and increase absorption of other ingredients	Piperinic acid, alkaloids, lignans and esters.[13]
Moringa (Moringa oleifera Lam.),	Blood sugar regulation, cholesterol management, supports digestion, improves skin health, potent anti-inflammatory and antioxidant	Vitamins, minerals, antioxidants, flavonoids, isothiocyanates[18]
Guduchi (Tinospora cordifolia)	Potent immune booster, immunomodulator and anti-inflammatory	Gilion, Tinosporaside, alkaloids(berberine), Tinosporic acid, flavonoid (Tinosporon, Quercetin)[11]

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